ENVIRONMENTAL IMPACT ANALYSIS

SECTION 4

4.0 ENVIRONMENTAL IMPACT ANALYSIS

The environmental consequence of constructing and operating the Terminal Expansion and Elba Express Pipeline facilities would vary in duration and significance. Four levels of impact duration were considered: temporary, short term, long term, and permanent. Temporary impact generally occurs during construction with the resource returning to preconstruction condition almost immediately afterward. Short term impact could continue for up to 3 years following construction. Impact was considered long term if the resource would require more than 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the Project, such as the construction of Terminal Expansion facilities. We considered an impact to be significant if it would result in a substantial beneficial or adverse change in the physical environment and the relationship of people with the environment.

In this section, we discuss the affected environment, general construction and operational impact, and proposed mitigation for each resource. Southern LNG, EEC, and Southern, as part of their proposals, agreed to implement certain measures to reduce impact. We evaluated their proposed mitigation to determine whether additional measures are necessary to reduce impact. These additional measures appear as bulleted, boldfaced paragraphs in the text. We will recommend that these measures be included as specific conditions to authorizations that the Commission may issue to Southern LNG, EEC, and Southern. Conclusions in this EIS are based on our analysis of the environmental impact and the following assumptions:

- Southern LNG, EEC, and Southern would comply with all applicable laws and regulations;
- the proposed facilities would be constructed as described in section 2.0 of this document; and
- Southern LNG, EEC, and Southern would implement the mitigation measures included in the application and supplemental filings to the FERC, including those submitted in its comments on the EIS.

4.1 GEOLOGIC RESOURCES

4.1.1 Geologic Setting

Terminal Expansion

The Terminal is located in the Coastal Plain Province. This region contains a thick sequence of unconsolidated and semi-consolidated alluvium consisting of interlayered sands, sandy clay, gravelly sands, marine clays, and quartz sands.

The topography of the Elba Island is a gentle 0 to 5 percent slope with elevations ranging from 0 to 11.5 feet above sea-level.

Dredge spoil was placed hydraulically on Elba Island more than 30 years ago during maintenance of the Savannah Harbor Channel and typically ranges from 0 to 4 feet in thickness.

As a result, the topography of the island has been altered. Identified surficial materials present during a geotechnical investigation completed to support the Terminal Expansion facilities are provided in table 4.1-1 below.

TABLE 4.1-1

Surficial Material Present at Elba Island Terminal Expansion Site

Surficial Material	Elevation (ft MLW)	Description
Fill	0 to -7.5	Hydraulic fill composed of a clay, silt, and sand; hard crust at ground surface; thickness is variable. Recent dredge spoil.
Soft Clay	-7.5 to -26.5	Alluvial clay with discontinuous sand lens and an organic content of 10 to 35%; very soft to firm consistency with increasing depth. A Pleistocene (0.1 to 1.8 mya) deposit.
Sand	-26.5 to -47.5	Poorly graded, fine to medium sand, medium dense, to dense. Variable thickness of 5 to 31 feet. Believed to be an early Pleistocene to late Miocene (5.3 to 11.2 mya) depositional feature.
Very Stiff Sandy Clay	-47.5 to -95	Olive green sand and clay deposits, with silts, clays, and fine sands. Known locally as the Marl Formation. Reported as a competent bearing stratum for pile foundations. Miocene (5.3 to 23.8 mya) deposit.
Very Dense Clayey Sand	-95 to -105	Very dense. Miocene deposit.
Very Dense Silty Sand	-105 to -140	Very dense. Miocene deposit.

(WPC, 2006a)

The shoreline on the northeast side of Elba Island, along the Savannah River main stem, is almost completely armored with granite riprap to prevent erosion. The shoreline on the southwest side of the island, along the South Channel, is shallow, sheltered, not exposed to large vessel wakes, and has limited scour potential from swift currents, which occur in the Savannah River main stem. As a result, the South Channel side of Elba Island is stable and almost free of rip-rap (Applied Technology & Management, Inc. [ATM], 2006).

Bedrock is located at a significant depth below ground surface, where limestone is present (WPC, 2006a). Based on the proposed design of the Terminal Expansion facilities, the blasting of bedrock would not be required.

Geotechnical investigations conducted by Southern LNG indicate that the subsurface sediments underlying the site of the proposed Terminal Expansion site consist of about 4 feet of dredged and man-made fill. Below this are a 34-foot-deep soft clay layer, followed by layers of sand, very stiff sandy clay, very dense clayey sand, and very dense silty sand, to a depth of -140 feet MLW (WPC, 2006a).

Elba Express Pipeline

The proposed pipeline route begins in the extensive Coastal Plain Province trending to the northwest toward the Fall Line, which is the physiographic and geologic boundary contact between the younger sediments of the Coastal Plain and the older crystalline rocks of the Piedmont Physiographic Province. The Fall Line roughly follows a straight line extending between the cities of Columbus, GA and Augusta, GA. Notable conditions are stream characteristics, more rapids and shoals near this geologic contact, compared to the wider,

meandering floodplains of the Coastal Plain (UG-CVIG, 2006). The relief of the pipeline route ranges from 25 feet to approximately 1,000 feet with gentle to moderate slopes, each increasing as the pipeline trends to the northwest (UG-CVIG, 2006).

The thick sequence of alluvium in the Coastal Plain Province contains areas of semi-consolidated alluvium as the pipeline approaches the Fall Line and the Piedmont Province, where crystalline rock is locally present closer to the surface. In the Piedmont, a complex mix of igneous and metamorphic bedrock is covered by nearly continuous layer of unconsolidated material called regolith (UG-CVIG, 2006).

Along a majority of the pipeline route, subsurface construction can be completed with conventional excavation equipment. However, in areas of shallow bedrock likely to be encountered in the Piedmont, there is a potential need for bedrock blasting. EEC is in the process of completing a geotechnical investigation to determine the need for blasting along the pipeline route.

EEC has prepared a Blasting Specification Plan to support blasting activities. **We recommend that prior to the commencement of blasting, EEC file with the Secretary of the Commission (Secretary) a revised Blasting Specification Plan that includes:**

a. the locations (by MP) where bedrock blasting would be required;
b. any applicable state blasting regulations; and
c. a pre-blast survey assessment of structures, wells, and utilities within 150 feet of the proposed construction ROW.

In the event property owners identify any damage or change to the properties, or if excessive peak particle velocities have been recorded during the blasting operations, EEC shall complete follow-up surveys of the potentially impacted property.

4.1.2 Mineral Resources

Terminal Expansion

No mineral resources that are currently or potentially exploitable have been identified at the Terminal site (USGS, 2004; WPC, 2006a).

Elba Express Pipeline

Mineral resources along the pipeline route include crushed stone, sand, gravel, dimensional granite, and kaolin. Currently or potentially exploitable mineral resources are primarily limited to the Fall Line and the Piedmont areas of the pipeline route. Mining appears to be limited to surface mining (GMA, 2006; USGS, 2004).

In Elbert County, Georgia, the proposed pipeline passes within 2,500 feet of six mining operations. However, the proposed pipeline would not impact any current or potential mining activities.

4.1.3 Geologic Hazards

Seismicity and Faulting

Georgia and South Carolina are located in an area with potential for intraplate earthquakes to occur. Many are relatively minor, however, strong earthquakes, such as the 1886 magnitude 7.0 earthquake centered in Charleston, South Carolina can occur in the Southeastern U.S. (UGA, 2006b; WPC, 2006b).

The U.S. Geological Survey (USGS) produces Hazard Maps for the United States with probabilistic peak ground acceleration values represented as a factor of "g". The factor "g" is equal to the force on an object at the surface relative to gravity. The scale runs from 0-2 percent g (lowest hazard) to 350 percent g (highest hazard). Engineers and designers utilize these probabilistic ground motion values, representing hard rock beneath site soils, when designing earthquake resistant structures.

Terminal Expansion

The Terminal Expansion site is located in Seismic Zone 2A of the Uniform Building Code and requires completion of a seismic hazard study. USGS Seismic Hazard Maps for the Terminal indicate a 10 percent probability of a 5.72 percent g exceedance in 50 years, and a 2 percent probability of a 19.66 percent g exceedance in 50 years (USGS, 2002a).

Southern LNG conducted a site-specific field exploration study to further assess the geotechnical characteristics of the underlying sediments for foundation design and information needed to accurately assess seismic risks at the Terminal. The evaluation included probabilistic seismic hazard analysis that incorporated the potential contribution to the hazard from both regional and distant earthquake sources. The results of this study indicate the relative seismic risk is low for the Terminal site, and that structures can be designed to survive the site-specific design criteria (WPC, 2006a; WPC, 2006b). The site-specific design criteria are contained in the September 15, 2006 Geotechnical Engineering Investigation Report, prepared by WPC on Southern LNG's behalf.

Critical components (Seismic Category I) of the proposed project would be designed in accordance with the Seismic Design Requirements of National Fire Protection Association Standard (NFPA) 59A-2001, and the guidance set forth in FERC Staff's Draft Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities (2007).

Non-critical facilities or structures would be designed in accordance with the seismic design criteria in American Society of Civil Engineers (ASCE) Standard, ASCE 7-98, *Minimum Design Loads for Buildings and Other Structures*.

FERC staff has sought additional information and clarification of certain details regarding the seismic design criteria through its June 13, 2007 Environmental Data Request. Southern LNG has responded stating that several pieces of information would be provided "by middle to end of

July, 2007." Because the outstanding information has not yet been filed, we recommend that **prior to construction, Southern LNG file, for review and approval by the Director of OEP, the seismic design and geotechnical information requested in Questions 13, 14, 16, 17, 18, and 19, of staff's June 13, 2007 Environmental Data Request. The filing should also include the list of Seismic Category assigned to each structure, component, and system constructed as part of the Elba III facility expansion.**

Elba Express Pipeline

The pipeline route also was reviewed on the USGS Seismic Hazard Maps for "percent g" values and the probability of exceedance in a 50-year period. For pipeline route there is a 10 percent probability of a 5-6 percent g exceedance in 50 years, and a 2 percent probability of a 16-20 percent g exceedance in 50 years (USGS, 2002b). Therefore, the potential seismic hazard to the pipeline facilities is considered low.

Soil Liquefaction

Soil liquefaction is a process whereby the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. The result is a transformation of soil to a liquid state. Typically, three general factors are necessary for liquefaction to occur and can be used as a liquefaction hazard screening. They are (USGS, 2006):

- **Young** (Pleistocene) sands and silts with very low or no clay, naturally deposited (beach, river deposits, wind blown deposits), or man-made land (hydraulic fill, backfill).
- **Soils must be saturated.** The space between individual particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. This is most commonly observed near bodies of water such as rivers, lakes, bays, oceans, and wetlands.
- **Severe shaking.** This is most commonly caused by a large earthquake. Prior to an earthquake, the water pressure is relatively low. However, earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. This factor is limited by the distance from the earthquake's epicenter. That is, liquefaction potential decreases as distance from the epicenter of an earthquake increases.

Terminal Expansion

Southern LNG conducted a site-specific hazard analysis for liquefaction potential for the Terminal Expansion facilities. Ground motion values obtained from the Seismic Hazard Study completed for the Terminal Expansion site and the geotechnical data (standard penetration tests, cone penetration tests, and shear wave velocity measurements) gathered during the site investigation were used for the analysis. Analysis of the results indicates localized zones within the sand layer located 30 to 50 feet below ground surface have the potential for liquefaction at a 5,000 year safe shutdown earthquake and no potential during an operating basis earthquake (WPC, 2006a).

A liquefaction impact analysis was subsequently completed for the sand layer and an unacceptable level of deformation and stability concern was not identified (WPC, 2006a).

Based on the site-specific liquefaction impact analysis, age of the locally potentially liquefiable sands, seismic setting, and prove-out design mitigation measures, we believe the risk of a liquefaction event impacting the Terminal Expansion facilities is low.

Elba Express Pipeline

Areas along the proposed pipeline contain saturated, non-cohesive soils of Pleistocene age, and there is a 10 percent probability of a 5-6 percent g seismic event exceedance in 50 years (USGS, 2002b). This is considered a relatively low seismic hazard area, and below the 10 percent g threshold criteria commonly used for liquefaction hazard screening purposes. As a result, the potential for a liquefaction event at the pipeline facilities is considered low.

Subsidence

Ground subsidence in the southeastern United States is typically associated with natural geologic processes, compaction, and solution; and, man-made processes such as subsurface mining and removal of groundwater from aquifer systems.

Terminal Expansion

Factors resulting in regional subsidence are not present on Elba Island. Minor subsidence associated with the placement of dredge spoils was noted (WPC, 2006a) and historically, the Savannah area was known for minor subsidence due to groundwater withdrawals. Georgia has a program in-place to actively control groundwater withdrawals in the underlying aquifer systems. Accordingly, regional subsidence is not likely a geologic hazard for the Terminal Expansion facilities. However, significant local subsidence has occurred at the site as evidenced by the elevations of certain on-site foundations originally constructed at grade. Since all major components of the facility are supported on pile foundations the localized subsidence has not been a significant safety concern.

Southern LNG's analysis of existing subsurface soil conditions indicates that the soft sediments located beneath the proposed LNG tanks is highly compressible, has low undrained strength, and would not be capable of supporting the tanks using shallow foundation systems. Therefore, to support the tanks and prevent localized settlement, Southern LNG proposes for each tank foundation to drive up to 1,941 steel or pre-stressed concrete piles into the sediment to a depth of about 74 feet, and for all building foundations, equipment, and pipe racks to a depth of about 45 feet. This would minimize the potential for settlement of the facilities due to the presence of soft natural and fill soils found at the site, typically 26 to 56 feet below the ground surface.

Elba Express Pipeline

Areas prone to natural subsidence processes were not identified along the pipeline route (AMEC, 2001; UG-CVIG, 2006; USGS, 1990). Georgia and South Carolina have programs in-place to

actively control groundwater withdrawals in the underlying aquifer systems. No subsurface mining was identified along the proposed pipeline route (GMA, 2006; USGS, 2004). The potential for known geologic and man-made conditions contributing to subsidence along the pipeline route were not identified at levels that may be considered an engineering concern for the pipeline. As a result, the potential subsidence hazard to the pipeline is considered low.

Flooding/Storm Damage

A flood is a high stream or river level that overflows the natural or man-made bank. A 100-year flood is a statistical average of historic flooding events on a stream or river. A 100-year flood does not occur on average every 100 years. Rather, it is the probability that a big flood would occur in a given year. A 100-year flood can occur in successive years. Many streams and rivers have enough historical data that scientists can provide a flood elevation for a given location. This helps with the planning and construction of infrastructure and buildings.

Another type of flood is a flash flood. A flash flood can develop quickly without any signs of rain. A severe, slow moving thunderstorm can provide heavy, localized rain contributing to this effect. A flash flood can carry large volumes of water and debris such as rocks and mud.

Storm surge is a coastal phenomenon associated with low pressure weather systems, typically intense hurricanes and winter storms. The surge of ocean water in-land above the high tide mark is a result of high winds pushing on the ocean surface causing the water to "pile up" higher than ordinary sea-level. Low pressure at the center of the storm contributes to this effect, as does bathymetry (*i.e.*, narrow bays, gentle seaward slopes). The storm surge effect is enhanced if it occurs at the time of high tide (USAFR, 2006).

Terminal Expansion

The Terminal Expansion site is subject to flooding from hurricanes, tropical storms, and other weather systems. Downstream flooding from the Savannah River and ocean storm surge are possible at Elba Island. The Terminal Expansion site has not been struck by a Category 3-5 hurricane in the past century; however, a severe hurricane and an associated storm surge is possible (CEMA, 2006).

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the Terminal location indicates Elba Island is within the 100-year flood zone, with a coastal flood hazard (including storm surge) and velocity hazard with wave action. The base flood elevation, still water and wave action, is 18 feet National Geodetic Vertical Datum (NGVD) of 1929.

ATM completed a site specific storm surge analysis to address storm surge levels during various return periods. The study evaluated mean and high tide events. Additionally, a wind wave analysis was completed for the site to determine the potential extreme wave heights under tropical storm conditions.

During a 100-year flood event with wave action, the shoreline would flood to 3.3 feet above existing grade. Over-land flood water is estimated at 2.6 feet (ATM, 2006).

Outside of the MSE walls for the new LNG storage tanks, waves would break at the MSE wall and run up the slope (wave runup). ATM used modeling software to estimate the maximum wave runup, calculated at 7 vertical feet, which is equivalent to an elevation of 21.3 feet NGVD. The perimeter MSE walls are proposed at 26 feet NGVD, which are not anticipated to be overtopped during a 100-year flood event. Waves breaking on the perimeter MSE walls would cause minor, repairable, erosion (ATM, 2006).

Because hurricane storm surge and wave action could potentially cause damage to the stone armored shoreline at the recessed berth, Southern LNG would armor this area with vertical sheetpile to prevent significant erosion.

Our analysis indicates that issues of concern and potential hazards associated with surficial fill, soft sediments, and soil liquefaction underlying areas that would be developed by Southern LNG for the Terminal Expansion facilities would be adequately addressed with its engineering design and our recommendations. Additionally, due to the relatively shallow construction depth of the pipeline, we conclude that the pipeline also would not have an affect on deep sediment loading or stability.

Localized Scour and Shoreline Erosion

Terminal Expansion

Proposed modifications in the recessed berthing slip include dredging of approximately 72,000 cubic yards of sediment, installation of 900 linear feet of vertical sheetpiling, and installation of four mooring piles. The recessed berthing slip currently experiences relatively low currents and sediment deposition (ATM, 2006). Southern LNG's proposed expansion of this slip would create a slight increase in sediment dredging maintenance. No modifications are proposed outside of the protected, recessed berthing slip. No impacts to wave and current patterns in the Savannah River are anticipated and any potential shoreline erosion from increase vessel traffic would be negligible.

Waterway for LNG Marine Traffic

During normal operation, the increase in vessel traffic due to the terminal expansion would have no significant adverse impact on geologic resources within the Zones of Concern (described in section 4.12.4.3). LNG marine traffic, including LNG vessels and associated escort vessels, would be far from shore from the majority of the route and operating at speeds of 9-11 knots. Because vessel traffic would be operating at low speeds, wakes would not significantly increase the potential for shoreline erosion along the transit waterway. Impacts associated with shoreline erosion are further addressed in section 4.3.3. Because LNG is less dense than water and would vaporize upon contact with water and air, there would be no significant adverse impacts to geologic resources along the transit route from intentional or accidental, ignited or unignited LNG spills.

4.1.4 Paleontology

Construction of the proposed facilities would primarily disturb Holocene deposits, which typically do not contain Paleozoic age fossils. The dredged material making up much of the structure of Elba Island is known to contain fossil fragments. However these fossils are of little value for providing significant new paleontological data. Any significant fossil finds encountered during construction would be reported to the GDNR in order to solicit suggestions for proper recovery and/or preservation. If paleontological resources are discovered during construction on land owned by or managed by the USACE, the local USACE land manager would be contacted in order to solicit mitigation measures recommended to ensure protection of such resources.

4.2 SOILS

Soils characteristics that can affect construction or increase the potential for soil impacts include: drainage class, hydric soils, presence of shallow bedrock or coarse fragments, compaction potential, erosion potential, revegetation potential, prime farmland and soil contamination.

4.2.1 Soil Limitations

We evaluated the potential soil impacts associated with construction and operation of the proposed Terminal Expansion facilities, including the waterway for marine traffic to the terminal, and Elba Express Pipeline facilities.

Terminal Expansion

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) has identified soils on Elba Island as made land (Mae) and tidal marsh, salty (Tml). Most areas where made land soils occur are formerly marshland, where dredged materials were deposited. Dredged materials are a byproduct of dredging activities in coastal streams along the Savannah River shipping channel and harbor. Made land soils consist of course sands to clays, sometimes with stratified layers of varying thickness (USDA, 1974). All of the soils to be impacted by the Terminal Expansion facilities, including the expansion of the existing slip, would be made land soils.

Tidal marsh, salty soil types are tidally influenced and occupied by salt-tolerant vegetation found primarily along Elba Island's coast. Surface layers of this soil type contain many pithy, fibrous roots with high organic matter content. Soil series associated with this soil type are Capers, Kershaw, and Osier. These soil series are highly variable, but the Capers series most likely represents the soils within the tidal marsh areas of Elba Island. Generally, this series is very poorly drained and is dominated by salt-tolerant grasses. No tidal marsh areas would be impacted by the Terminal Expansion Project.

Elba Express Pipeline

The soils crossed by the pipeline and associated aboveground facilities were analyzed using the State Soil Geographic (STATSGO) database. The STATSGO database was developed by the NRCS for use in regional, river basin, state, multi-state, and multi-county resource planning. STATSGO spatial data are compiled by combining geologically and topographically related soils series found in county soil surveys into larger units called Map Unit Identifiers (MUIDs). The STATSGO database provides information on soil characteristics that may be used to estimate the vulnerability of specific soils to development impacts.

Table 4.2.1-1 provides a summary of the soil limitations that could be encountered by the proposed Elba Express Pipeline route, while table 4.2.1-2 provides a summary of the soil limitations associated with the proposed aboveground facilities.

TABLE 4.2.1-1

Summary of Soils Limitations – Elba Express Pipeline a/

County	Shallow Depth to Bedrock or Coarse Fragments	High Compaction Potential	High Erosion Potential	Poor Revegetation Potential	Prime Farmland Soil
Chatham (4.7 miles)	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	0.08 miles 1.33 acres
Effingham (27.1 miles)	0 miles 0 acres	0.69 miles 10.45 acres	0 miles 0 acres	0.73 miles 11.06 acres	2.48 miles 37.58 acres
Screven (25.7 miles)	0 miles 0 acres	0 miles 0 acres	0.03 miles 0.45 acres	15.45 miles 234.09 acres	15.86 miles 240.30 acres
Jenkins (13.3 miles)	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	5.89 miles 89.24 acres	4.37 miles 66.21 acres
Burke (23.0 miles)	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	15.03 miles 227.73 acres	16.65 miles 252.37 acres
Jefferson (13.9 miles)	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	7.65 miles 115.91 acres	9.19 miles 139.24 acres
Glascock (4.9 miles)	0 miles 0 acres	0 miles 0 acres	0 miles 0 acres	3.53 miles 53.48 miles	4.02 miles 60.91 acres
Warren (7.4 miles)	0.05 miles 0.67 acres	0 miles 0 acres	1.06 miles 14.52 acres	4.21 miles 59.50 acres	2.46 miles 34.85 acres
McDuffie (15.0 miles)	0.28 miles 3.73 acres	0 miles 0 acres	5.11 miles 68.13 acres	2.25 miles 30.00 acres	3.81 miles 50.80 acres
Wilkes (26.1 miles)	0.15 miles 2.00 acres	0 miles 0 acres	7.53 miles 100.40 acres	0.21 miles 2.80 acres	8.19 miles 109.20 acres
Elbert (21.3 miles)	1.06 miles 14.13 acres	0 miles 0 acres	4.26 miles 56.80 acres	1.36 miles 18.13 acres	4.00 miles 53.33 acres
Hart (5.6 miles)	0.76 miles 10.13 acres	0 miles 0 acres	2.09 miles 27.87 acres	0.08 miles 1.07 acres	0.77 miles 10.27 acres
Anderson (0.7 miles)	0.04 miles 0.53 acres	0 miles 0 acres	0.39 miles 5.20 acres	0 miles 0 acres	0.10 miles 1.33 acres
Overall Project Total	2.34 miles 31.20 acres	0.69 miles 10.45 acres	20.47 miles 273.37 acres	56.39 miles 843.01 acres	71.98 miles 1,057.52 acres

TABLE 4.2.1-1

Summary of Soils Limitations – Elba Express Pipeline a/

County	Shallow Depth to Bedrock or Coarse Fragments	High Compaction Potential	High Erosion Potential	Poor Revegetation Potential	Prime Farmland Soil
(187.9 miles)					

a/ Data based on 125 foot ROW from MP 0.0-114.8 and 110 foot ROW from MP 114.8 to about MP 187.9.

TABLE 4.2.1-2

Summary of Soils Limitations – Elba Express Aboveground Facilities

Proposed Facility	Soil Mapping Unit	Drainage Class	Hydric Soil	Shallow Depth to Bedrock or Coarse Fragments	High Compaction Potential	High Erosion Potential	Poor Revegetation Potential	Prime Farmland Soil
Elba Compressor Station	GA054	Well	No	No	No	Yes	Yes	No
Port Wentworth Meter Station	GA073	Poorly	Yes	No	No	Yes	No	No
McIntosh Meter Station and EEC/Cypress Meter Station	GA068	Poorly	Yes	No	No	Yes	No	No
Effingham Meter Station	GA068	Poorly	Yes	No	No	Yes	No	No
Wrens Meter Station	GA046	Well	No	No	No	Yes	Yes	Yes
Transco Zone 4 Meter Station	GA026	Well	No	Yes	No	Yes	No	No
Transco Mixing Station	SA006	Well	No	Yes	No	Yes	No	No
Plant Rainey Meter Station	SA006	Well	No	Yes	No	Yes	No	No
Transco Zone 5 Meter Station	SA006	Well	No	Yes	No	Yes	No	No

4.2.3 Erosion Control Plans

Terminal Expansion

Southern LNG would adopt FERC's Plan during the construction and operation of the proposed Terminal Expansion facilities. Southern LNG's Plan includes provisions for erosion control, revegetation and managing of saturated soils. We believe that adherence to its Plan would minimize erosion during construction and operation.

Elba Express Pipeline

EEC would comply with their project-specific Upland Erosion Control, Revegetation, and Maintenance Plan during the construction and operation of the proposed Elba Express Pipeline facilities. EEC's Plan includes provisions for erosion control, revegetation, and special construction techniques for saturated soils and agricultural areas. We have evaluated the EEC Plan and believe adherence to their plan would minimize erosion during construction and operation.

4.2.3 Soil Resources

Prime Farmland Soils

Prime farmland is defined as "land that is best suited to food, feed, fiber and oilseed crops" (USDA, 2005). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (*e.g.*, artificial drainage).

Terminal Expansion

Prime farmland soils are not located on the proposed Terminal Expansion site; therefore, no impacts to prime farmland soils would result from the proposed expansion.

Elba Express Pipeline

The pipeline would impact approximately 1,057.52 acres of prime farmland soils, which comprises 38 percent of the total route. The Effingham Meter Station at MP 10.3 would disturb approximately 3.03 acres of prime farmland soils during construction and 0.89 acre would be permanently occupied by the station during operation. EEC would minimize impacts on prime farmland by constructing the pipeline in accordance with the EEC Plan (see appendix E). These mitigation measures would include restoration of agricultural drainage systems, topsoil segregation, decompaction, and removal of rocks greater than four inches in diameter from the soil surface. We believe EEC's implementation of their Plan during construction and operation would minimize potential impacts on prime farmland soils and restore the areas to preconstruction conditions.

Hydric Soils

Hydric soils are prone to compaction and rutting due to extended periods of saturation and high clay content. If construction of the pipeline occurs when these soils are saturated, compaction and rutting could occur. Furthermore, high groundwater levels that accompany hydric soils could create a buoyancy hazard for the pipeline. Special construction techniques such as

concrete coating and other weighting methods would be used to overcome buoyancy hazards during operation of the pipeline.

Terminal Expansion

Elba Island does contain hydric soils; however, none would be impacted by the Terminal Expansion facilities.

Elba Express Pipeline

The pipeline would cross hydric soils. Hydric soils are prone to compaction and rutting due to extended periods of saturation and high clay content. If construction of the pipeline occurs when these soils are saturated, compaction and rutting could occur. Furthermore, high groundwater levels that accompany hydric soils could create a buoyancy hazard for the pipeline. Special construction techniques such as concrete coating and other weighting methods would be used to overcome buoyancy hazards during operation of the pipeline. During construction of the proposed pipeline, EEC would comply with its Procedures, which include provisions for wetland crossings and special construction techniques in areas of saturated soils. We believe that EEC's implementation of their Procedures during construction would minimize impacts to hydric soils.

Compaction Potential

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of the soil. The degree of compaction is dependent on moisture content and soil texture. Fine textured soils with poor internal drainage and high shrink-swell potential are the most susceptible to compaction. Construction equipment traveling over wet soils could disrupt soil structure, reduce pore space, increase runoff potential, and cause rutting. Compaction and rutting impacts would be more likely to occur when soils are moist or saturated.

Terminal Expansion

Based on the historic dredge and fill operations used to create most of the site, the soils at the Terminal site are considered to be compacted. During most dredge and fill operations, fill material is excavated, placed onto the land surface, and then compacted using heavy machinery. These operations result in moderately to highly compacted soils intended to facilitate construction at the elevated land surface. Some soils within the LNG terminal site footprint of the project facilities would be compacted permanently to form foundations for the project facilities.

Elba Express Pipeline

Due to the presence of sandy clay loam, or finer soils, with poor drainage characteristics along the pipeline, several areas have the potential to experience some level of soil compaction. The pipeline would impact approximately 10.45 acres of soil that may be susceptible to soil compaction. EEC would minimize unavoidable soil compaction and rutting by adhering to measures in their Plan, which includes testing topsoil and subsoil for compaction at regular

intervals in agricultural areas. After construction, any severely compacted agricultural areas would be tilled with a paraplow or other deep tillage tool, or planting and plowing-in a green manure crop may be used to improve soil bulk density. With implementation of the compaction minimization measures contained in EEC's Plan, we believe that impacts due to soil compaction would be minimized.

Erosion

Erosion is a continuing natural process that can be accelerated by human disturbance. Factors that influence the degree of erosion include soil texture, structure, length and percent of the slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to water erosion are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles. Clearing, grading, and equipment movement could accelerate the erosion process and, without adequate protection, result in discharge of sediment into waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair vegetation.

Terminal Expansion

Because the existing Terminal site is essentially flat and currently a combination of maintained grassy areas and graveled or asphalted areas, the potential for erosion of soils and discharge of sediments off the site would be relatively low during construction. We believe Southern LNG's implementation of the FERC Plan during construction and restoration would avoid or minimize erosion.

Elba Express Pipeline

The pipeline would disturb approximately 273.37 acres of soil susceptible to erosion. For the pipeline, EEC would utilize erosion control methods such as slope breakers, sediment barriers such as silt fencing and hay bales, mulch, erosion control fabric, and revegetate within 20 days of backfilling the trench in accordance with the EEC Plan. We believe that implementation of these measures during construction and restoration would minimize overall soil erosion.

Revegetation

Successful restoration and revegetation in areas that are not permanently developed is important to maintain ecosystem productivity and to protect the underlying soils from potential damage, such as erosion.

Terminal Expansion

Southern LNG would implement the requirements of the FERC Plan for revegetation of disturbed areas following construction, including seeding disturbed areas with native vegetation as recommended by soil conservation authorities and monitoring disturbed areas for up to three years to ensure successful revegetation. We believe that if upland revegetation is conducted in

accordance with these measures, areas disturbed by construction would be successfully revegetated to preconstruction conditions.

Elba Express Pipeline

The pipeline would cross approximately 843.01 acres of soil with low revegetation potential. Table 4.2.1-1 identifies areas along the pipeline route where revegetation potential may be low due to soils with coarse surface textures and high drainage capacity. EEC would revegetate the non-cultivated portions of the construction areas in accordance with the mitigation measures in the EEC Plan and any specific landowner requests. In addition, EEC would use seed mix and fertilizer/lime applications described in EEC's Plan in conjunction with NRCS critical area planting standards for Georgia and South Carolina. We believe that if upland revegetation is conducted in accordance with these measures, areas disturbed by construction would be successfully revegetated to preconstruction conditions.

Soil Contamination

Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The contamination effects would typically be minor because of the low frequency and volumes of spills and leaks. Southern LNG and EEC have developed a joint project-wide Spill Plan (see appendix D). This plan identifies cleanup procedures to be implemented in the event of soil contamination from spills or leaks of fuel, lubricants, coolants, or solvents. We have evaluated this plan and believe that the implementation of the project-wide Spill Plan would avoid or minimize soil contamination during construction and operation of the Project.

Terminal Expansion

The existing Terminal site has been in operation for more than 25 years and has been subject to frequent internal environmental audits. A soil chemistry evaluation was conducted on the Terminal site in 2002 (ATM, 2002). This study indicated the material that was sampled had concentrations of elevated metals and organics consistent with the dredge material that underlies the Terminal. The COE Savannah District, Planning Division, Environmental Branch reviewed the 2002 study report and found no contaminant related issues with regard to the dredged material for the marine slip or sediments proposed to be dredged and placed in the Elba Island CDF.

The proposed excavation of 72,000 cubic yards of sediment to modify the marine slip involves material in the same area and disposal in the same CDF, as approved in 2002. Dredging of the existing berthing slip and turning basin would result in impacts similar to current COE activities required to maintain the Savannah Harbor. Dredging would stir up sediment and temporarily degrade the water quality in the immediate area of the berthing slip. Modifications to the existing berthing slip would be completed under the guidelines established by Southern LNG and the COE. The COE indicated that Southern LNG would be able to perform this work by modifying its existing 404/Section 10 permit. Therefore, we conclude that excavation of

sediment in the marine slip would not result in the temporary suspension of contaminated sediment. Water quality is discussed further in section 4.3.3 of this EIS.

Elba Express Pipeline

EEC conducted a regulatory database search to determine if contaminated soils associated with hazardous wastes sites or other solid waste sites occur within 0.25 mile of the pipeline corridor. No landfills, hazardous waste sites, quarries, or mines were identified within 0.25 mile of the proposed pipeline (ESRI, 2006 and EPA, 2006a).

Waterway for LNG Marine Traffic

On the open seas, no significant impact on soil resources would result from either an increase in routine LNG vessel and escort vessel traffic, the use of larger LNG vessels, or a marine spill (either unignited or ignited) of LNG. Nor would a significant impact on soil resources result from an increase in routine operations within the onshore portion of the Savannah River channel (from the eastern shoreline of Tybee Island westward to the Elba Island Terminal). The LNG vessel traffic associated with the Terminal Expansion would travel at speeds of 9 to 11 knots along the Savannah River transit route. Any wave induced shoreline erosion resulting from the increased LNG vessel traffic along the waterway at these slow speeds would be less than significant. Therefore, the following discussion focuses on potential impacts associated with non-routine incidents occurring within the onshore portion of the channel.

Soils within the Zones of Concern (described in section 4.12.4.3) along the Savannah River vessel transit route are consistent with soils present at the Terminal and along the pipeline route. If an unignited marine spill of LNG were to result in a LNG pool that contacted soils along the Savannah River, shore side soils would be temporarily affected by the extremely cold temperatures. These cold temperature effects would be temporary as the LNG would vaporize quickly and disperse in the atmosphere; therefore, no significant impact on shoreline soils would be anticipated. If not ignited, no impacts on soils would be expected outside of Zone 1 from a marine spill of LNG.

If a pool fire were to occur in association with a marine LNG spill, soil surfaces in Zones 1 and 2 could be impacted from radiant heat (see figure 4.12-1). The increased temperatures would briefly raise soil surface temperatures; damage or destroy vegetation exposing soils to increased erosion potential (described in section 4.5.1); and contribute to nutrient loss, a short-term suspension of biological activity, and evaporation of available water from the surface of the soil. No significant or long-term soil impacts would result. The impacts from a LNG marine spill and an associated pool fire within Zone 2 would be expected to be less than those in Zone 1. No impacts would be expected to occur on soils within Zone 3. However, the maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and temporarily impact any soils it came in contact with in the Zones of Concern. Because of the extensive operational experience of LNG shipping, the structural LNG vessel design, and the navigational safety and security controls further described in the section 4.12, the likelihood of

the above marine LNG spill scenarios occurring are extremely remote and therefore are highly unlikely to impact soil resources.

4.3 WATER RESOURCES

4.3.1 Groundwater

Terminal Expansion

Existing Groundwater Resources

The proposed Terminal Expansion site is located in the Atlantic Coastal Plain Physiographic Province and is underlain by the Floridian Aquifer and Southeastern Coastal Plain Aquifer. These aquifers are used extensively for agricultural, commercial, industrial and public/domestic water supplies.

The Floridian Aquifer (Tertiary limestone aquifer) consists of a thick sequence of carbonate rock (limestone and dolomite) of Tertiary age and is the most productive aquifer in the region. The Floridian Aquifer underlies an area of about 100,000 square miles in southern Alabama, southeastern Georgia, southern South Carolina, and all of Florida. Within the proposed Terminal Expansion site, the Floridian Aquifer is thought to be approximately 700 feet thick. It is widely used as a public water supply and supports several large municipalities, including Savannah, Georgia (USGS, 1990). In the vicinity of the Terminal Expansion site, the Floridian Aquifer overlies the Southeastern Coastal Plain Aquifer but the lack of a confining unit between the two aquifers results in a free flow of groundwater in many areas.

The Southeastern Coastal Plain Aquifer underlies an area of approximately 90,000 square miles in the coastal plains of Alabama, Georgia, South Carolina and northern Florida. The proposed Terminal Expansion site is underlain by the Pearl River, Chattahoochee River, and Black Warrior River regional aquifers. The Pearl River Aquifer is predominately a thick sequence of sand with minor sandstone, gravel, and limestone beds extending over coastal Alabama, Georgia, and South Carolina. The Chattahoochee River Aquifer is isolated from the Pearl River Aquifer by the Chattahoochee River confining unit and consists mostly of sand beds with clay lenses and local deposits of glauconitic sand and limestone ranging in age from later Cretaceous to late Paleocene. The Black Warrior River Aquifer is isolated from the Chattahoochee River Aquifer by the Black Warrior River confining unit and consists of Upper Cretaceous sands and clays that extend from North Carolina to southwestern Alabama. The Black Warrior River Aquifer is absent in a wide band adjacent to the inner coastal plain margin of South Carolina and eastern Georgia, including portions of the proposed Terminal Expansion site.

The Terminal Expansion site is also underlain by a shallow, surficial aquifer within the Georgia Coastal Plain which consists mainly of beds of unconsolidated sand, shelly sand, and shell (coquina) materials less than 100 feet thick. These materials are continental and/or marine deposits from the Cretaceous to Holocene ages. Complex layering of free and/or coarse sand, sandy shell, shell, and clay are typical of the system as continental and marine influences fluctuated over time. Groundwater in this surficial aquifer is typically unconfined, but confined

or semi-confined conditions may occur locally due to the presence of impermeable or semi-impermeable clay beds or lenses. Water quality and yield within the shallow aquifer are extremely variable. Water enters the surficial aquifer as precipitation, quickly moving along short flowpaths, and is often discharged quickly as base flow to surface waterbodies. In addition, a large percentage of the water is lost through evapotranspiration from the forests that occupy large portions of the Georgia Coastal Plain. Water that is not lost to evapotranspiration or discharged to surface waterbodies infiltrates to the Floridian Aquifer.

Because recharge to the shallow, surficial aquifer is via local precipitation, water levels tend to fluctuate seasonally. Despite fluctuations in water level, water quality, and yield, this aquifer represents a valuable resource in many areas providing for domestic water supplies (*e.g.*, water used for indoor and outdoor household purposes such as drinking, food preparation, bathing, laundry, and gardening). Local yields, occurring within highly permeable deposits, may exceed 500 gallons per minute (gpm) allowing support of higher demand uses.

The U.S. Environmental Protection Agency (EPA) defines a sole- or principal-source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas can have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. None of the aquifers within the Terminal Expansion site are designated as sole-source aquifers.

Groundwater Construction and Operation Impacts

No significant impacts are expected to occur to groundwater resources from construction and operation of the proposed Terminal Expansion. Potential impacts to groundwater would be avoided or minimized through the use of standard and specialized construction techniques, and implementation of Southern LNG's Plan, Procedures, and the project-wide Spill Plan.

The average depth to groundwater within the Terminal Expansion site is between 70 and 100 feet. Pile driving associated with construction of the mooring dolphins would occur to a depth of 74 feet, potentially intruding into the groundwater table. A potential impact associated with driven pilings is the contamination of aquifer layers through seepage from one layer to another. Keeping the pilings within one layer of the aquifer system and not crossing multiple aquifer layers minimizes the potential for cross-contamination. Because the piles would be confined to one layer of the aquifer system, we feel pile driving impacts, if any, to groundwater would be minimal.

Our February 2003 EA for the Elba Island Expansion Project (Elba II Project) in Docket Nos. CP02-379-000 and CP02-380-000, and the COE's January 23, 2003 Case Document and EA for the Elba II Project, concluded that dredging the berthing slip to 42 feet below MLW for the Elba II Project would not impact the Floridian Aquifer. About 72,000 cubic yards of material would be dredged for the proposed Elba III Project, as opposed to the 3.3 million cubic yards that was dredged for the Elba II Project. The dredging proposed for the Elba III Project would expand the existing berthing slip by removing a sloped area at the toe of slip, but would not increase the depth of the berthing slip as was proposed for the Elba II Project. Therefore, the Terminal

Expansion facilities would not pose any increased impact to the Floridian Aquifer, or other aquifers, underlying the existing terminal site.

Southern LNG would require about 300,000 gallons of fresh water to wash down the interior of each proposed LNG storage tank. The source of the freshwater would either be from the existing water system on Elba Island, or from sources trucked to Elba Island. We believe, if groundwater is used to wash down the interior of the LNG storage tanks, the one time groundwater withdrawals would not lower or otherwise affect the water table.

The greatest potential for impacts on groundwater resources would be an accidental spill, leak, or other releases of hazardous substances. Subsurface conditions at the Terminal Expansion site are characterized by alluvial deposits consisting mostly of stiff, to very stiff clays, and any small accidental spills or leaks or other releases would not present an immediate threat to significant aquifers in the area if recovered in a timely manner.

Southern LNG and EEC have developed a project-wide Spill Plan. The Spill Plan portion addresses actions to be used to prevent spills and specifies actions that would be taken should any spills occur, including emergency notification procedures. On-site EIs would be responsible for ensuring that contractors implement and maintain spill control measures during construction. The Waste Management Plan portion provides information that would be used as a contractor's guidance tool when generating wastes at a construction site and would assist the contractor in developing a waste management plan which would be submitted to Southern LNG before construction. The Container Management Policy portion would be applied to all containers used to accumulate: (1) non-hazardous, non-regulated waste, (2) hazardous waste, (3) hazardous toxic substances, and (4) store products of 1 gallon container size or larger.

Southern LNG's would minimize the potential for adverse effects to occur from a spill or release by implementing the project-wide Spill Plan. It contains provisions to ensure that the unforeseen impacts to groundwater resources are responded to and addressed properly. In addition, Southern LNG would adhere to federal and state water quality standards *(e.g.,* CWA, Sections 401, 402, and 404, and the Safe Drinking Water Act) to ensure that there would be no adverse effects on the quality of groundwater resources. We believe that implementing the measures detailed in the project-wide Spill Plan would minimize or eliminate the potential for adverse impacts on groundwater.

Groundwater withdrawal volumes for the operation and maintenance of the proposed Terminal Expansion facilities would be similar to current volumes and would not add impacts to the water table.

Waterway for LNG Marine Traffic

No significant impacts to groundwater would be expected from the terminal out to the territorial sea from the normal operations associated with an increase in LNG marine traffic and use of larger vessels for the proposed expansion of Elba Island facilities. Further, no significant impacts would be expected to occur to groundwater from an accidental release of LNG or an

associated fire within the Zones of Concern (described in section 4.12.4.3 of this EIS) along the LNG marine transit route.

Public and Private Water Supplies Wells and Springs

Southern LNG operates two potable water wells within the boundaries of the terminal. No public or municipal water supply wells, springs or domestic wells are within 150 feet of the proposed of the Terminal Expansion facilities.

Elba Express Pipeline

Existing Groundwater Resources

The proposed Elba Express Pipeline would cross the Coastal Plain, Blue Ridge, and Piedmont Physiographic Provinces of the southeastern United States and is underlain by a shallow, surficial aquifer, the Upper and Lower Brunswick Aquifers, and the Floridian Aquifer. None of the aquifers in the project area are EPA designated sole-source aquifers (EPA, 2006b).

Within the Coastal Plain Physiographic Province, the shallow, surficial aquifer consists of intermixed layers of unconsolidated clays, silts, and sands that are typically under unconfined or semi-confined layers of silt and clay in coastal areas. Withdrawals from this aquifer are generally used for domestic (*e.g.*, water used for indoor and outdoor household purposes as described above) and livestock supplies in rural area. It ranges in depth from 11 to 72 feet and yields 2 to 25 gpm.

In southeast Georgia, the Upper and Lower Brunswick Aquifers underlie the shallow, surficial aquifer. The Brunswick aquifer system consists of discontinuous lens-shaped bodies of sand, generally 50 to 80 feet thick, comprised of Miocene deposits. These deposits are not a major source of groundwater along the Elba Express Pipeline route but are considered a supplemental supply to the Floridian Aquifer. The Upper and Lower Brunswick Aquifers range in depth from 85 to 390 feet and yields between 10 and 30 gpm.

The Floridian Aquifer (described above), ranges in depth from 40 to 900 feet and yields between 1,000 to 5,000 gpm. The Floridian Aquifer is largely confined throughout the Elba Express Pipeline Project area. The Floridian Aquifer is the most productive aquifer in the region and extends under southern Alabama, southeastern Georgia, southern South Carolina, and all of Florida.

Groundwater Construction and Operation Impacts

Although proposed pipeline construction activities could affect groundwater resources, most potential impacts would be avoided or minimized by the use of standard and specialized construction techniques, and EEC adhering to its project specific Plan, Procedures, and the project-wide Spill Plan. Shallow aquifers could sustain minor impacts from changes in overland water flow and recharge caused by clearing and grading of the proposed ROW. Near-surface soil compaction caused by heavy construction vehicles could reduce the soil's ability to absorb

water, which could increase surface runoff and the potential for ponding. In forested areas, water infiltration normally enhanced by vegetation would be reduced until vegetation is reestablished. These minor impacts would be temporary and would not significantly affect groundwater resources or quality. Upon completion of construction, EEC would restore the ground surface as closely as practicable to original contours, conduct decompaction, if necessary, and revegetate the ROW to ensure restoration of preconstruction overland flow and recharge patterns.

Construction of the proposed pipeline would require trenching to a depth of about 7 feet below the ground surface. In areas where the water table is near the ground surface, trench excavation could intersect the water table, requiring trench dewatering. Trench dewatering may result in localized, minor changes to the water table, as well as to springs and wetland areas. Because pipeline construction at a given location would be completed within a short period of time, potential impacts from dewatering would be temporary and water table elevations would be quickly reestablished. At locations where the trench may be continually flooded and dewatering would not be feasible, the pipe would be floated into place using the push-pull method as described in section 2.6.3.

Blasting would likely be required where bedrock is encountered along the construction ROW. Because no areas of potentially contaminated groundwater have been identified immediately adjacent to the proposed pipeline route, there is little potential for blasting to affect contaminated groundwater migration pathways. Further, because blast charges used would be the minimum required to excavate to a depth of about 7 feet below the ground surface, any impacts to groundwater flow would be minor and localized.

Construction of the pipeline necessitates the use of heavy equipment and associated fuels, lubricants, and other potentially hazardous substances that, if spilled, could affect shallow groundwater and/or unconsolidated aquifers. Potential contamination due to accidental spills or leaks of hazardous materials associated with vehicle fueling, vehicle maintenance, and construction materials storage presents the greatest potential threat to groundwater resources.

To ensure that potential impacts to groundwater resources are prevented and minimized to the extent practicable, and to avoid spills and leaks, Southern LNG and EEC have developed a project-wide Spill Plan and would implement its Procedures which include spill prevention and response guidelines. EEC's preventative measures include instructions for construction personnel on spill prevention, spill response procedures, and spill response materials, plus guidance and protocols for refueling operations and regular inspection of containers and equipment for signs of deterioration. EEC's EIs would be responsible for the approval of proper locations of equipment refueling and lubrication activities. We have reviewed Southern LNG and EEC's project-wide Spill Plan and find that they adequately address the storage and transfer of hazardous materials and the response to be taken in the event of a spill. By following the project-wide Spill Plan, the potential impacts on groundwater due to spills or leaks would be minimized.

Public and Private Water Supplies Wells and Springs

Public and private water supply wells were identified from existing databases and records maintained by respective state and water management districts, and surveys conducted by EEC.

No public water supply wells or wellhead protection areas would be within 150 feet of the construction ROW. Should any previously unidentified wells or wellhead protection areas be identified, EEC has agreed to comply with mitigative measures recommended by the GDNR and Department of Health and/or Environmental Control (DHEC) to monitor and protect those resources. EEC, in consultation with the GDNR, is in the process of determining if the Elba Express Pipeline route would encroach on 1,000-foot buffers that have been established for four wellhead protection areas near the City of Tignall in Wilkes County, Georgia (about 0.5 mile west of MP 153.5).

Sixty-seven private water supply wells have been identified within 150 feet of the construction ROW and workspace (listed in appendix G). EEC states that survey work has not been completed for the entire pipeline route and it will continue to investigate the presence of private wells during the remaining civil surveys. Therefore, there is potential for additional water wells or springs to occur within 150 feet of construction work areas. Based on the ongoing efforts by EEC to identify springs, seeps, and wells near the construction work areas, **we recommend that prior to construction, EEC file with the Secretary the locations by MP of all springs, seeps, and wells identified within 150 feet of its construction ROW.**

In addition to further ensure that water supply wells/systems are adequately protected **we recommend that EEC file a report within 30 days of placing the pipeline facilities in service, identifying all water supply wells/systems damaged by construction and how they were repaired. The report should include a discussion of any complaints concerning the well yield or quality and how each problem was resolved.**

Blasting in proximity to groundwater wells during excavation activities could cause temporary changes in water level and turbidity (Froedge, 1980). EEC would implement its Blasting Specification Plan and Procedures to minimize impacts on groundwater wells within 150 feet of construction work areas. EEC has committed to:

- Monitor all wells within 150 feet of the construction work areas for water quality and flow before, during, and after construction.
- Provide alternative sources of water or otherwise compensate the owner if construction activities temporarily impair well water.
- Compensate the owner for damages or fund installation of a new well if permanent well damage is caused by construction.

4.3.2 Floodplains

According to the FEMA Flood Insurance Rate Maps (FEMA, 1987), the Terminal Expansion site falls within Zone VE, a 100-year flood hazard zone susceptible to coastal flooding. The 100-year flood elevation for Elba Island is 18 feet above the NGVD of 1929. The Terminal

Expansion facilities would be designed to withstand storm forces so that factors such as flooding, water damage, and land erosion would have minimal affects on the operation and safety of the facilities. Southern LNG has incorporated certain design elements into its facilities to address potential flooding and storm damage at the terminal site (see sections 2.6.1 and 4.1.3).

See section 4.12.2 for additional information regarding safety from hurricane events.

No aboveground facilities for the proposed Elba Express Pipeline are within a 100-year floodplain.

4.3.3 Surface Water

Terminal Expansion

A number of artificial, intermittent drainage ditches occur on the site and are part of the existing stormwater management system which discharges water into the Main and South Channels of the Savannah River. The Terminal Expansion facilities would use the existing stormwater management system to collect drainage from the new facilities.

Elba Island is within Savannah Harbor, approximately 5 miles east of the City of Savannah, Georgia, and 8.5 miles upstream from the mouth of the Savannah River. The Savannah River, the major water feature adjacent to the site, is located in eastern Georgia. Its headwaters originate in the Blue Ridge province of Georgia, North Carolina, and South Carolina. The river comprises the Georgia and South Carolina border and travels through the Piedmont Province and upper and lower Coastal Plains before reaching the Atlantic Ocean. The Savannah River forms at the confluence of Georgia's Tugaloo River and South Carolina's Seneca River and is approximately 300 miles long. The portion of the Lower Savannah River affected by the proposed Elba III Project (*i.e.*, transit corridor) is a part of a major shipping port and has been the subject of many modifications. The Savannah River has been extensively channelized (approximately 500 feet wide and 42 feet deep) throughout the extent of the Terminal Expansion facilities area. The channel is maintained by the COE. Much of the Lower Savannah River within Chatham County is tidally influenced. During ebb tide, some of the flow from the main Savannah River Channel is diverted down the South Channel, located on the south side of Elba Island. The South Channel has depths ranging from 3 to 14 feet.

Water and sediment quality within the Lower Savannah River, including the transit corridor, have been impacted by point source discharges including municipal waste water treatment plant discharges, industrial wastewater discharges, sewer overflows, land application systems and leachate from landfills. Other sources of pollutants include non-point source contributions from land use activities, and physical habitat alteration. Non-point sources include sediment, fertilizers, animal waste, pesticides, herbicides, septic systems and underground storage tanks.

Although portions of the Savannah River are listed on the Nationwide River Inventory (NRI) by the National Park Service, adjacent to the proposed Terminal Expansion site is not within the NRI-designated reach. The GDNR has designated the Savannah River and South Channel as a "Fishing" use which is defined as being suitable for the propagation of fish, shellfish, game and

other aquatic life; secondary recreation in and on the water; or any other use requiring water of a lower quality. The Savannah River has been designated EFH for several species. See section 4.6.3 and appendix J for a discussion on EFH.

No potable water intakes are located within 3 miles downstream of the proposed Terminal Expansion site. In addition, none of the drainage ditches affected by the proposed Terminal Expansion facilities are considered "sensitive surface waters".

Construction Impacts

On July 26, 2001, the COE issued a permit (Permit No. 200016440) to Southern LNG to deepen an existing deep berthing area that runs parallel to Elba Island and lies in-between Elba Island and the Savannah River Channel and to construct a new turning basin located directly across from Southern LNG's existing terminal facilities, on the northeast side of the Savannah River Channel and bank of the Savannah Harbor in Jasper County, South Carolina. The permit also authorized routine maintenance of the deep berthing area and the turning basin which requires the annual removal of up to approximately 700,000 cubic yards of accumulated sediments.

On January 24, 2003, the COE issued a permit (Permit No. 200200640) to Southern LNG to construct a new berthing slip located immediately west and south of the deep berthing area described above. The new berthing slip consists of a North and South Dock. The permit also authorized routine maintenance of the berthing slip which requires the annual removal of up to approximately 230,000 cubic yards of accumulated sediments.

On July 14, 2006, Southern LNG submitted a permit application to the COE and GDNR requesting authorization to modify the existing berthing slip described in and constructed under Permit No. 200200640. Construction of the proposed Terminal Expansion facilities would require the dredging of approximately 72,000 cubic yards of material to modify the slope at the toe of the existing berthing slip and install a sheet pile bulkhead. In addition, four mooring dolphins would be installed in the existing berthing slip area. In its July 14, 2006 permit application, Southern LNG also requested authorization to conduct routine maintenance of the modified berthing slip which would continue to require the annual removal of approximately 230,000 cubic yards of accumulated sediments, previously authorized under Permit No. 200200640.

Southern LNG indicated that it would attempt to coordinate "project dredging" with the routine maintenance dredging activities authorized under Permit No. 200200640. Southern LNG also indicated that the COE is expected to authorize "project dredging" as a modification to Permit No. 200200640.

We expect that the COE and GDNR will continue to authorize routine maintenance of the both the turning basin and berthing slip which would require the total annual removal of approximately 930,000 cubic yards of accumulated sediments.

The turning basin size requirements may change as a result of the Project. The expectation is that any such change would lead to an overall reduction in its size, and result in less of the basin

being dredged. Southern has modeled the turning basin and submitted this modeling to the Coast Guard for their review and approval.

Dredging of the existing berthing slip and turning basin would result in impacts similar to current COE activities required to maintain the Savannah Harbor. Dredging would stir up sediment and temporarily degrade the water quality of the immediate area surrounding the existing berthing slip. Modifications to the existing berthing slip would be completed under the guidelines established by Southern LNG's Plan and Procedures.

The sediments excavated from the existing berthing slip could contain pollutants from point and non-point sources; however, these sediments would not be different from those sediments dredged during COE maintenance of the Savannah River near Elba Island. The COE indicated that Southern LNG would be able to perform this work by modifying its existing 404/Section 10 permit. The dredged sediments would be piped into one of two upland CDFs owned and operated by Southern LNG on the northwest end of Elba Island (see sections 4.2.3 and 4.5.1).

Land disturbing activities associated with the Terminal Expansion facilities would be confined to a previously disturbed area within the terminal and berthing slip. During site preparation for the expansion facilities, disturbed soils would be exposed to potential erosion. To minimize the impacts of erosion and sedimentation on surface waters, construction activities at the terminal would be conducted in accordance with Southern LNG's Plan and Procedures. Southern LNG would install all necessary erosion and sedimentation control structures and any stormwater would be directed toward existing drainage ditches, filtered, and settled before entering the Savannah River.

Surface water quality could be adversely affected by a spill, leak, or other release of hazardous materials during construction activities. Transport of these hazardous materials into the Savannah River by stormwater runoff would degrade water quality and could impact aquatic organisms. To minimize the potential for a spill or release and to establish procedures for handling a spill or release during construction of the expansion facilities, Southern LNG would implement the project-wide Spill Plan.

Construction of the proposed Terminal Expansion facilities would increase the amount of impervious surfaces at the terminal site, which would increase stormwater runoff volumes. The existing stormwater system would be modified, as necessary, to accommodate the additional runoff from the proposed expansion facilities.

Hydrostatic Testing

Southern LNG would hydrostatically test the Terminal Expansion facilities prior to placing them in service to verify their integrity. These tests consist of pressurizing the facilities with water and checking for pressure losses due to leakage. Hydrostatic testing would be performed in accordance with API Standard 620, Appendix Q.8. API Standard 620 deals with the design and construction of large, welded, field-erected low-pressure carbon steel aboveground storage tanks (including flat-bottom tanks) with a single vertical axis of revolution, and Appendix Q deals with

low-pressure storage tanks for liquefied hydrocarbon gases at temperatures not lower than -270°F (ICH, 2007).

A total of 63,250,000 gallons of water would be required for the hydrostatic testing of the new LNG storage tanks (31,625,000 gallons per tank). Hydrostatic test water would be pumped from the Savannah River and at rate of up to 5,000 gpm. Southern LNG proposes to withdrawal water for the hydrostatic testing of Tank D-5 and D-6 place in January 2010 and July 2012, respectively. Southern LNG would file for a temporary water withdrawal permit with GDNR prior to withdrawing water from the Savannah River.

Pump intakes would be appropriately screened with a 1/2-inch wire-mesh to prevent the entrainment of large particles during hydrostatic test water withdrawal. To prevent the impingement/entrainment of fish species on the screens, screen boxes would be sized such that the velocity of the inflowing water at the screen surface would be significantly less than the typical maximum swimming velocities of adult fish species of concern in the Savannah River (less than 0.5 foot per second). Additionally, Southern LNG has agreed to place intakes at a depth recommended by appropriate agencies to further reduce the possibility of entraining eggs, ichthyoplankton, and fish larvae. However, the potential still exists for fish eggs and larvae to pass through the intake filter and be destroyed during the testing process. Therefore, **we recommend that Southern LNG not conduct hystrostatic test water withdrawals for LNG storage tank testing in estuarine habitats from April 1 through July 31.**

A total of 600,000 gallons (300,000 gallons per tank) of fresh water from the existing water system on Elba Island, or from water trucked to the site, would be used to wash the interior surface of each LNG tank as part of the hydrostatic testing.

Following the completion of the hydrostatic test, test water and wash water would percolate through hay bales and flow into existing drainage ditches before it enters the South Channel of the Savannah River. The discharge rate into the hay bales would be approximately 20,000 gpm for the hydrostatic test water and 100 gpm for wash water. Discharges would be monitored and adjusted to prevent overflow. No chemicals would be added to the hydrostatic test water or wash water before or after testing.

We believe the use of Southern LNG's Plan and Procedures, and the project-wide Spill Plan, and its compliance with National Pollution Discharge Elimination System (NPDES) permits would minimize adverse impacts to water quality.

Operational Impacts

Terminal Expansion

During normal operation of the proposed Terminal Expansion facilities, surface water discharges would include stormwater runoff and condensate from the vaporizers. These discharges would be piped underground to recharge the existing firewater pond and would not be considered a regulated discharge by the GDNR or the Georgia Environmental Protection Division (GEPD).

Southern LNG would follow its existing spill prevention and control procedures for avoiding, or containing and disposal of, spills or releases directly into the Savannah River during offloading of LNG vessels.

Because LNG vessels would be fully loaded with LNG when arriving at Elba Island, there would be no ballast water on board, and vessels would not discharge ballast water while docked at the terminal. However, the LNG vessels would take on ballast while discharging LNG cargo in order to maintain a constant draft at the berth. In addition to water withdrawal for ballast, LNG vessels may also withdraw water for cooling vessels boilers. The volume of water taken on by an off-loading vessel depends on the vessel. Annual ballast uptake estimates would range from 2 billion gallons if all deliveries are made using 125,000 cubic meter vessels (2,045,300,000 gallons) to 0.6 billion gallons if 266,000 cubic meter vessels are utilized (614,400,000 gallons). Because LNG vessels at the berth would continue water withdrawals to support shipboard operations there is a potential to entrain plankton, fish eggs, and larvae. To minimize ballast water uptake, Southern LNG would request through its Port Guidelines that vessels limit ballast quantities loaded whenever possible to that required for safety and navigation. Any intake and/or discharge of ballast would comply with federal regulations and be in accordance with Southern LNG's *Ballast Management Plan*. To further minimize the impact that could result from the increase of 95 vessels per year, **we recommend that Southern LNG work with vessel owners to identify and implement methods that have the potential to reduce water withdrawal volumes while the vessels are berthed. Southern LNG should provide to the Commission an annual report for the first three years, detailing the measures that were successfully implemented for each vessel.**

These "water conservation" measures could result in a percentage reduction in entrainment losses of early lifestages of EFH species as well as planktonic prey that may help offset the increased impacts from the expansion of the project.

Waterway for LNG Marine Traffic

Our discussion of the waterway for LNG marine traffic includes the Elba terminal area of the Savannah River out to the territorial sea in the Atlantic Ocean. Water quality for the Lower Savannah River has been previously discussed in section 4.3.3 of this EIS. The transit corridor through the Atlantic Ocean would consist of similar characteristics as the Lower Savannah River. Water and sediment quality have been impacted by point and non-point source discharges. A dredged channel (46 feet deep at MLW and 600 feet wide) is maintained for about 7.0 miles from the sea buoy to the jetties. No maintenance is required from this point out to the territorial sea. Further, there are similar EFH species within this region of the Atlantic Ocean (discussed in appendix J).

LNG vessel activity at the existing berthing slip and along the transit corridor, including LNG vessels and associated escort vessels, may result in minor resuspension of bottom sediments into the water column resulting in a temporary increase in turbidity within the berthing slip, the Savannah River, and offshore. Resuspension of bottom sediments and resulting increases in turbidity are considered temporary, short-term impacts that are not significant. Use of shallow draft tugs to assist LNG vessels throughout the mooring and departure operations may also result

in some resuspension of bottom sediments and increase turbidity over the short-term until sediments become stabilized. The resuspension of bottom sediments could reduce dissolved oxygen along the waterway and result in sediment burial. An increase in marine traffic could result in the need for additional maintenance dredging within the Savannah River Channel. However, the incremental increase associated with the project would not be expected to increase the need for maintenance dredging. Additionally, increased vessel traffic could result in a minor increase to shoreline erosion caused by vessels wakes or prop wash. However, LNG marine traffic would travel at a slow speed within the Savannah River transit corridor and increased sedimentation due to hull sheer stress or propeller wash would be expected to be consistent with other transiting vessels and would not significantly increase shoreline erosion. Further, the major contributors to shoreline erosion are water level variations, wind-generated waves, and currents. The sedimentation and erosion impacts associated with the proposed LNG marine traffic are consistent with the existing marine traffic in the Savannah River transit corridor, and we have determined that the proposed LNG marine traffic would not significantly increase shoreline erosion or sedimentation along the transit corridor. The minor increase in total vessel traffic (3 percent) would be expected to increase shoreline erosion by less than 0.1 percent, and thus, would not impact the shoreline significantly.

Accidental spills or releases of hazardous materials could also impact the waterway. No oil or mixtures containing more than 15 parts of oil per million may be discharged within 50 miles of the shore (MARPOL 73/78). No solid debris may be discharged from vessels (30 CFR 250.40 and MARPOL, Annex V, Public Law 100-220 [101 Statute 1458]). Therefore, although additional debris may enter the water column incidentally from the increased vessel traffic, the anticipated amount of any additional debris would be small and not significant. Further, the LNG vessels would adhere to the protective measures specified in Southern LNG's offshore SPCC Plan.

LNG marine traffic would intake cooling water for vessels boilers while transiting offshore into the Savannah River. Impacts to water quality from these intakes would include increased water temperature from engine cooling operations. However, the temperature change would be insignificant given the total volume of water within these areas and the limited amount of impact to any one given area.

If an unignited marine LNG spill were to occur along the transit route, given that LNG is lighter than water, the LNG would float on the water until it had vaporized. No significant impacts to water quality would be expected from an unignited release of LNG because LNG is not soluble in water and the cryogenic liquid would vaporize rapidly upon contact with the warm air and water. Within Zone 1 (described within section 4.12.4.3 of this EIS), the water's surface within the LNG pool may be temporarily impacted by sudden lowering of temperature until the LNG had vaporized. Because cold water is more dense than warm water, the colder water would settle to the bottom of the channel and could temporarily impact the benthos in the area beneath the pool of LNG. If an associated fire were to occur with the release of LNG, the water's surface temperature could increase within Zone 1 of the vicinity of the fire. If the radiant heat were to harm the shoreline vegetation, this could result in increased sedimentation within Zone 2. Impacts to Zone 2 would be expected to be considerably less than Zone 1. In addition, given the resilience of vegetation in wet warm climates, and that root systems would remain intact, these

impacts would not be expected to be permanent. No surface water impacts would be expected within Zone 3 from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any vegetation within its path, thus increasing the likelihood of increased sedimentation. However, because of the marine transit safety and security measures, the likelihood of an LNG vessel spill from collisions, allisions and terrorist attacks would be extremely remote (as discussed in sections 4.12.4 and 4.12.6 of this EIS). Impacts associated with a spill would be expected to be temporary and not significant.

Elba Express Pipeline

The proposed Elba Express Pipeline would cross the Savannah River and Ogeechee River Basins. The Ogeechee River Basin includes the Lower and Upper Ogeechee sub-basins and has a drainage area of 5.9 million acres. The Savannah River Basin includes the Brier Creek, Little River, Broad River, and Upper and Lower Savannah River sub-basins and has a drainage area of 3.7 million acres. The Savannah River Basin and the Ogeechee River Basin, would be crossed from MP 0.0 to MP 121.3. From MP 121.3 to MP 187.9 the Savannah River Basin would be the only basin crossed.

The proposed Elba Express Pipeline would cross 352 surface waters, including 161 perennial stream/river crossings, 150 intermittent/ephemeral stream crossings, 11 ponds and 30 manmade ditches. Appendix H provides a list of the waterbodies crossed by the proposed pipeline, including location by county, state, and milepost; waterbody name and type; crossing width and method; classification; and state fishery classification. Of the total waterbodies that would be crossed by the proposed pipeline, 5 are 100 feet wide or greater (major waterbodies), and include the Little River at MP 134.9, Broad River at MP 161.0, Beaverdam Creek (Richard B. Russell Lake) at MP 170.8, Coldwater Creek at MP 178.0, and the Savannah River at MP 187.5.

In addition to the waterbodies crossed by the proposed pipeline, contractor yards could temporarily affect 2 intermittent stream crossings, 1 pond, and 4 manmade ditches, access roads that need improvements could affect 9 waterbodies, and the Port Wentworth Meter Station could affect 1 manmade drainage ditch.

The proposed pipeline route would cross one waterbody within 3 miles upstream of a public potable surface water intake. In Elbert County, Georgia, Beaverdam Creek (Richard B. Russell Lake) is used for a water supply for the City of Elberton (about 3.0 miles west of MP 170.8).

Waterbodies may be considered sensitive for a number of reasons including, but not limited to, the presence of significant fisheries, habitat for threatened or endangered species, high-quality recreational or visual resources, historic value, or the presence of impaired water or contaminated sediments. The proposed pipeline route would cross 7 waterbodies considered sensitive because of their 303(d) list of impairments or NRI status and include Ogeechee Creek at MP 33.9, two crossings of Dry Branch at MP 83.2 and MP 84.2, Brushy Creek at MP 96.6, Rocky Creek at MP 139.2, Broad River at MP 161.0, Beaverdam Creek (Richard B. Russell Lake), and the Savannah River at MP 187.5.

Big Brier Creek (MP 119.2), Broad River, and Savannah River are listed on the NRI. The NRI describes Big Brier Creek as a natural, undeveloped scenic stream with outstandingly remarkable values (ORVs) that include scenery, recreation, fish, wildlife, history, and cultural. Broad River is described as a scenic piedmont stream that is crossed by the Towaliga Fault and has rugged topography, rock outcrops, falls, and rapids. Its ORVs include scenery, recreation, geology, fish, and wildlife. The NRI indicates that the Savannah River forms the boundary between Georgia and South Carolina and has a topography characteristic of the Lower Piedmont and Coastal Plain Province. It is relatively flat and dotted with islands and high banks. Its ORVs include scenery, recreation, geology, fish, wildlife, history, and cultural (NRI, 2007). EEC has and continues to consult with the National Park Service to determine if any additional measures would be required for the crossing of these NRI segments.

Only Dry Branch and Rocky Creek are listed for impairments similar to the potential impacts of the proposed pipeline construction (*i.e.,* erosion and sedimentation). Dry Branch is listed as Partially Supporting by the Georgia EPD due to the presence of lower diversity and quality within the benthological macroinvertbrate community caused by non-point source pollution and sedimentation. Rocky Creek is listed as Not Supporting by the Georgia EPD due to benthological community impacts caused by urban runoff. EEC has agreed to meet the regulatory agency goals for sedimentation for both Dry Branch and Rocky Creek and meet the intent of the total maximum daily load requirements.

EEC reviewed the Georgia and South Carolina Hazardous Sites Inventory and EPA Superfund Site lists to determine if any waterbodies crossed by the proposed Elba Express Pipeline have known contaminated water or sediments. No sites with contaminated soil or groundwater would be crossed or are immediately adjacent to the pipeline.

Construction Impacts

The greatest potential impact on surface waters would result from the temporary suspension of sediments during in-stream construction. The extent of the impact would depend on sediment loads, stream velocity, turbidity, bank composition, and sediment particle size. These factors would determine the density and downstream extent of sediment migration. In-stream construction could cause the dislodging and transport of channel bed sediments and the alteration of stream contours. Changes in the bottom contours could alter stream dynamics and increase downstream erosion or deposition, depending on circumstances. Turbidity resulting from resuspension of sediments from in-stream construction or erosion of cleared ROW areas could reduce light penetration and photosynthetic oxygen production. In-stream work could also introduce chemical and nutrient pollutants from sediments. Resuspension of deposited organic material and inorganic sediments could cause an increase in biological and chemical use of oxygen, potentially resulting in a decrease of dissolved oxygen concentrations in the affected area. Lower dissolved oxygen concentrations could cause temporary displacement of motile organisms and could kill non-motile organisms within the affected area.

Construction could potentially rupture the containing layer of some ponds or wetland areas. However, the COE would require EEC to maintain the hydrology of wetland areas by issuance of its 404 permit, and EEC would be required to maintain pond hydrology by individual landowner

agreements. Where waterbodies are an integral part of a wetland ecosystem (*e.g.*, natural and/or beaver ponds), EEC would implement measures to ensure that the hydrologic regime of the waterbody/wetland complex would be maintained. Where the pipeline may drain a waterbody/wetland complex, trench breakers could be constructed and/or the trench bottom could be sealed to maintain the original wetland hydrology (see section 4.4.2).

The clearing and grading of streambanks would expose soil to erosional forces and would reduce riparian vegetation along the cleared section of the waterbody. The use of heavy equipment for construction could cause compaction of near-surface soils, an effect that could result in increased runoff into surface waters. The increased runoff could transport additional sediment into the waterbodies, resulting in increased turbidity levels and sedimentation rates in the receiving waterbody.

Refueling of vehicles and storage of fuel, oil, or other hazardous materials near surface waters could create a potential for contamination. If a spill were to occur, immediate downstream users of the water could experience degradation in water quality. Acute and chronic toxic effects on aquatic organisms could also result from such a spill.

EEC would follow its Procedures for waterbody crossings to ensure that adequate water flow rates would be maintained at all crossing locations and interruption of downstream uses would be prevented. EEC's Plan and Procedures include requirements for preconstruction planning, environmental inspection, construction methods, sediment and erosion control, restoration, decompaction, and post-construction maintenance. It includes provisions to handle stormwater and protection of waterbodies and wetlands from accidental spills of fuels or hazardous materials. In addition, EEC would implement the measures contained in the project-wide Spill Plan, and other mitigation, as appropriate.

EEC proposes to open-cut all perennial waterbody crossings except two manmade ditches and two unnamed intermittent streams associated with the crossing of Georgia State Highway 21 at MP 0.1. These waterbodies would be conventionally bored. Additionally, EEC has proposed to cross the Broad River at MP 161.0 and the Savannah River at MP 187.5 by the HDD method. EEC is in the process of conducting geotechnical feasibility investigations for these proposed HDD crossings which include drilling multiple bore holes along the proposed pipeline alignment, review of boring logs, and soil and core sampling laboratory testing. **We recommend that EEC file with the Secretary the results of its HDD geotechnical feasibility investigations for crossing the Broad River and the Savannah River. If its planned HDD crossing is not feasible, then EEC should develop a site-specific alternative crossing plan and sediment control plan for activities within these waterbodies in consultation with all relevant agencies (e.g., COE, GDNR, FWS, NPS, and NMFS). EEC's plan should be filed for review and written approval by the Director of OEP <u>prior to construction at each waterbody location</u>.**

In its comments on the draft EIS, EEC provided a feasibility evaluation of using the HDD method to cross the Little River at MP 134.9, Beaverdam Creek at MP 170.8, and Coldwater Creek at MP 178.0. EEC evaluated three crossing methods (i.e., aerial, HDD, and open cut) and considered waterbody characteristics, geotechnical considerations, pipeline size, environmental

sensitivities, constructability, and costs. Based on its evaluation, EEC determined that crossing these waterbodies using the open cut method would be more feasible than using the HDD method. EEC indicted that it has consulted with the FWS and GDNR regarding its proposed crossing methods and stated that although the FWS and GDNR would prefer the use of a HDD, neither agency objected to EEC's plan to employ the open cut crossing method at the Little River, Beaverdam Creek, and Coldwater Creek.

The HDD method involves boring a pilot hole beneath the waterbody to the opposite bank and then enlarging the hole with one or more passes of a reamer until the hole is the necessary diameter. A prefabricated pipe segment is then pulled through the hole to complete the crossing. A successful drill generally results in no impact on the stream bed or banks of the waterbody being crossed. For this reason, directional drilling is generally considered to be a preferred crossing method for sensitive waterbodies. However, there are certain impacts that could occur as a result of the drilling, such as an inadvertent release of drilling mud. This could occur in the area of the mud pits or tanks, or along the path of the drill due to unfavorable ground conditions. Drilling mud is most often comprised of naturally occurring materials, such as bentonite, which in small quantities would not be detrimental to vegetation, fish, or wildlife. However in larger quantities, the release of drilling mud into a waterbody could affect fisheries and vegetation; although impacts would generally be less than those associated with an open-cut crossing.

EEC would implement its HDD Contingency Plan and Feasibility Assessment that describes how the drilling operations would be conducted and monitored to minimize the potential for inadvertent drilling mud releases (frac-out) or failure of the drill. The HDD Contingency Plan and Feasibility Assessment also discusses procedures for clean-up of drilling mud releases and for sealing the drill hole if a drill cannot be completed.

EEC would minimize impacts on surface waters during an open-cut crossing by implementing the waterbody construction and mitigation procedures contained in its Procedures, which include:

- limiting clearing of vegetation between extra work areas and the edge of the waterbody to preserve riparian vegetation;
- constructing the crossing as close to perpendicular to the waterbody as site conditions allow;
- maintaining adequate flow rates throughout construction to protect aquatic life and prevent the interruption of existing downstream uses;
- locating equipment staging areas, soil stockpile areas, and equipment refueling areas at least 50 feet from surface waters;
- requiring construction across waterbodies to be completed as quickly as possible and during the windows specified in its Procedures or required by applicable permits;
- developing and adhering to any required site-specific construction plan for each waterbody greater than 100-feet-wide at the crossing location (major waterbody);
- requiring temporary erosion and sediment control measures to be installed across the entire width of the construction ROW after clearing and before ground disturbance;
- requiring maintenance of temporary erosion and sediment control measures throughout construction until streambanks and adjacent upland areas are stabilized;

- requiring bank stabilization and reestablishment of bed and bank contours and riparian vegetation after construction;
- limiting post-construction vegetative maintenance of buffer strips adjacent to streams; and
- implementing the project-wide Spill Plan if a spill or leak occurs during construction.

In addition to the use of the measures described above, EEC would need to obtain and comply with all conditions of its COE Section 404 permit and Section 401 state water quality certifications.

The intermittent/ephemeral waterbodies are expected to be dry at the time of construction, during the summer months. These waterbodies do not typically support fisheries or provide critical aquatic habitat or migratory passage for aquatic organisms. After construction, EEC would restore all contours to preconstruction conditions. Impacts on intermittent/ephemeral waterbodies would be limited to temporary alteration of channel beds and banks and possibly increased sediment load during initial storm events following construction. If intermittent/ephemeral waterbodies are flowing at the time of construction, EEC states it would install the pipeline using the open-cut method in accordance with the measures in its Procedures.

The seven waterbodies that would be crossed by the Elba Express Pipeline that are considered sensitive because of their 303(d) list of impairments or NRI status would not be further impaired since these waterbodies would be crossed using EEC's Procedures. Impacts to the Broad River and Savannah River would be avoided by EEC's use of the HDD method.

We believe that implementation of the measures and the procedures contained in Southern LNG and EEC's project-wide Spill Plan, HDD Contingency Plan and Feasibility Assessment, and Procedures would avoid or minimize potential impacts on surface waters, and no long-term impacts on surface water quality would occur.

Hydrostatic Testing

EEC would hydrostatically test the Elba Express Pipeline facilities prior to placing them in service to verify their integrity. These tests consist of pressurizing the facilities with water and checking for pressure losses due to leakage. Hydrostatic testing would be performed in accordance with the pipeline safety regulations identified in 49 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards."

Sources of hydrostatic test water are expected to be surface waterbodies in close proximity to the pipeline. EEC would require approximately 21,705,500 gallons of water to hydrostatically test the Elba Express Pipeline (see table 4.3-1).

The withdrawal of large volumes of hydrostatic test water from the surface water sources could temporarily affect the recreational and biological uses of the resource if the withdrawals constitute a large percentage of the source's total flow or volume. The withdrawal of large volumes of water from waterbodies could also result in the temporary loss of habitat, changes in

water temperature and dissolved oxygen levels, and entrainment or impingement of fish or other aquatic organisms.

TABLE 4.3-1

Hydrostatic Test Water Volumes for the Elba Express Pipeline

Primary Sources Sites	**Approximate Volume (gal)**
City of Port Wentworth – water hydrant used by Southern (MP 0.0)	1,500,000
County of Effingham – water hydrant used by Southern (MP 9.0)	1,500,000
Existing water well at the Effingham Bus. Maintenance Shop adjacent to Southern ROW (MP 16.3)	1,402,100
Ogeechee Creek (MP 33.9)	1,389,500
South Fork of the Ogeechee (MP 44.6)	5,402,000
Rocky Creek (2nd crossing) (MP 86.2)	1,350,500
Brushy Creek (MP 96.6)	1,181,700
Little River (134.9)	1,181,700
Broad River (MP 161.0)	1,856,500
Beaverdam Creek (Richard B. Russell Lake) (MP 170.9)	2,325,100
Cedar Creek (MP 185.3)	1,000,000
Savannah River (MP 187.5)	1,616,400
Total	**21,705,500**

EEC would minimize the potential effects of hydrostatic testing on surface water resources by adhering to the measures in its Procedures, including:

- locating hydrostatic test manifolds outside of wetlands and riparian areas as practical;
- withdrawing from and discharging to water sources in compliance with appropriate agency requirements that consider the protection of fishery and other resources on a case-by-case basis;
- complying with all appropriate permit requirements;
- screening the water intake manifold to avoid entrainment of fish;
- suspending the water intake hose with a float to reduce the uptake of sediment from the waterbody floor;
- maintaining adequate flow rates to protect aquatic life and provide for all waterbody uses and downstream withdrawals of water by existing users;
- anchoring the discharge pipe for safety;
- discharging test water to a suitable receiving body of water, across a well-vegetated upland area or filtered through a filter bag or into erosion control barriers;
- discharging test water against a splash plate or other energy dissipating device; and
- controlling the rate of discharge in order to prevent flooding or erosion.

EEC would acquire the necessary permits from state agencies before withdrawing hydrostatic test water, including specific approvals from applicable resource agencies. No chemicals would be added to the test water.

4.3.4 Sediments

Terminal Expansion

Geotechnical investigations conducted by Southern LNG indicate that the subsurface sediments underlying the proposed Terminal Expansion site consist of about 4 feet of historically-placed hydraulic (dredged) and man-made fill. Below this is a 34-foot-deep soft clay layer, followed by layers of sand, very stiff sandy clay, very dense clayey sand, and very dense silty sand, to a depth of 140 feet below MLW (WPC, 2006a). Table 4.1-1 in section 4.1.1 provides descriptions of the surficial material at the Terminal Expansion site.

Southern LNG's analysis of existing subsurface soil conditions indicates that the soft sediments located beneath the proposed LNG tanks are highly compressible, have low undrained strength, and would not be capable of supporting the tanks using shallow foundation systems or ground improvement measures such as stone columns, dynamic compaction, and surcharge. Therefore, to support the tanks and prevent localized settlement, Southern LNG would support each tank's foundation on 1,941 steel or pre-stressed concrete piles driven into the sediment to a depth of about 74 feet, with each building's foundation, equipment, and pipe racks driven to a depth of about 45 feet. These depths would minimize the potential for settlement of the facilities due to the presence of soft/weak natural and fill soils typically found 26 to 56 feet below the site's ground surface.

Made land sediments to be dredged from the back slope of the existing berthing slip would be placed into the existing spoil disposal area on the north end of Elba Island, adjacent to the Terminal. In order to accommodate larger LNG vessels, a total of 72,000 cubic yards of material would be dredged from the back of the slip, creating a steep 90-degree angle at the back of the slip and dredging to the current depth of the existing slip (-42 feet MLW). A sheetpile bulkhead would be installed at the back of the slip to stabilize the sediment.

4.4 WETLANDS

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation (Environmental Laboratory 1987). Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, flood control, and naturally improving water quality.

Wetlands affected by the Terminal Expansion and Elba Express Pipeline facilities are regulated at the federal and state levels. On the federal level, the COE has authority under Section 404 of the CWA to review and issue permits for activities that would result in the discharge of dredged or fill material into waters of the United States, including wetlands. Section 401 of the CWA requires that proposed dredge and fill activities under Section 404 be reviewed and certified by the designated state agency (the GDNR in Georgia and the South Carolina Department of Natural Resources [SCDNR] in South Carolina) to ensure that the proposed project would meet state water quality standards.

Southern LNG and EEC identified wetlands within the project areas by field delineations conducted in 2005 and 2006. EEC will complete additional delineations and report amendments as necessary to address areas where survey access has not been obtained prior to the initiation of construction. Delineations followed the 1987 COE Wetland Delineation Manual (Environmental Laboratory, 1987). Additionally, qualitative assessments were conducted for each wetland. The COE requires that qualitative assessments be based on five ecological parameters that include: quality of wetland vegetation; soils; hydrology; presence of plant and animal species of concern; and level of disturbance within the wetland and adjacent areas. The COE would take jurisdiction on all wetlands included in Southern LNG's and EEC's delineation reports. Wetland types were classified into one of three types according to Cowardin et al. (1979), including:

- palustrine forested wetlands (PFO), which are dominated by tree species at least 6 meters tall;
- palustrine scrub-shrub wetlands (PSS), which are dominated by woody vegetation less than 6 meters tall; or
- palustrine emergent wetlands (PEM), which are dominated by erect, rooted herbaceous hydrophytes.

The wetland delineation reports are accessible as part of the Terminal Expansion and Elba Express Pipeline project's public files in Docket Nos. CP06-471-000, CP06-472-000, and CP06-473-000 using the e-library link on the FERC's Internet website.

4.4.1 Affected Wetlands

Terminal Expansion

No wetlands would be affected by the proposed facilities at the Terminal Expansion site.

Waterway for LNG Marine Traffic

No wetlands along the Savannah River transit route are expected to be impacted by the proposed increase in vessel traffic. Wave action and sedimentation rates from LNG marine traffic would be expected to be consistent with current levels with a minimal overall impact given the limited increase in number of vessels. Locations of wetlands along the marine traffic route are shown in figure 4.12.-2.

Wetland plant species within the Zones of Concern (described in section 4.12.4.3) along the Savannah River are consistent with species present at the terminal and along the pipeline route, and are present along the entire LNG marine traffic route. If an unignited release of LNG were to occur along the LNG marine traffic route, given that LNG is lighter than water, the LNG would float on the water until it had vaporized. If the LNG were to contact any wetland plants along the Savannah River, those species above the water line could be impacted by the extremely low temperatures. While impacts within Zone 1 could be significant, no wetland impacts would be expected outside of Zone 1 from the resulting pool of LNG.

If an associated fire were to occur with a marine LNG spill, and wetland vegetation exists within Zone 1, those wetlands could be impacted by the high radiant heat. Impacts on wetland vegetation within Zone 1 would be significant. In Zone 2, wetland vegetation could be impacted from radiant heat. Those species could dry out due to the extreme heat. Impacts on wetland vegetation within Zone 2 would likely be less severe than those in Zone 1. In addition, given the resilience of wetland species in wet warm climates, and that root systems would remain intact, these species would be expected to reestablish rapidly in the affected areas. Zone 3 would not be expected to experience any significant impacts from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any wetlands within its path. However, because of the marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS), the likelihood of an LNG carrier spill from collisions, allisions and terrorist attacks would be extremely remote.

Elba Express Pipeline

PFO wetlands crossed by the Elba Express Pipeline Project consist of an overstory dominated by deciduous broad-leaved tree species, some conifer species, and a variety of herbaceous plant and vines in the herbaceous layer. Common vegetation in forested wetlands along the pipeline route include: water oak, laurel oak, sweet gum, sweet bay, tulip poplar, red maple, black gum, bald cypress, and loblolly pine in the over- and under-story and bushy bluestem, giant cane, sedges, soft rush, dwarf palmetto, and greenbrier in the herbaceous layer.

PSS wetlands crossed by the Elba Express Pipeline Project typically occur in areas of periodic mowing that prevents the establishment of tree species, but allow for the establishment of shrubs and herbaceous species (ex. existing ROWs). PSS wetlands are vegetated with true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. They may represent a successional stage leading to a forested wetland or they may be relatively stable communities. Common vegetation in scrub-shrub wetlands along the pipeline route include: red maple, eastern false willow, black willow, yaupon holly, and southern bayberry. The herbaceous layer includes those common species found forested wetlands.

PEM wetlands are present for most of the growing season in most years and usually are dominated by perennial plants. Common vegetation in emergent wetlands along the pipeline route include: bushy bluestem, Virginia button-weed, spikerush, soft rush, redroot, maidencane, pickerelweed, meadow-beauty, hooded pitcher plant, and bulrush.

Construction of the Elba Express Pipeline would temporarily disturb approximately 237.09 acres of wetland. Of this amount, approximately 119.45 acres are emergent wetlands; 11.37 acres are scrub-shrub wetland; and 106.27 acres are forested wetland. No permanent impacts to emergent wetlands are anticipated. Appendix I lists each wetland that would be crossed by the Elba Express Pipeline, as identified during EEC's field delineations, along with wetland identifier and quality, milepost, wetland types, and approximate area affected by construction.

Two contractor yards (0.46 acre of scrub-shrub and 0.18 acre emergent) and three meter station sites (0.23 acre forested wetland and 0.90 acre emergent wetland) would also affect wetlands.

Access roads that need improvements could affect 5 wetlands. EEC has identified six ATW areas that would be required in wetlands due to site-specific construction conditions to allow conventional bore of roadways and a railroad.

The primary impact of pipeline construction and ROW maintenance activities on wetlands would be the temporary and permanent conversion of wetland vegetation. These effects would be greatest during and immediately following construction. Generally, the wetland vegetation community would eventually transition back into a community with a function similar to that of the wetland before construction. In emergent wetlands, the impact of construction would be relatively brief, since the herbaceous vegetation would regenerate quickly (generally within 1 to 2 years). Scrub-shrub wetlands could take 2 to 4 years to reach functionality similar to preconstruction conditions depending on the age and complexity of the system. In forested wetlands, the impact of construction would be much longer due to the longer regeneration period of these vegetative types. Given the species that dominate the forested wetlands crossed by the Elba Express Pipeline, regeneration to preconstruction conditions may take up to 30 years.

Other impacts associated with construction of the pipelines could include temporary changes to wetland hydrology and water quality. During construction, failure to segregate topsoil over the trenchline in non-saturated wetlands could result in the mixing of the topsoil with the subsoil. This disturbance could result in altered biological activities and chemical conditions in wetland soils and could affect the reestablishment and natural recruitment of native wetland vegetation after restoration. In addition, inadvertent compaction and rutting of wetland soils during construction could result from the movement of heavy machinery and the transport of pipe sections and temporary stockpiling of wetland soils. Surface drainage patterns and hydrology could be temporarily altered during construction and the pipeline trench could act as a drainage channel. Increased siltation and turbidity could result from trenching activities. In addition, trenching could penetrate or remove impervious soil layers under the wetland and, consequently, drain perched water tables. This in turn, could result in drier soil conditions that inhibit the reestablishment of wetland vegetation. Disturbance of wetlands also could affect the wetland's capacity to control erosion and floods.

4.4.2 Wetland Construction Procedures

In general, wetland impacts need to be avoided, minimized, rectified, reduced, and mitigated in accordance with federal and state regulations. These steps are commonly referred to as "sequencing" because one step must be completed before the next step is started. As described in section 2.6.3, the Elba Express Pipeline has been routed to avoid wetlands to the extent feasible. In addition, wetland impacts would be minimized by the proposed pipeline routing adjacent to existing maintained ROWs to the extent practicable. This would minimize impacts on previously undisturbed wetlands.

EEC would further minimize the potential environmental impact of construction on wetlands by implementing its Procedures during construction and restoration of all of its proposed facilities. EEC's Procedures contain wetland mitigation measures that are designed to minimize the overall area of wetland disturbance, minimize the duration of wetland disturbance, reduce the amount of

wetland soil disturbance, and enhance wetland restoration following construction. Examples of some of the wetland impact minimization measures specified in EEC's Procedures are:

- limiting the width of the construction ROW to 75 feet through non-cultivated wetlands;
- limiting the operation of construction equipment within wetlands to that equipment essential for clearing, excavation, pipe installation, backfilling, and restoration;
- limiting grading in wetlands to directly over the trenchline, except where necessary to ensure safety;
- minimizing the length of time that topsoil is segregated and the trench is open;
- installing trench breakers at the boundaries of wetlands as needed to prevent draining of a wetland and to maintain original wetland hydrology;
- prohibiting storage of hazardous materials, chemicals, fuels, and lubricating oils within a wetland or within 100 feet of a wetland boundary; and
- limiting post-construction maintenance of vegetation within herbaceous wetlands to a 10-foot wide strip of vegetation centered over the pipeline; and in forested areas, limiting tree removal to those that are greater than 15 feet in height and within 15 feet of the pipeline centerline.

EEC would use a 75-foot-wide construction ROW in wetlands. EEC has attempted to locate ATWs at least 50 feet from wetlands; however, six ATWs locations along the pipeline ROW have been preliminarily identified as having wetlands located in them. The ATWs are required for conventional bores used to cross roadways, an access road, and stream crossing. Deviations from this 50-foot setback would require our approval prior to construction.

When unavoidable wetland impacts are proposed, the COE would require in its permit that all appropriate and practicable actions be taken to avoid or mitigate those impacts. We have reviewed the route and alternatives to minimize the level of impact to wetlands. Additionally, we have reviewed EEC's Procedures for crossing wetlands and found them acceptable.

GDNR and the FWS asked about EEC's plans for crossing "grady" type wetlands within the Di-Lane Plantation WMA in Burke County between MPs 74.4 and 78.1. EEC indicated that soil segregation was discussed with the GDNR as a way to ensure that these wetland areas are properly restored. Further, EEC stated that it would take core samples every 2.5 feet near "grady" type wetlands to determine the soil conditions down to about 20 feet below ground surface. Where the proposed pipeline crosses the Di-Lane Plantation WMA, it would parallel two existing SNG pipelines. Although construction would require clearing 70 feet of temporary workspace along the edge of the existing pipeline corridor, EEC would require no additional permanent ROW to cross the WMA. We believe potential impacts on "grady" type wetlands would be minimized because the proposed route follows an established corridor across this WMA and EEC has agreed to develop additional mitigation beyond its Plan and Procedures (which constitute Best Management Practices) in consultation with the COE and the GDNR before construction.

On-Site Mitigation

EEC indicated in section C.4 of its Procedures that it does not intend to revegetate wetlands by planting native species rather it would allow wetlands to revegetate naturally. However, as indicated in section C.5 of its Procedures, EEC presented its proposed wetland restoration methods in its *Wetland and Waterbody Delineation Report and Mitigation Plan*, that was submitted to the COE as part of its permit approvals, and specified that it does not intend to revegetate scrub-shrub and emergent wetlands by planting native species rather it would allow wetlands to revegetate naturally. Mitigation measures for forested wetland impacts are described below. EEC would implement the restoration measures for wetlands (*e.g.*, natural revegetation) as described in its *Wetland and Waterbody Delineation Report and Mitigation Plan* and in accordance with its COE permit conditions.

EEC has stated it would comply with federal and state permit conditions regarding wetland restoration and mitigation. EEC would be required to abide by any conditions in the COE permit regarding construction, restoration, revegetation, and maintenance of the proposed pipeline.

Off-Site Mitigation

EEC has stated it would also comply with the conditions of applicable authorizations such as from the COE under Section 404. When unavoidable impacts would result from the proposed action, the COE would require that all practicable actions be taken to mitigate those impacts.

Typically, mitigation for temporary impacts on emergent or scrub-shrub wetlands would need to be "in-kind, in-place" (*i.e.*, rehabilitation of the wetlands that are impacted) as opposed to compensatory mitigation. Active planting or seeding in emergent and scrub-shrub wetlands would not be required as long as the wetlands are adequately restored within two growing seasons. The COE could require mitigation requirements for temporary impacts on forested wetlands including planting to reestablish the forest vegetation as well as compensatory mitigation for the long-term impacts. Planting would include the use of live plants of specific sizes planted at specified densities with certain survival rates required. Where permanent wetland impacts would occur (*e.g.*, at aboveground facility sites), the COE would require compensatory mitigation.

The COE has a policy of "no net loss" of wetlands of the United States. This means that every wetland impact must be offset by the creation, restoration, enhancement, or preservation of at least an equal amount of wetlands, which is referred to as compensatory mitigation. Compensatory mitigation is considered when the regulatory agencies have evidence that sequencing has been carried out. Residual wetland impacts that are not or cannot be mitigated within the project area are accounted for using compensatory mitigation to ensure that there is a full replacement of both wetland area and functions. Compensatory mitigation would be achieved by the purchase of credits from a wetland mitigation bank approved by the COE or by providing funding (*i.e.*, in-lieu fees) for an approved, agency-sponsored wetland preservation, enhancement, or creation project. Mitigation would be required to occur within the same watershed where the impacts occurred.

In its *Wetland and Waterbody Delineation Report and Mitigation Plan*, EEC indicted that, to mitigate forested wetland impacts associated with the Elba Express Pipeline, it proposes to purchase credits from a wetland mitigation bank that manages large areas of existing forested wetlands or has the potential to restore forested wetlands within the watersheds that would be crossed by the proposed pipeline.

EEC, in consultation with the COE, determined that it would have to purchase a total of 81.00 mitigation credits from a mitigation bank to compensate for the anticipated loss of forested wetlands associated with Elba Express Pipeline (71.00 credits) and any additional impacts to forested wetlands that could occur, due to unforeseen minor route variations, during the construction phase (10.00 credits).

Possible mitigation banks and projects in Georgia that EEC could use to satisfy its mitigation requirements are the (1) Quacco Canal Wetland Restoration Project in Chatham County; (2) Millhaven Mitigation Bank in the Savannah River basin; (3) Pine South Wetland Mitigation Bank in Jefferson County, and (4) Phinizy Swamp Wetland Mitigation Bank that services most of the Savannah River basin including all counties crossed by the proposed pipeline.

In its comments on the draft EIS, the EPA stated that the Quacco Canal Wetland Restoration Project is not a COE approved commercial mitigation bank and has expressed concern about its development into a commercial bank. The Pine South Wetland Mitigation Bank consists of a wetland type not likely requiring mitigation for the Elba III Project while the Phinizy Swamp Wetland Mitigation Bank does not match the Piedmont wetland impacts. The EPA indicated that it is uncertain if the Millhaven Mitigation Bank remains active or has available credits; however, this bank better matches the coastal plain riverine wetlands that would be affected by the Project. Therefore, **we recommend that EEC reevaluate the local wetland mitigation options, in consultation with the COE, in order to determine one or more suitable banks that provide in-kind mitigation in the same watershed as project impacts. EEC should file its reevaluation for review and approval by the Director of OEP <u>prior to construction</u>.**

EEC's compensatory mitigation plan for forested wetland impacts is still under development and review by the COE. EEC will file it with the FERC once it is complete.

Vegetation maintenance would not be conducted over the full width of the permanent ROW in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide would be maintained in an herbaceous state. In addition, trees within 15 feet of the pipeline greater than 15 feet in height may be selectively cut and removed from the permanent ROW.

The COE would require mitigation for habitat losses on both existing mitigation land as well as other COE project lands. In its comments on the draft EIS, EEC stated that COE presented its proposed mitigation requirements for COE projects lands which include a 3:1 acreage mitigation ratio for permanent impacts and a 0.5:1 to 1:1 acreage mitigation ratio for temporary impacts. EEC has agreed to coordinate with the COE to determine appropriate mitigation requirements.

4.5 VEGETATION

4.5.1 Vegetation Resources

Terminal Expansion

The proposed Terminal Expansion facilities would be constructed on previously disturbed areas of Elba Island. The island, within the Savannah River, has been used as a CDF for dredging activities conducted on the Savannah River. Due to the historic use of the island as a CDF site, it is considered to be highly disturbed, and comprised of exotic species that are not productive as agricultural land, grazing land, or wildlife habitat.

The northwest end of the island is currently used as a CDF. The vegetation community types for the Terminal Expansion site includes a maintained grassy area that is vegetated with Bahia grass and two, small, low-lying, non-wetland areas are vegetated with water purslane. The vegetation communities in areas to the south of the terminal, outside of the proposed construction area, include a mixture of low quality hardwood stands, maintained grass, and strips of emergent marsh. Areas of the existing terminal site that are not developed are covered by asphalt, crushed rock, or maintained grass.

Construction of the proposed Terminal Expansion facilities would affect about 176.8 acres of land, of which, 93.4 acres are maintained grassy areas and 83.4 acres are paved or graveled areas. The loss of this vegetation is not seen as significant due to the non-native species composition.

Waterway for LNG Marine Traffic

Aquatic and shoreline habitats adjacent to the vessel transit corridor include open water, salt and brackish marshes, and exposed tidal flats. Potential impacts on these habitats that result from increased LNG marine traffic associated with the project along the transit corridor would be similar to those resulting from other vessels using the navigation channel. No significant impacts on aquatic and shoreline habitats are expected within the transit corridor as a result of normal operation of increased LNG marine traffic.

Vegetation species within the Zones of Concern (described in section 4.12.4.3 of this EIS) along the Savannah River are consistent with species present at the terminal and along the pipeline route. If an unignited marine LNG spill were to result in a pool that contacted any vegetation along the Savannah River, plants could be temporarily impacted by the extremely cold temperature. In addition, given the resilience of vegetation species in wet warm climates, and that root systems would remain in tact, vegetation would be expected to reestablish rapidly. However, tree species would take longer to reestablish. No impacts to vegetation would be expected outside of Zone 1 from a release of LNG. If an associated fire were to occur with the release of LNG, plants within Zone 1 in the vicinity of the fire would either burn or combust due to the radiant heat. Impacts within Zone 2 would be expected to be less than those in Zone 1. Some plants within Zone 2 may be harmed by the radiant heat, while others would be unaffected.

No impacts would be expected to occur to vegetation species within Zone 3 from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any vegetation species within its path. However, because of the marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS), the likelihood of an LNG vessel spill from collisions, allisions and terrorist attacks would be extremely remote.

Elba Express Pipeline

Vegetation types that would be affected by the Elba Express Pipeline include forest, pine plantation, and open land (see table 4.5-1). Wetlands are discussed in section 4.4 of this EIS. Portions of the Elba Express Pipeline Project route contain southern mixed pine-oak forest. Common overstory species of this forest cover type include long-leaf and shortleaf pine, loblolly pine, slash pine, live oak, myrtle oak, laurel oak, water oak, willow oak, red maple, black gum, sweet gum, elm, beech, sycamore, magnolia, and hollies. The understory is typically vegetated with shrubs including saw palmetto, southern bayberry, and winged sumac, while the herbaceous layer includes grass species such as bluestem grass, yellow stargrass, wiregrass, redroot, Spanish moss, and colic root.

TABLE 4.5-1

Estimated Impacts on Vegetation Communities Along the Elba Express Pipeline (acres) a/

Project Component	Upland Forest		Planted Pine		Open Land		Total	
	Temp	Perm	Temp	Perm	Temp	Perm	Temp	Perm
ELBA EXPRESS PIPELINE								
	921.30	337.28	534.78	161.26	625.45	215.78	**2,081.53**	**714.32**
ELBA EXPRESS COMPRESSOR STATION								
	0.00	0.00	23.21	23.21	0.37	0.37	**23.58**	**23.58**
ABOVEGROUND FACILITIES (Meter Stations, Mixing Station, and Launcher/Receiver)								
	7.85	4.64	3.76	1.37	0.68	0.68	**12.29**	**6.69**
CONTRACTOR YARDS								
	11.89	0.00	0.03	0.00	109.03	0.00	**120.95**	**0.00**
Project Totals	**941.04**	**341.92**	**561.78**	**185.84**	**735.53**	**216.83**	**2,238.35**	**744.59**

a/ Estimated impacts on wetlands are discussed in section 4.4. Vegetation totals do not include wetland cover types. Construction impacts include ATW.

About 44.5 acres of existing access roads would be improved.

Temp = temporary

Perm = permanent

Planted pine plantations are dense pine forests that have been planted primarily for timber or wood pulp production. Loblolly pine, slash pine, shortleaf pine, and long-leaf pine are common overstory species. The understory is sparse and is often controlled through maintenance activities.

Open lands are typically vegetated with grasses, forbs, and shrubs. Agricultural, industrial, and residential lands are further discussed in section 4.8 of this EIS.

EEC's proposed construction ROW and temporary extra workspaces would disturb approximately 921.30 acres of upland forest, 534.78 acres of pine plantation, and 625.45 acres of open land. These impact areas reflect the entire length of the 125-foot-wide construction ROW for the 42-inch-diameter pipeline and the 110-foot-wide construction ROW for the 36-inch-diameter pipeline, as well as identified temporary extra workspaces. Newly identified or revised temporary extra workspaces could also affect acreage totals.

The primary impact on vegetation from construction of the Elba Express Pipeline facilities would be the cutting, clearing, and/or removal of existing vegetation within the construction work area. The degree of impact would depend on the type and amount of vegetation affected, the rate at which vegetation would regenerate after construction, and the frequency of vegetation maintenance conducted on the ROW during pipeline operation.

The ROW revegetation rate would depend on several factors, including local climate, soil type, vegetation maintenance practices, land use, and the existing and seeded vegetation. The amount of time required for complete recovery of vegetation to predisturbance levels would depend on these factors as well as the size and age of pre-existing vegetation when cleared. The relative impact of clearing would be greatest in forested areas because the removal of this vegetation would result in the greatest change in the structure and environment of the plant community. Moreover, the effect of clearing would be of longer duration in forested areas than in other areas (*e.g.*, open land) and, in the case of the maintained ROW would be permanent. On temporary work areas where forest regeneration would be allowed, the re-establishment of forest to preconstruction conditions could take between 25 and 150 years. In contrast, the re-establishment of open lands following construction would probably take one to three years.

Conversion of woodland to an herbaceous cover would be a long-term effect of construction. Where its proposed pipelines would cross upland forest and pine plantations, EEC would maintain the entire permanent ROW (50-feet-wide in most cases) in a grassy condition. Of the 1,502.82 acres of forest that would be cleared during construction of the pipelines and aboveground facilities, about 498.54 acres would be maintained in herbaceous cover following construction, and the remaining 975.06 acres would be allowed to revert to forest. The 527.76 acres of green space (defined here as upland forest and planted pine) permanently converted from forested lands to herbaceous cover represent about 16 percent of the total project land disturbance, and on a regional scale would result in a minor conversion of about 0.002 percent of a Georgia state total of 24 million forested acres (Georgia Forestry Commission, 2007). Forested wetlands within the maintained permanent ROW would be converted to emergent or scrub/shrub wetlands (see section 4.4). There would be minimal change in open lands because it would be maintained in vegetative cover similar to that found before construction.

Vegetation removal would result in alteration to the vegetation structure, especially in forested habitats. Following installation of the pipeline and recontouring of the ROW, EEC would reseed all disturbed areas in accordance with its Plan (seed mixes were recommended by the NRCS).

Revegetation of the temporary ROW and extra work areas would occur at varying rates depending on site-specific conditions such as the amount of disruption of the soil and species composition of adjacent habitats. Wooded habitats would take much longer to regrow to preconstruction conditions than herbaceous habitats. Species composition of the ROW after construction and restoration could be different from pre-construction composition, although given sufficient time, species composition likely would resemble pre-construction conditions.

Species composition of adjacent habitats, particularly along the edges of the ROW, could be altered by changes in abiotic conditions such as sunlight and wind levels. Increased light would favor growth of shade intolerant species that typically do not inhabit the forest interior. Higher wind levels could lead to increased windthrow in adjacent forested areas, especially forested wetlands.

Construction of EEC's aboveground facilities, including the compressor station, meter stations, and launcher/receivers would affect upland forest, pine plantation, open land, and developed land. Construction would permanently remove vegetation at each site during the installation of buildings, equipment, and hardened surfaces such as paved or gravel access roads and parking areas. Construction of the aboveground facilities would permanently convert about 4.64 acres of upland forest, 26.97 acres of pine plantation, and 1.05 acres of open land to natural gas facility use (see table 4.5-1). We do not consider this to be a significant impact, as this represents a very small percentage of the total available land of similar type in the surrounding project area.

EEC's use of contractor yards would temporarily affect about 11.89 acres of upland forest, 0.03 acre of planted pine, and 109.36 acres of open land. No permanent impacts on vegetation would result from the use of these sites.

4.5.2 Noxious Weeds

Noxious weeds and other invasive plants are non-native, undesirable native, or introduced species that are able to exclude and out-compete desirable native species, thereby decreasing overall species diversity. Under the Federal Plant Protection Act of 2000 (formerly the Noxious Weed Act of 1974 [7 USC SS 2801-2814]), a noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops, livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment." The Federal Plant Protection Act contains a list of 137 federally restricted and regulated federal noxious weeds, as per CFR Title 7, Chapter III, Part 360, including 19 aquatic and wetland weeds, 62 parasitic weeds, and 56 terrestrial weeds. Each state is federally mandated to uphold the rules and regulations set forth by this Federal Plant Protection Act and manage its lands accordingly.

Noxious weeds are addressed by Executive Order 13112, which directs federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species can cause. The executive order further specifies that federal agencies shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless it has been determined that the benefits of such actions outweigh the potential

harm caused by invasive species and that all feasible and prudent measures to minimize the risk of harm would be taken in conjunction with the actions.

Vegetation removal and soil disturbance during construction could create optimal conditions for the establishment of invasive or noxious weed species. Construction equipment traveling from weed-infested areas into weed-free areas could disperse invasive or noxious weed seeds and propagates, resulting in the establishment of noxious weeds in previously weed-free areas. To control the spread of noxious weeds, EEC has agreed to develop an Exotic, Nuisance, and Invasive Plant Management Plan prior to construction and in consultation with the appropriate agencies and would file this Plan with the Director of OEP. EEC indicated that examples of some of the impact minimization measures that would be specified in its Exotic, Nuisance, and Invasive Plant Management Plan are:

- areas of disturbed soils would be planted as described in EEC's Plan and Procedures using herbaceous species recommended by local NRCS offices;
- exotic plant growth in revegetated areas would be monitored by the EI and/or other designated EEC personnel as part of the project's wider revegetation monitoring program;
- ROW inspections would occur annually and would be documented in accordance with EEC's Plan and Procedures;
- the EIs would assess the progress and recommend measures to eradicate or control noxious weeds; and
- inspections in upland areas would occur for at least two growing seasons after pipeline construction, and in wetlands for 5 years (or until revegetation efforts are successful) after pipeline construction.

4.5.3 Vegetation Communities of Special Concern

No vegetative communities of special concern have been identified along the proposed Elba Express Pipeline route. Potential habitat for special-status plant species have been identified along the pipeline route and are discussed in section 4.7.

4.6 WILDLIFE AND AQUATIC RESOURCES

4.6.1 Wildlife Habitats

Terminal Expansion

The proposed Terminal Expansion site has two areas that contain wildlife habitat: the existing terminal site and berthing slip area. Wildlife habitat on the existing terminal site has been degraded due to previous construction activities. The terminal site habitat is that of a homogenized ecosystem managed in a grassed state, which occupies portions of the site that are not occupied by terminal facilities or paved areas. Wildlife species potentially utilizing the site are limited to various small rodents, lizards, insects, and possibly some passerine species. Grassed areas outside the fenced portion of the terminal facilities are used as grazing areas by deer.

Wildlife habitats at the existing berthing slip area is comprised mainly of subtidal soft sediments and unconsolidated intertidal flats. Subtidal soft sediment provides feeding habitat for demersal fish, worms, and mollusks living on and in the sediments (see section 4.6.2). Unconsolidated sediments found in the Savannah River Channel are considered early successional due to the constant disturbance from dredging maintenance, propeller wash, vessel traffic, and natural sedimentation. Unconsolidated subtidal habitat has been designated as EFH for penaeid shrimp and the snapper/grouper complex species (see section 4.6.3 and appendix J).

Construction of the proposed Terminal Expansion facilities would affect about 179.8 acres of previously disturbed land. Of which, 96.4 acres are maintained grassy areas and 83.4 acres are paved or graveled areas. About 33.3 acres of open water, including subtidal soft sediments and unconsolidated intertidal flats, would also be affected at the existing berthing slip area.

Construction of the proposed Terminal Expansion facilities would have little impact on wildlife due to the lack of wildlife habitat existing on the site. The maintained grass areas do not provide sufficient habitat to support diverse wildlife populations. Some species such as small rodents, lizards, and insects may be affected by the construction due to alteration in habitat and direct contact with construction equipment. Current and proposed routine maintenance activities at the terminal site would have similar but less extensive effects on wildlife species in the area, depending on the time of year. However, the overall impact on general wildlife would not be substantial because of the short duration of the activities and availability of similar habitats adjacent to the terminal site from which the affected species could return and recolonize the nearby areas.

Dredging and pile driving activities at the existing berthing slip during construction could cause an increase in turbidity and noise; however, these impacts would be short-term and localized, thus minimizing the effect on open water species that may be in the vicinity of the slip.

Operation of the Terminal Expansion facilities would result in a potential increase of 95 additional LNG vessels docking and unloading LNG cargo at the Elba Island Terminal and is not expected to affect wildlife at and near the terminal site.

Waterway for LNG Marine Traffic

Potential impacts on wildlife that result from increased LNG marine traffic associated with the project along the transit corridor would be similar to those resulting from other vessels using the navigation channel. No significant impact on wildlife resources as a result of increased LNG marine traffic is expected within the transit corridor. Tybee National Wildlife Refuge is an important resting and feeding area for migratory birds including gulls, terns, neotropical migratory songbirds, least terns, black skimmers, Wilson's plovers, and several other shorebird species have nested on the spoil deposits. The refuge's shoreline and open spoil deposits are used as resting sites for brown pelicans, gulls, and terns. However, because no impacts to Tybee National Wildlife Refuge have been reported with Elba's previous expansion, no impacts to any migratory birds would be expected by the incremental increase in LNG vessels transiting the

navigation channel. Other wildlife species along the LNG marine traffic route are discussed in sections 4.6.1 and 4.7 of this EIS. Sensitive wildlife areas are depicted in figure 4.12-2.

Wildlife species within the Zones of Concern (described in section 4.12.4.3) along the Savannah River are consistent with species present at the terminal and along the pipeline route. If an unignited marine LNG spill were to occur along the transit route and contact any wildlife within Zone 1, it could be injured or expired. However, any mobile species would generally move away from the incident of LNG, thereby lessening any impacts the spill may cause to wildlife. Because the vaporized gas that would be released would be a cold, heavier-than-air, vapor cloud, birds flying over the area at the time of release could experience asphyxiation from the lack of oxygen. No wildlife impacts outside of Zone 1 would be expected from an unignited release of LNG.

If an associated fire were to occur with the release of LNG, wildlife within Zone 1 in the vicinity of the fire would likely be injured or expired. Impacts to wildlife offshore would be limited to species that may be on the water's surface or flying overhead at the time of a release. Impacts to wildlife within Zone 2 would be expected to be less than those in Zone 1. Some species may be impacted by radiant heat, while others may be impacted by being displaced from its home range. Wildlife not directly impacted by the fire may lose nesting, foraging, or mating habitat until the impacted area is revegetated. No impacts would be expected within Zone 3 from a pool fire. The maximum flammable rang for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any wildlife within its path. However, because of the marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS), the likelihood of an LNG vessel spill from collisions, allisions and terrorist attacks would be extremely remote. Additionally, wildlife would be expected to return to the affected area as the vegetation reestablishes.

Elba Express Pipeline

Vegetation types that provide wildlife habitat include forest, agriculture, open land, industrial and residential land, and wetlands. Below are some of the species that could be expected to be within the project area, but are not all-inclusive.

The southern mixed hardwood-pine forests and pine plantations that would be crossed by the Elba Express Pipeline provide habitat for mammals including the armadillo, opossum, white-tailed deer, gray fox, short-tailed shrew, eastern cottontail rabbit, mice, eastern mole, gray squirrel, southern flying squirrel, bobcat, and coyote. Resident and migratory non-game bird species include cardinal, Carolina wren, and vultures. Game species include wild turkey, bobwhite quail, and mourning dove. Small songbirds utilize the forests, thickets, wetlands, and fields of the southern mixed hardwood-pine forests to rest and feed during migration, and in some cases breed. Amphibians and reptiles that can be found in the forest habitat type include spotted salamander, marbled salamander, ornate chorus frog, spring peeper, southern leopard frog, southeastern five lined skink, cricket frog, eastern fence lizard, southern ring-neck snake, southern black racer, eastern king snake, and eastern diamondback rattlesnake.

Open land along the pipeline route consists mainly of grasses, forbs, and shrubs. Wildlife associated with these areas include small mammals such as the harvest mouse, eastern mole, least shrew, and the eastern cottontail rabbit. Bird species include mourning dove, common grackle, red-winged blackbird, eastern bluebird, and red-shouldered hawk. Reptiles and amphibians include garter snake, southern black racer, skinks, and frogs. Industrial and residential areas provide limited wildlife habitat for species that utilize wooded yards and landscape shrubbery for forage and shelter.

Forested and scrub/shrub wetlands provide habitat for waterfowl, wading birds, raptors, and large and small mammals. Typical wildlife associated with these habitats include wood ducks, egrets, great blue heron, hawks, eagles, white-tailed deer, swamp rabbit, raccoon, muskrat, beaver, and fox. Emergent wetlands provide habitat for herbivorous mammals, waterfowl, wading birds, fish, mussels, insects, and amphibians.

Open water habitats are utilized by beaver, river otter, and nutria. Bird species including anhinga, belted kingfisher, brown pelican, wood stork, osprey, snowy egret, wood duck, and marsh wren and reptiles such as American alligator, cottonmouth, and turtles can be found in open water habitats.

Construction of the Elba Express Pipeline, including temporary extra workspaces, would temporarily disturb about 2,747.96 acres of wildlife habitat during construction and would permanently disturb about 960.56 acres through pipeline ROW maintenance related to ongoing operation. Construction and operation of the aboveground facilities would permanently disturb about 32.00 acres of wildlife habitat.

The impact of the Elba Express Pipeline Project on wildlife species and their habitats would vary depending on the requirements of each species and the existing habitat present along the pipeline route. The general disturbance of the ROW associated with construction activities would likely result in the temporary displacement of most wildlife from the immediate vicinity of the construction zone and adjacent areas. Clearing of the temporary construction ROW would reduce cover, nesting, and foraging habitat for some species and may result in mortality to less mobile forms of wildlife, such as small rodents and reptiles. Larger or more mobile wildlife, such as birds and large mammals, would leave the vicinity of the ROW as construction activities approach. Some nesting species and tree cavity nesting species may suffer mortality during ROW clearing. For those adult birds that are able to disperse from the working ROW, nesting success may be denied or diminished for one annual breeding cycle. The relatively slow regeneration of forested communities within the temporary ROW would result in the long-term reduction in habitat for those species that utilize these communities. However, abundant similar habitats are available adjacent to the proposed construction corridor. Further, species that use early successional shrub or forest communities may benefit from the regeneration process. Additionally, the non-woody vegetation may provide seeds and foliage for food for small mammals and birds, as well as habitat for ground-nesting birds, mammals, and reptiles.

A variety of migratory bird species, including songbirds and raptors, utilize the vegetation communities found within the project area. Migratory birds are species that nest in the United

States and Canada during the summer, and then migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season.

The Elba Express Pipeline project is within the Southeastern Coastal Plain Bird Conservation Region, which includes extensive riverine swamps and marsh complexes along the Atlantic Coast, as well as interior forest vegetation. Priority bird species include the red-cockaded woodpecker, painted bunting, Bachman's sparrow, Swainson's Warbler, and swallow-tailed kite. Coastal intertidal habitats provide critical wintering areas for the American oystercatcher and important wintering and spring migration habitats for large numbers of herons, egrets, ibis, terns, and other species, as well as winter habitat for large numbers of canvasback, mallard, American widgeon, redhead, and the majority of the continent's population of tundra swans.

The Migratory Bird Treaty Act of 1918 serves to protect migratory birds from deleterious impacts. The project would result in a temporary reduction of habitat available to migratory birds. However, this effect would be mitigated by the restoration of disturbed areas following construction, which would make them available for use by migratory birds during the next nesting season following construction. Numerous wetlands and riparian systems would be crossed by the Elba Express Pipeline. These areas are important as year long habitats for numerous resident wildlife species and are used seasonally as stopovers for migrating waterfowl along migratory flyway routes. The degree of impact for some species using these habitats would depend on the season of construction. Impact on migratory waterfowl from construction within stopover habitat would generally only occur only if these habitats were disturbed during migration. Wetland and riparian habitats are also important breeding habitat for amphibians, and impact on breeding amphibians would generally be greater if construction took place in these habitats during the spring breeding season. Disturbance to these habitats would be minimized through implementation of EEC's Procedures, and except for the conversion of forested riparian and wetland vegetation to herbaceous vegetation within the ROW, there would not be a permanent impact on these habitats. Construction is scheduled to begin during the summer months. This construction schedule could potentially result in the loss of nests. However, due to the availability of similar habitat types adjacent to the proposed construction right-of-way, locating the pipeline adjacent to existing rights-of-way for over 50 percent of the route to the extent practicable, and the absence of federally and state listed bird species along the pipeline route, we believe that impacts to migratory birds would be minimized.

Suitable nesting habitat occurs throughout the Elba Express Pipeline Project area. Although the project activities could cause some migratory birds to avoid the construction areas, this impact would be limited to the relatively short period of active construction and is not expected to result in a significant or long-term change in migration patterns through the area.

Many animals would relocate into similar habitats nearby. However, if there were a lack of adequate territorial space, some individuals could be forced into suboptimal habitats. This could increase inter- and intra-specific competition and lower reproductive success and survival. The influx and increased density of animals in some undisturbed areas caused by these dislocations could also reduce the reproductive success of animals that are not displaced by construction. These effects, however, would cease after completion of construction, and wildlife could return

to the newly disturbed areas and adjacent, undisturbed habitats after ROW restoration is completed.

The cutting, clearing, and/or removal of existing vegetation would also affect wildlife by reducing the amount of available habitat. The degree of impact would depend on the type of habitat affected and the rate at which vegetation regenerates after construction. The impact on species that commonly inhabit agricultural land would be relatively minor and temporary because these areas are regularly disturbed and would be replanted during the next growing season following installation of the pipeline. The impacts on grass and shrub-dwelling species would be less than that of forest-dwelling species. Although the structural component of shrub-dominated habitats could recover more slowly, successful restoration of non-woody vegetation may improve the values of forage for some wildlife within a relatively short time.

In forested areas, the principal impact on wildlife of the increased or new ROW clearing would be a change in species using the ROW from those favoring large forested tracts (*e.g.*, southern flying squirrel) to those using edge habitats and more open areas (*e.g.*, white-tailed deer). The edges between open and wooded habitats, often termed the "edge effect," could increase the diversity and density of organisms that are often found in the transitional zones where two ecosystems come together. Many species adapt well to this habitat reversal and take advantage of the increased populations of small mammals that prefer open areas. Predatory species such as the red-tailed hawk, coyote, and fox commonly use utility ROWs for hunting.

Although the project may be advantageous for some species, it would create new cleared ROWs or widen existing cleared ROWs, which may affect some forest interior species, or species that prefer large tracts of unbroken forest. The breeding success of some forest interior bird species (*e.g.*, warblers and thrushes) has been shown to be limited by the size of available unbroken forest tracts (Robbins, 1979; Robbins *et al*., 1989). For these species, additional loss of forest habitat in tracts of already marginal size could further reduce breeding success. The cleared ROWs may also encourage population expansion of parasitic species, such as the brown-headed cowbird which parasitize songbird species. The potential for this type of impact would be greatest where the pipelines would traverse smaller, isolated woodlots (Galli *et al*., 1976). It may also encourage population expansion of exotic species, such as the English sparrow and European starling, which compete with many native species. In addition, southern pine beetle is a persistent nuisance pest that has infested mature and dense pine plantations weakened by natural and human disturbances. The affects of forest fragmentation would be reduced because the Elba Express Pipeline route would parallel existing ROWs for approximately 56 percent of its length. Additionally, the southern pine beetle only impacts tree species that are injured or dying. EEC has committed to minimizing the damage to vegetation adjacent to the corridor, thereby reducing the likelihood of impacts from the southern pine beetle. The brown-headed cowbird, English sparrow, and European starling currently occur throughout the project range, and therefore would not add new impacts.

The loss of forest habitat and the creation of open early successional and induced edge habitats in these woodlots could decrease the quality of habitat for forest interior species for distances up to 300 feet from the ROW (Anderson *et al*., 1977; Temple, 1986). This may reduce the density and diversity of forest interior species in a corridor wider than the actual cleared ROWs. It is not

likely that new permanently cleared 20- to 50-foot-wide ROWs would impede the movement of most forest interior species, although it could reduce the breeding habitat of these species.

Because EEC would make use of existing ROWs as much as possible and would adhere to its Plan and Procedures, and other measures discussed in this EIS, we believe that the Elba Express Pipeline Project would not substantially alter local wildlife populations, and that the impact of habitat fragmentation on wildlife would be minimal.

4.6.1.1 Managed and Sensitive Wildlife Areas

The proposed Elba Express Pipeline would cross two WMAs in Georgia: The Di-Lane Plantation WMA in Burke County between MPs 74.4 and 78.1 and the Clarks Hill WMA in Warren and McDuffie Counties between MPs 134.8 and 135.3.

The Di-Lane Plantation WMA consists of 8,100 acres of land owned by the COE and managed by the GDNR. Wildlife management practices within this WMA include a 3,500 acre forest thinning and burning management program to enhance wildlife species (*e.g.,* bobwhite quail), prescribed burning, fallow field management, hardwood control, and dove field management. Recreational activities include hunting, camping, interpretive trails, fishing, hiking, and bird watching. The Di-Lane Plantation WMA is on Georgia's list of Important Bird Areas (IBA). An IBA is a place that provides essential habitat for one or more species of bird, whether in breeding season, winter, or during migration and are considered to be exceptionally important for bird conservation. In addition to providing habitat for game birds, such as bobwhite quail, mourning doves, and wild turkeys, the Di-Lane Plantation WMA provides habitat for many nongame birds such as bluebirds, sparrows, and warblers. During the late fall and early spring, large numbers of hawks use open fields in the area to hunt. Numerous wood ducks and a variety of other waterfowl roost throughout the area during the winter. Other common winter wetland birds include great blue and green herons and occasionally wood storks.

The Clarks Hill WMA consists of 12,700 acres of land also owned by the COE, as part of its J. Strom Thurmond Project (see section 4.8.5) and managed by the GDNR. Recreational activities within Clarks Hill WMA consist of hunting, fishing, hiking, and bird watching. Several goose grazing pastures within the Clarks Hill WMA have been created by and are managed under the Ducks Unlimited MARSH Project (enhancement of waterfowl habitat and hunting opportunities in Georgia). In addition, waters within the J. Strom Thurmond Project, including the Little River crossed at MP 134.9, have recently been designated as an IBA. Some of the Clarks Hill pastures have been recently renovated and planted in a fresh mixture of pasture grasses and legumes. These areas are regularly limed and fertilized to provide soil nutrients for optimum plant growth and offer an attractive site for geese to feed and congregate during the late waterfowl season.

EEC stated that it has initiated consultation with the Di-Lane Plantation and Clarks Hill WMA managers regarding field surveys, easement acquisitions, and permitting processes. Our review of the pipeline route in these areas indicates that active construction could impact recreational activities within these WMAs. See section 4.8.5 for further information on these sensitive areas and our recommended mitigation measures. About 53.7 acres of COE Project and Mitigation Lands would be crossed by the proposed project at the crossings of Di-Lane Plantation WMA,

Little River, Richard B Russell Lake/Beaverdam Creek, Coldwater Creek, and Savannah River. These crossings would be done in accordance with EEC's Plan and Procedures, as well as any landowner agreements.

4.6.2 Aquatic Resources

Terminal Expansion

Surface waters affected by the construction of the proposed Terminal Expansion facilities are intertidal estuarine environments that support an estuarine fishery. Typical recreational fish species are listed in table 4.6-1. Impacts on sensitive fisheries and EFH are further described in section 4.6.3 below. Impacts on surface waters and special status species are discussed in detail in sections 4.3.3 and 4.7, respectively.

TABLE 4.6-1

Recreational Fish Species near the Proposed Terminal Expansion Facilities

Common Name	Scientific Name	Classification
SPECIES		
Spotted Sea Trout	*Cynoscion nebulosus*	Warmwater/Recreational
Red Drum	*Sciaenops ocellatus*	Warmwater/Recreational
White Shrimp	*Penaeus aztecus*	Warmwater/Recreational
Brown Shrimp	*Penaeus setiferus*	Warmwater/Recreational
Blue Crab	*Callinectes sapidus*	Warmwater/Recreational
Striped Bass	*Morone saxatilis*	Recreational
Cobia	*Rachycentron canadum*	Recreational
Spanish Mackerel	*Scomberomorus maculatus*	Recreational
Bluefish	*Pomotomus saltatrix*	Recreational
Summer Flounder	*Paralichthys dentatus*	Recreational
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	Recreational
Snapper/Grouper	*Lutjanus/Epinephelus, Mycteroperca*	Recreational

With the exception of spotted sea trout, blue crab, and striped bass all of the recreational fish species identified in table 4.6-1 are further discussed in section 4.6.3 and appendix J.

Spotted seatrout occur from Cape Cod, Massachusetts to the Florida Keys, but are most abundant from the Chesapeake Bay southward. They are found primarily in estuaries, but move into nearshore ocean waters during cold periods. In general, spotted seatrout appear to be non-migratory and spend their entire life within five to ten miles of their natal estuary. Small tidal marsh creeks and shallow grass beds are the most important nursery grounds for the young, while larger juveniles are widely distributed in estuarine areas and along coastal beaches. Adults frequent grass beds, live oyster beds, creek mouths, drop-offs, and structures such as jetties, stumps, pilings, and wrecks, where they primarily feed on shrimp and fish. They are most abundant in depths of less than ten feet, prefer a temperature between 60 to 80° F, tolerate a

range of salinities. Spotted seatrout spawn from April to September around inlets (Species Profile: Spotted Seatrout, 2007).

Blue crab occur from Nova Scotia to Florida and Texas; Bermuda; West Indies to Uruguay. Blue crabs are estuarine dependent and its life history involves a complex cycle of planktonic, nektonic, and benthic stages, which occur throughout the estuarine-nearshore marine environment. Spawning females and larval stages inhabit lower estuarine and adjacent marine waters and later stage larvae exist mainly in more open waters. Juvenile blue crabs exhibit wide seasonal and aerial distribution within the estuary but are associated with waters of low to intermediate salinity and soft-mud sediment bottom types, often adjacent to vegetated habitats. Adult blue crabs are widely distributed and occur on a variety of bottom types in fresh, estuarine, and shallow oceanic waters. Larger sized blue crabs are more prevalent in larger bays and bayous. Although adult blue crabs are ubiquitous throughout an estuarine system, they are distributed seasonally with respect to salinity and sex (Blue Crab Home Page, 2007).

Striped bass are anadromous species. In Georgia waters, spawning occurs during April and May. They migrate from their salt water habitat as much as 180 miles upstream to find swift, freshwater currents suitable for spawning. At least 50-miles of free-flowing river are necessary for striped bass eggs to hatch successfully. Striped bass stocked into freshwater lakes also make spawning migrations to the headwaters. Striped bass congregate in schools which roam the open waters of lakes, coastal rivers, and embayments to forage. Striped bass management efforts in Georgia include annual population surveys, setting protective size and creel limits, protecting spawning habitat and water quality, and producing fingerling striped bass in hatcheries for stocking into reservoirs and coastal rivers. Coastal populations of striped bass in the Savannah River, in southeast Georgia, are maintained by annual stocking (GDNR, 2007).

Elba Express Pipeline

The proposed Elba Express Pipeline would cross 352 surface waters, including 161 perennial stream/river crossings, 150 intermittent/ephemeral stream crossings, 11 ponds and 30 manmade ditches. Appendix H provides a list of the waterbodies crossed and state fishery classification. Of the total waterbodies that would be crossed by the proposed pipeline, 5 are 100 feet wide or greater and are considered major waterbodies (Little River, Broad River, Beaverdam Creek [Richard B. Russell Lake], Coldwater Creek, and the Savannah River. The Savannah River is the only waterbody known to contain federally listed species. Special status fish species are discussed in section 4.7.

With the exception of the Savannah River, all waterbodies crossed by the Elba Express Pipeline are warmwater fisheries. Typical warmwater fish species found in the project area include largemouth bass, spotted bass, bream, black crappie, spotted suckers, blue and channel catfish, darters, minnows, drum, spotted gar, and eels. Warmwater invertebrates include mussels, and white river crayfish. The waters of the Savannah River downstream of the Lake Hartwell Dam to the headwaters of Richard B. Russell Lake are considered a Trout-Put, Grow, and Take by the South Carolina Department of Health and Environmental Control. The GDNR considers these waters a “Secondary Trout Stream” which are capable of supporting trout year-round but there has been no evidence of reproduction.

4.6.2.1 Fish and Invertebrates

Fish and invertebrate species found in the Savannah River and South Channel near the Terminal Expansion site and waterbodies crossed by the Elba Express Pipeline are presented in section 4.6.2. No coral reefs occur within the Terminal Expansion site or along the waterway for LNG marine traffic.

The NOAA Fisheries, the South Atlantic Fishery Management Council (SAFMC), and the Mid-Atlantic Fishery Management Council (MAFMC) have identified EFH in the vicinity of the proposed Terminal Expansion facilities. Impacts on sensitive fisheries and EFH are further described in section 4.6.3 and appendix J.

4.6.2.2 Construction Impacts to Aquatic Resources

Terminal Expansion

Construction of the proposed Terminal Expansion facilities would require the dredging of approximately 72,000 cubic yards of material from Southern LNG's existing berth on the Savannah River, to modify the slope at the toe of the berthing slip and install a sheet pile bulkhead. In addition, four mooring dolphins would be installed in the existing berthing slip area. Impacts to aquatic resources would occur as a result of these modifications to the existing berthing slip area. Impacts on sensitive fisheries and EFH are further described in section 4.6.3 and appendix J. Impacts on surface waters and special status species are discussed in detail in sections 4.3.3 and 4.7, respectively. No other waterbodies that support aquatic resources occur on the terminal site.

Construction activities along the boundaries of the existing berthing slip area could result in siltation at the water's edge and temporarily increase turbidity and/or the suspension of solids within the water column. Increases in turbidity can affect fish physiology and/or behavior. Potential physiological effects include mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, and interference with respiratory functions. Possible behavioral effects from increased turbidity include interference with feeding for sight-foraging fish and area avoidance. Alternately, the reduced visibility of predatory fish could lower vulnerability to predation for prey species. Turbidity tends to interfere with light penetration and thus reduces photosynthetic activity by phytoplankton. Such reductions in primary production would be localized around the immediate area of the existing berthing slip and would be limited to the duration of the sedimentation plume at the existing berthing slip.

Excessive nutrient loading from sediment resuspension could also have an adverse impact upon the harbor because it could cause dramatic increases in the productivity of planktonic algal populations. The particles that would be resuspended as a result of dredging are fine silt and clays that would wash out of the channel before settling. If particles are suspended higher in the water column, or in deeper water, the settling time and distance would be greater. EEC would comply with any project-specific recommendations or requirements to minimize suspension of sediments that are attached to dredging permits. In general, impacts of dredging on water

turbidity are expected to be localized, short-term, and minor. These impacts would likely be similar to current maintenance dredging impacts associated with the berthing slip.

Southern LNG would use a hydrolic cutterhead dredge for its proposed berth modifications. This activity within the existing berthing slip would cause some sediment to become suspended and would increase turbidity temporarily, lowering the water quality within a localized area of the dredging activities. The Savannah River has a naturally high suspended sediment load which, during storm events, is expected to increase well beyond the 200 mg/L increase typically created by a hydraulic dredge. In addition, during storm events the higher suspended sediment loads would likely be more uniform throughout the water column due to mixing as the sediment proceeds downstream. Therefore, the potential effects of increased suspended sediments would be short term and insignificant, due to the relatively short duration of construction.

Southern LNG would conduct water sampling before and throughout dredging operations to ensure that standards specified in its previous COE permit would not be exceeded for total suspended solids or dissolved oxygen.

In its comments on the draft EIS, Southern LNG indicated that it would use a vibratory hammer to install sheet piling at the toe of the existing berthing slip and conventional diesel pile drivers to install two mooring dolphins located in open water at the mouth of the slip, about 0.3- and 0.4-mile from the South Carolina shoreline. Pile driving activities, in some cases, can generate intense underwater sound pressure waves that can adversely affect nearby marine organisms including marine mammals, sea turtles, and fish. Although the effects of pile driving are poorly studied and there appears to be substantial variation in a species' response to sound, intense sound pressure waves can change fish behavior or injure/kill fish through rupturing swim bladders or causing internal hemorrhaging. The degree to which an individual fish exposed to sound waves would be affected is dependent upon variables such as the peak sound pressure level and frequency as well as the species, size, and condition of a fish (*e.g.*, small fish are more prone to injury by intense sound waves than are larger fish of the same species). In some cases, sound pressure levels greater than 155 decibels can elicit avoidance behaviors or stun small fish (NOAA Fisheries, 2003). Sounds greater than 190 decibels are thought to physically injure some fish (Hastings, 2002). The presence of predators can also influence how a fish might be affected by pile driving (*e.g.*, fish stunned by pile driving activities may be more susceptible to predators).

The Atlantic bottlenose dolphin is common along the coast of Georgia and near the mouth of the Savannah River. Southern LNG indicated that pile driving activities could affect local bottlenose dolphin populations by masking dolphin vocalizations; however, these impacts would be minimized due the bottlenose dolphin's directional hearing and ability to adjust vocalization amplitude and frequency, and the structured content of bottlenose dolphin echolocation signals. Since bottlenose dolphins are known to inhabit the Savannah River area, where construction and operational noise from other sources already exists, it is expected that this species will continue to forage within and near the Savannah River despite the additional noise generated from pile driving activities at the Terminal Expansion site.

The intensity of the sound pressure levels produced during pile driving depends on a variety of factors including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile driving hammer. For example, driving hollow steel piles with impact hammers produce intense, sharp spikes of sound that can injure fish. In some cases, fish may be startled by the first few strikes of an impact hammer. However, this response can wane and the fish may remain in the area (NOAA Fisheries, 2001). As such, the potential effect on fish from impact hammers could be magnified since fish would not only be exposed to intense sound waves but may not avoid pile driving activities, which would prolong their exposure to the potentially harmful sounds and increase their risk of injury or death. In a review of studies documenting fish kills associated with pile driving, NOAA Fisheries (2003) reported that all fish kills were during use of an impact hammer on hollow steel piles.

Driving steel pipe piles with an impact hammer in similar settings has been shown to generate sound levels from 192 to 194 decibels, above the level that is thought to injure some fish. Depending on the specific conditions at the site, these sounds can have a transmission loss rate of 0.021 to 0.046 decibels per foot (Nedwell and Edwards, 2002; Nedwell et al., 2003). Based on these values, the use of an impact hammer could generate underwater sound levels great enough to affect some fish as far as 190 feet (*i.e.*, 190 decibels) and 1,860 feet (*i.e.*, 155 decibels) from a steel pile. Although the sound waves of the greatest intensity would be limited to the immediate vicinity of the piles within the existing berthing slip, sound levels of 155 decibels could extend to the far shore of the Savannah River while piles are being driven. Southern LNG indicated that it would use concrete piles which generate less noise that steel piles because concrete has a less resonant quality than steel, an octagonal or square shaped concrete pile is less efficient at transmitting sound than a cylindrical steel pile, and concrete piles are typically smaller than steel piles. Typically, steel hammers to drive steel piles generate more noise (220 decibel peaks at 33 feet) than steel hammers used to drive concrete piles (180 to 195 decibel peaks at 33 feet). Southern LNG indicated in its filing that the sound level at 50 feet from the pile driving equipment would be 210 db re 1µPa which is greater than the 195 1µPa which would be expected to elicit avoidance behavior in most species. Therefore, we believe impacts from pile driving activities could be exceeded.

In its comments on the draft EIS, Southern LNG and NMFS indicated that they were in consultation regarding these pile driving concerns and are determining mitigation measures to further reduce the potential to harm fish in the vicinity of pile driving activities at the two open water mooring dolphins located at the mouth of the berthing slip, about 0.3- and 0.4- mile from the South Carolina shoreline. These measure could include a start-stop procedure which would allow the operator to control the vibration frequency of pile driver apparatus or a soft-start procedure in which pile driving would be initiated at an energy level less than full capacity (*i.e.*, approximately 40 to 60 percent energy levels) for at least 5 minutes before gradually escalate to full capacity.

Although the area may be used for foraging, the impact area would be small and any behavioral avoidance would not be expected to reduce the foraging success of any listed species since ample foraging habitat is available in the surrounding area. However, the potential for auditory injury exists for any animals within close range of the pile driving activity. In addition to the potential

for harm from pile driving noise and other general marine construction activities are expected to occur intermittently over a period of several months. During this period, sea turtles and fish may be affected by the operation of boats and equipment associated with expansion of the marine terminal. To reduce the potential of harm from pile driving and any long-term, intermittent disturbance to these species resulting from the construction activities, Southern LNG has developed a *Marine Species Protection Plan* that would reduce any potential impacts to discountable levels. This plan includes the following measures:

- inform all construction personnel associated with the Project that there are civil and criminal penalties for harming, harassing, or killing sea turtles and/or dolphins, which are protected under the ESA and the MMPA and the responsible party would be held accountable for any sea turtle or dolphin harmed, harassed, or killed as a result of pile driving activities;

- all vessels associated with pile driving work would operate at "no wake/idle" speeds at all times while in water where the drafts of the vessels provide less than 4 feet clearance from the bottom and would follow routes of deep water whenever possible;

- the power (or fuel setting) of the hammer should be reduced to the minimum energy level required to drive the piles thereby reducing the amount of noise produced in the marine environment;

- ensure that no impact hammering in open water would be initiated upon the sighting of sea turtles or dolphins within 328 feet of the Project area. Surveillance of the 328-foot boundary would start 10 to 15 minutes prior to pile driving as this distance would provide a buffer zone three times the area over which it has been concluded is the potential physical harm distance. If observed, impact hammering would be delayed until the sea turtles or dolphins have not been seen in the Project area for at least 30 minutes.

- any collision with or noted injury to a sea turtle or dolphin would be reported immediately to the COE, GDNR, and the NMFS;

- the pile driving contractor would keep a log detailing sightings, collisions, or injury to sea turtles or dolphins that occur during the contract period;

- if dead or injured protected species are observed and are unrelated to the Project, they would be reported, as requested, to the local stranding network contacts while all other observed dead or injured protected species would be reported to NMFS's Southeast Regional Office; and

- upon Project completion, a report summarizing all incidents and sightings would be submitted to the NMFS's Southeast Regional Office.

Because consultation is not yet complete, **we recommend that Southern LNG continue to consult with NMFS to minimize noise impacts associated with pile driving activities and file the results of this consultation with the Secretary prior to construction.**

Hydrostatic test water intakes would be appropriately screened with a 1/2-inch wire-mesh to prevent the entrainment of large particles during hydrostatic test water withdrawal. To prevent the impingement/entrainment of fish species on the screens, screen boxes would be sized such that the velocity of the inflowing water at the screen surface would be significantly less than the typical maximum swimming velocities of adult fish species of concern in the Savannah River (less than 0.5 foot per second). Additionally, Southern LNG has agreed to place intakes at a depth recommended by appropriate agencies to further reduce the possibility of entraining eggs, ichthyoplankton, and fish larvae. Further, we have recommended that Southern LNG not conduct hydrostatic test water withdrawals for LNG storage tank testing in estuarine habitats from April 1 through July 31. Hydrostatic testwater discharges would be into an aboveground structure and allowed to flow into the South Channel of the Savannah River in accordance with permit requirements. Hydrostatic testing is further discussed in section 4.3.3. No chemicals would be added to the hydrostatic test water before or after testing. Therefore, we believe there would be no significant impacts on aquatic species or habitats as a result of discharging hydrostatic test water.

Elba Express Pipeline

Impacts on fisheries resources resulting from pipeline construction activities at waterbody crossings can include sedimentation and turbidity, alteration or removal of instream and stream bank cover, introduction of water pollutants, or entrainment of small organisms during hydrostatic testing. Studies generally have indicated that pipeline construction through waterbodies results in temporary impacts on streams and rivers, and that there are no long-term effects on water temperature, pH, dissolved oxygen, benthic invertebrate populations, or fish populations (Vinkour and Shubert, 1987; Blais and Simpson, 1997).

EEC proposes to open-cut all perennial waterbody crossings except two manmade ditches and two unnamed intermittent streams associated with the crossing of Georgia State Highway 21 at MP 0.1, which would be conventionally bored, the Broad River at MP 161.0 and the Savannah River at MP 187.5, which would be crossed by the HDD method.

An open-cut crossing would result in short-term increases in turbidity and siltation downstream of the pipeline crossing sites. The concentration of suspended solids would decrease rapidly following the completion of in-stream work. The increased siltation may cause decreased flow of oxygenated water to benthic organisms and fish eggs, resulting in degradation of benthic and spawning habitat. Direct loss of spawning habitat, benthic invertebrates, and protective cover may occur at the pipeline crossing location due to trenching and backfilling. However, any sedimentation and turbidity resulting from construction would be short-term. Where feasible, waterbody crossings would occur during periods of low or no-flow. EEC would construct all waterbody crossings in accordance with the construction and mitigation measures in its Procedures. EEC's Procedures require completion of most instream work within 24 hours for waterbodies 10 feet wide or less, and within 48 hours for streams between 10 and 100 feet in width.

EEC has requested permission from the FWS, GDNR, and SCDNR, to conduct stream crossings in warmwater fisheries during all months of the year. In its comments on the draft EIS, EEC indicated that GDNR provided authorization for construction in warm water fisheries during all months of the year provided construction takes place during normal or low water levels. In South Carolina, EEC would cross the Savannah River and an intermittent stream by the HDD method. EEC states within its Procedures, it would use its discretion to utilize the most appropriate crossing method for the location during a time period within its construction schedule. This is in accordance with our Wetland and Waterbody Construction and Mitigation Procedures which state, construction within warmwater streams should occur from June 1 through November 30 unless expressly permitted by the appropriate state agencies (*i.e.*, GDNR) in writing on a site-specific basis to provide these waterbodies greater protection.

Use of EEC's Procedures would reduce impacts on fisheries from construction-induced sedimentation and turbidity. Trench spoil would be stored within the approved ROW on or above the stream banks at least 10 feet from the water's edge. Temporary erosion control devices would be installed around spoil piles to minimize the potential for sediment-laden water to enter the stream. Additionally, all staging and temporary workspace areas would be located at least 50 feet back from the water's edge where topographic conditions permit (unless otherwise permitted), thus minimizing the potential for erosion and sedimentation along the stream banks.

Impacts on water quality from the open-cut crossing would be short-term and suspended sediment concentrations would be expected to return to pre-construction levels soon after construction across the waterbody is completed. Because of EEC's proposed use of its Procedures, impact on fish and other freshwater aquatic organisms is expected to be very localized and short-term.

Hydrostatic testing the integrity of the completed pipelines would occur following construction, which would require water to be withdrawn from surface waterbodies in close proximity to the pipeline (see table 4.3-1). Water withdrawal could potentially entrain fish eggs and juvenile fish. To minimize the potential for this impact, EEC would implement its Procedures, which include covering the intake hose with an adequately sized mesh screen to reduce the potential for fish and fish egg entrainment. Therefore, impacts to the fisheries resources from hydrostatic testing would be minimal with the use of these preventative measures.

To minimize the potential for spills, EEC would implement the project-wide Spill Plan, and it's Procedures which include spill prevention and response guidelines.

4.6.2.3 Operational Impacts to Aquatic Resources

Terminal Expansion

Species at the terminal and along the vessel transit route are described above in sections 4.6.2, 4.6.3, and 4.7. Operation of the proposed Terminal Expansion facilities would result in a potential increase of 95 additional LNG vessels docking and unloading LNG cargo at the Elba Island Terminal. The additional LNG vessels would traverse the Savannah River transit corridor, dock, and offload LNG cargo in the same manner as existing LNG marine traffic that

currently calls on the terminal. However, the LNG vessels would take on ballast water while discharging LNG cargo in order to maintain a constant draft at the berth. Aquatic species in the immediate vicinity of the vessels berth could be impacted by entrainment during ballast water intake. Ballast water intakes on LNG vessels are near the bottom of the vessels, therefore entrainment would be limited to organisms in the deeper water column (25-30 feet below the surface) near the bottom of the basin. Ballast water intake by additional vessels at the terminal would be similar to ballast water intake by vessels that currently call on the terminal, as well as others that unload cargo at other points of call along the Savannah River and this impact would not add appreciably to current impacts. In addition to water withdrawal for ballast, LNG vessels may also withdraw water for cooling vessels boilers. Steam-powered vessels require more cooling water than comparably sized diesel-powered vessels. It is estimated that a steam-powered LNG vessel moored at the terminal would intake and discharge approximately 9,842 cubic meters per hour, or a total of 57 million gallons, to completely off-load (an operation lasting approximately 22 hours). Southern LNG has stated that it would minimize the volume of water that would be used for vessel operations while at the berth.

Southern LNG indicated that striped bass and red drum were identified as particular species with eggs and larvae that could be affected by ballast and cooling water intakes, and the withdrawal of hydrostatic test water. Although spawning within the Savannah River could occur for red drum, no specific spawning grounds or migration patterns are known to exist (see appendix J). In its comments on the draft EIS, NMFS indicated that red drum larvae from eggs released near the mouth of the Savannah River are likely to be carried up river to the terminal location. Since red drum larvae are buoyant and float on or near the waters surface, impacts from water withdrawals at or near the bottom of vessels for ballast or cooling water would not be expected to have a significant impact on this species. NMFS also indicated that juvenile white shrimp may use adjacent salt marsh and subtidal mudflats for feeding and nursery. As stated in appendix J, white shrimp are common in the project area and prefer a more unconsolidated muddy substrate. No Habitat Areas of Particular Concern have been identified for shrimp in the proposed project area. Further, impacts from dredging operations (such as turbidity) would be minimal, localized, and short term. Impacts associated with vessel water withdrawal activities would be similar to those currently existing at the terminal and along the Savannah River. In addition, no salt marsh habitat would be disturbed by the expansion of Southern LNG's terminal. The GDNR's recovery program for striped bass includes restoration of the fishery to the Savannah River. It is unlikely that viable striped bass eggs or larvae would be affected by ballast water intake, or withdrawal of the hydrostatic test water, since eggs and larvae require lower salinities than is found around Elba Island. Southern LNG indicated that during a 2003 USGS study conducted near the southern end of Elba Island, no juvenile or adult striped bass were caught. All larvae were caught in oligohaline and tidal freshwater habitats which do not occur near Elba Island. This finding was further confirmed in a study conducted by the Georgia Cooperative Fish and Wildlife Research Unit during 2001. Therefore, we do not believe that striped bass would be affected by ballast and cooling water intakes, or the withdrawal of hydrostatic test water.

The LNG vessels would take on seawater ballast while discharging LNG cargo in order to maintain a constant draft at the berth. Aquatic species in the immediate vicinity of the vessel berth could be impacted by entrainment during ballast water intake. Ballast water intakes on LNG vessels are near the bottom of the vessels, therefore entrainment would be limited to

organisms in the deeper water column (25-30 feet below the surface) near the bottom of the basin. Additionally, the ballast water intakes have bars spaced 0.5-inch apart to further reduce the entrainment of fish species. Egg and larvae counts along major rivers indicate they are mainly concentrated along the river banks. However, the potential to entrain plankton, fish eggs, and larvae still exists. Ballast water intake by additional vessels at Southern LNG's Terminal would be similar to intake by vessels that currently call on the terminal, as well as others that unload cargo at other points of call within the Savannah River. While it is unknown as to the total impact from ballast and cooling water to eggs and larvae, we would not expect these additional vessels to add appreciably to current impacts. In addition to water withdrawal for ballast, LNG vessels may also withdraw water for cooling vessels boilers. The specific volumes needed for this operation are not available; however, based on the limited annual LNG vessel traffic, it would not result in appreciative impacts beyond that described for ballast water intake. Cooling water intakes are typically located adjacent to and at the same approximate depth as ballast water intakes. Based on the fact that the screening and flow control measures used for ballast water uptake would also be used for cooling water uptake to allow most juvenile and adult fish species to escape the intakes, we do not believe that impingement and entrainment would be a significant concern.

LNG vessels calling from international ports could potentially introduce aquatic invasive species into U.S. waters. However, LNG vessels would be fully loaded with LNG when arriving at Elba Island. No releases of ballast water would occur within the Savannah River from these LNG vessels; therefore, no impacts on aquatic species or habitats would occur as a result of discharge of LNG vessel ballast water. It is expected that any LNG vessels calling on the terminal would be in full compliance with the domestic requirements for ballast water management as specified in the National Invasive Species Act of 1996 and international standards that were adopted on February 13, 2004.

In addition, the Coast Guard has developed responses to exotic/invasive species associated with foreign vessels and its Office of Operating and Environmental Standards developed Mandatory Practices for All Vessels with Ballast Tanks on All Waters of the United States. The mandatory practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin and to remove fouling organisms that may be affixed to vessel hulls, piping, and tanks. The removal of organisms would be conducted on a regular basis and the disposal of any removed substances would be in accordance with local, state, and federal regulations. Therefore, we conclude that the introduction of non-indigenous attached species via vessel hulls is not likely to significantly alter the local biotic community.

Potentially adverse effects from the proposed LNG expansion are associated with vessel strikes to marine mammals protected under the Marine Mammal Protection Act (MMPA). Adverse reactions by whales to vessel activity have been recorded, and all are vulnerable to collisions with vessels, with incidents of strikes with juveniles and caves occurring more frequently than with adult animals. Some individuals may be able to detect and avoid underway vessels; however, the behavior of some individuals and age classes may result in an increased vulnerability to disturbance from vessels operating at speeds over 10 knots.

Waterway for LNG Marine Traffic

Potential impacts on aquatic resources that result from an increase in LNG marine traffic associated with the project would be similar to those resulting from current LNG vessels as well as other vessels using the navigation channel. Aquatic resources at the terminal and along the waterway are described further in section 4.6.2.1. The threatened and endangered species discussion is within section 4.7 and Essential Fish Habitat is discussed within section 4.6.3 and appendix J. Entrainment of fish eggs and larvae would be possible during transit as a result of the withdrawal of water for vessel engine cooling. However, because vessels would be constantly moving, this impact would be minimal at any specific location and insignificant along the waterway for LNG marine traffic. Section 4.6.2.3 further describes impacts associated with cooling water withdrawal. Tybee National Wildlife Refuge is adjacent to the proposed transit route. Because the previous LNG terminal expansion appears to have had no effect on Tybee National Wildlife Refuge, the small increase in vessel traffic associated with this proposed expansion (3 percent) would not be expected to significantly affect the habitat, fish, or wildlife of the Tybee National Wildlife Refuge either. No significant impact on aquatic resources as a result of increased LNG marine traffic is expected within the transit corridor. Some behavioral effects could occur during vessel transit, particularly with dolphins. Dolphins often approach vessels that are in transit to bowride. Bottlenose dolphins appear to have longer interbreath intervals, decreased interanimal distances, heading changes, and increased swimming speed in response to approaching boats. Shipping vessels may increase the noise levels within the water column. These noise increases have been shown to impact a variety of species, such as whales, dolphins, and manatees. However, the transit corridor entering the Savannah River and the river itself are used quite heavily, and the incremental increase in shipping traffic would have minimal effects on those species. Further, Southern LNG has agreed to include the NOAA Fisheries Vessel Strike Avoidance Policy (see appendix K) as part of its Terminal Use Agreement with LNG vessel operators. This would reduce the possibility of marine mammals or sea turtles being impacted by the proposed expansion (either by collisions or noise impacts).

As offshore vessels approach barrier island habitat, there is a potential that vessel wake, combined with wind-wave action and scour effects from the channel, could lead to bank erosion. This has the potential to disturb shorebird and sea turtle nesting habitat. However, as discussed earlier, Southern LNG's previous expansion project has not been reported to have affected the Tybee National Wildlife Refuge located within the river mouth, and this project would result in a similar increase in vessel traffic. Increased vessel traffic may temporarily disturb sargassum habitat if present within the navigation corridor. However, vessel activities would not result in the harvest of sargassum habitat and would be expected to be intermittent with minor and localized impacts.

If an unignited LNG spill were to occur along the transit route, given that LNG is lighter than water, the LNG would float on the water until it had vaporized, possibly reaching shore. The primary impact on aquatic resources (*i.e.*, fish, turtles, whales, etc.) would be LNG rapidly boiling upon contact with water, resulting in the rapid cooling of the water within the LNG pool, located within Zone 1 (Zones of Concern are described in section 4.12.4.3 of this EIS). If the LNG were to contact any aquatic species within Zone 1, the species could be injured or expired. Further, because the colder water would be more dense than the ambient water, it would sink to

the bottom and could affect the benthos in the area of the incident. Mobile species would be expected to move from the area until water temperatures return to normal. However, non-mobile species, such as oysters, could be subjected to the cold (the further from the spill, the less water temperatures would be affected). The oysters within the zones of concern are Crassostrea virginica and able to withstand a wide range of temperatures. Sea turtles however are sensitive to temperature changes, and would be expected to avoid the area, if possible, until temperatures returned to ambient levels. If an associated fire were to occur with the release of LNG, impacts to species within Zone 1 would be limited to species on or near the water's surface in the vicinity of the fire. Radiant heat within Zone 2 may impact some species on the water's surface. Impacts to Tybee National Wildlife Refuge (such as burning of vegetation and increased sedimentation caused by an associated fire) could impact many species, such as nesting turtles. No impacts would be expected on species within Zone 3 from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any species on the surface within its path. However, because of the marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS), the likelihood of a LNG vessel spill from collisions, allisions and terrorist attacks would be extremely remote. Further, species that reside in deep water would likely be unaffected or temporarily affected from a spill or resulting fire.

Elba Express Pipeline

Restoration of the pipeline ROW would minimize erosion potential relative to waterbodies. Impacts on aquatic resources are not anticipated during pipeline operation. Adherence to EEC's Plan and Procedures would allow for the continued re-growth of vegetation along the edges of the waterbodies minimizing long-term effects to fisheries.

4.6.3 Essential Fish Habitat

In 1996, new habitat conservation provisions were added to the MSFCMA that mandated the identification of EFH for managed species. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802(10)). The MSFCMA granted the NOAA Fisheries legislative authority for fisheries regulation in the United States within a jurisdictional area located between 3 and 200 miles offshore, depending on geographical location. NOAA Fisheries was also granted legislative authority to establish eight regional fishery management councils, each responsible for the proper management and harvest of finfish and shellfish resources within their respective geographic regions. Fishery management councils developed Fisheries Management Plans (FMP), which outline measures to ensure the proper management and harvest of finfish and shellfish within these waters. The Savannah River estuary associated with the Terminal Expansion site lies within the management jurisdiction of the SAFMC and MAFMC.

Federal agencies that authorize, fund, or undertake activities that may adversely impact EFH must consult with the NOAA Fisheries. Although absolute criteria have not been established for conducting EFH consultations, NOAA Fisheries recommends consolidated EFH consultations with interagency coordination procedures required by other statutes, such as the NEPA and ESA,

to reduce duplication and improve efficiency. Generally, the EFH consultation process includes the following steps:

1. Notification – The action agency should clearly state the process being used for EFH consultations (*e.g.*, incorporating EFH consultation into the EIS or Rivers and Harbors Act Section 10 permit).
2. EFH Assessment – The action agency should prepare an EFH Assessment that includes both identification of affected EFH and an assessment of impacts. Specifically, the EFH should include: 1) a description of the proposed action; 2) an analysis of the effects (including cumulative effects) of the proposed action on EFH, the managed fish species, and major prey species; 3) the federal agency's views regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable.
3. EFH Conservation Recommendations – After reviewing the EFH Assessment, NOAA Fisheries would provide recommendations to the action agency regarding measures that can be taken by that agency to conserve EFH.
4. Agency Response – The action agency must respond to NOAA Fisheries within 30 days of receiving NOAA Fisheries' recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH.

FERC staff proposes to incorporate EFH consultations for the Terminal Expansion facilities with the interagency coordination procedures required under NEPA. For purposes of reviewing this project under NEPA, the FERC is the lead federal agency and the COE and Coast Guard are cooperating agencies (see section 1.2). As such, we requested on April 17, 2007, that NOAA Fisheries consider the draft EIS as initiation of EFH consultation. The EFH Assessment includes the analysis in section 4.6 as well as the document in appendix J. NOAA Fisheries responded to our request with several points of clarification and two conservation recommendations (*i.e.*, vessel water withdrawal restrictions and time of year restrictions for hydrostatic test water withdrawal). We have added recommendations to this EIS to address both of these concerns (section 4.3.3 of this EIS).

4.7 THREATENED, ENDANGERED AND OTHER SPECIAL STATUS SPECIES

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species that are protected under the ESA, as amended, or are considered as candidates for such listing by the FWS or NOAA Fisheries, and those species that are state-listed as threatened or endangered.

Southern LNG, acting as the FERC's non-federal representative for the purpose of complying with Section 7(a)(2) of the ESA, initiated informal consultation with the FWS, NMFS, and the GDNR on January 26, 2006, regarding federally listed species with the potential to be affected by the proposed Terminal Expansion facilities and along the proposed vessel transit route. EEC initiated consultation with the FWS, NMFS, GDNR, and SCDNR on January 13, 2006, regarding federally listed species with the potential to be affected by the proposed Elba Express Pipeline

Project. Initial consultations concluded that the Georgia Field Office of the FWS would serve as the lead FWS office for the project consultations.

Section 7 of the ESA requires the lead federal agency (in this case, the FERC) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. The agency is required to consult with the FWS and/or the NMFS to determine whether any federally-listed endangered or threatened species or their designated critical habitat are found in the vicinity of the proposed project, and to determine the proposed action's potential effects on those species or critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitats, the federal agency must prepare a BA for those species that may be affected. The action agency must submit its BA to the FWS and/or the NMFS and, if it is determined that the action may adversely affect a federally listed species, the lead federal agency must submit a request for formal consultation to comply with Section 7 of the ESA. In response, the FWS and/or NMFS would issue a Biological Opinion as to whether or not the federal action would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. In compliance with Section 7 of the ESA, we have previously requested (on April 17, 2006) that the FWS and NMFS consider the draft EIS, along with the various survey reports and other information prepared by Southern LNG and EEC (submitted separately), as our BA for the proposed Elba III Project.

For purposes of this environmental analysis, special status species of plants and animals include species officially listed by the states of Georgia and South Carolina or the federal government as endangered, threatened, or rare; or species noted as sensitive or of special concern by the GDNR, SCDNR, FWS, or NMFS. To assist in compliance with Section 7 of the ESA, Southern LNG and EEC initiated informal consultation with the FWS and NMFS regarding the presence of federally listed or proposed endangered and threatened species along the projects and the vessel transit route. Additionally, Southern LNG and EEC have assisted the Commission in meeting its Section 7 obligations by conducting surveys for federally listed threatened or endangered species and their critical habitats in the project area and along the vessel transit route. Impacts that could result from an ignited or unignited spill along the vessel transit route are described at the end of this section and the zones of concern are outlined in figures 4.7-1 to 4.7-3.

Terminal Expansion, LNG Marine Traffic, and Elba Express Pipeline

Agency consultations, together with previous studies and a review of updated lists of threatened and endangered species, initially identified 31 federally listed species and 30 state listed species that potentially occur along the vessel transit route, at the Terminal Expansion and Elba Express Pipeline Projects. These federally listed species identified during surveys or with suitable habitat within the project area are described below and in tables 4.7-1 and 4.7-2. No marine protected areas or marine sanctuaries occur within the Terminal Expansion site or along the waterway for LNG marine traffic.

TABLE 4.7-1

Federal and State Listed Species Eliminated From Detailed NEPA Analysis for the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) - County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Plants					
Climbing buckthorn *(Sageretia minutiflora)*	--	ST		**Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Dwarf Sumac *Rhus michauxii*	FE	SE	--	**Pipeline** (GA) – Burke, Jenkins, Glascock, Warren, McDuffie, Wilkes, Elbert, Hart	Suitable habitat is not present within the Project area.
Dwarf witch-alder *Fothergilla gardenia*	--	ST	--	**Pipeline** (GA) – Effingham, Screven, Jenkins, Burke	Suitable habitat is not present within the Project area.
Mat-forming Quillwort *Isoetes tegetiformans*	FE	SE	--	**Pipeline** (GA) – McDuffie, Wilkes	Suitable habitat is not present within the Project area.
Narrow-leaf Dragonhead Tidal Marsh Obedient Plant *Physostegia leptophylla*	--	SE	--	**Pipeline** (GA) - Chatham **Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area.
Sandhill Rosemary *Ceratiola ericoides*	--	ST	--	**Pipeline** (GA) – Screven, Jenkins, Burke	Suitable habitat is not present within the Project area.
Shoals Spiderlily *Hymenocallis coronaria*	FC	SE	--	**Pipeline** (GA) –McDuffie, Wilkes, Elbert	Suitable habitat is not present within the Project area.
Smooth Coneflower *Echinacea laevigata*	FE	SE	SE	**Pipeline** (GA) – Hart; (SC) - Anderson	Suitable habitat is not present within the Project area.
Birds					
Bachman's Warbler *Vermivora bachmanii*	--	SE	--	**Pipeline** (GA) – Chatham, Effingham, Screven, Burke, Jefferson, Jenkins, Glascock, Warren, McDuffie, Wilkes, Elbert, Hart; (SC) - Anderson **Terminal** (GA) – Chatham	Suitable habitat is not present within the Project area. No individuals identified during field surveys.
Kirtland's Warbler *Dendroica kirtlandii*	FE	SE	--	**Pipeline** (GA) – Chatham, Effingham, Screven, Burke, Jefferson, Jenkins, Glascock, Warren, McDuffie, Wilkes, Elbert, Hart; (SC) - Anderson **Terminal** (GA) – Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Least Tern *Sterna antillarum*	FE	SR	ST	**Pipeline, Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Piping Plover *Charadrius melodus*	FT	ST	--	**Pipeline, Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.

TABLE 4.7-1 (continued)

Federal and State Listed Species Eliminated From Detailed NEPA Analysis for the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) - County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Red-cockaded Woodpecker *Picoides borealis*	FE	SE	SE	**Pipeline** (GA) - Chatham, Effingham, Screven, Jenkins, Burke, Jefferson **Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Seaside sparrow *Ammodramus maritimus*	FPS	--	--	**Terminal** (GA) - Chatham	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Reptiles					
Spotted Turtle*Clemmys guttata*	--	--	ST	**Vessel Transit Route** (SC) - Jasper	Suitable habitat is not present within the Project area
Amphibians					
Gopher Frog *Rana capito*	--	ST	SE	**Pipeline** (GA) - Chatham, Effingham, Screven, Jenkins, Burke	Suitable habitat is not present within the Project area.
Webster's Salamander *Plethodon websteri*	--	--	SE	**Pipeline** (SC) - Anderson	Suitable habitat is not present within the Project area.
Dwarf Siren *Pseudobranchus striatus*	----	--	ST	**Vessel Transit Route** (SC) - Jasper	Suitable habitat is not present within the Project area.
Mammals					
Rafinesque's Bigeared Bat *Corynorhinus rafinesquii*	--	SR	SE	Not listed in any counties crossed by the Pipeline or Terminal	Suitable habitat is not present within the Project area.
Round-tailed Muskrat *Neofiber alleni*	--	ST	--	**Pipeline** (GA) - Chatham, Effingham, Screven	Suitable habitat is not present within the Project area.

a/ Source: Georgia's and South Carolina's List of Federally Listed Species, the South Carolina Rare, Threatened, and Endangered Species Inventory and the List of Georgia "State Protected" Species.

b/ Legal Statuses:
Federal: Species with the Statuses of FE (Federal Endangered), FT (Federal Threatened), T(S/A) (Threatened because of Similarity of Appearance), FC (Federal Candidate), FPS (Federal Partial Status, Listed in a Portion of its Range) are Legally Protected under the U.S. Endangered Species Act of 1973.
Georgia: Species with the Statuses of SE (State Endangered), ST (State Threatened), SR (Rare Species); SU (State Unusual), SPS (State Partial Status, Listed in a Portion of its Range) are Legally Protected under the Georgia Endangered Wildlife (1973) and the Georgia Wildflower Preservation Act (1973).
South Carolina: Species with the Statuses of SE (State Endangered), ST (State Threatened), and LS (Species of Special Concern) Are Legally Protected under the South Carolina Code of Laws Section 50.

TABLE 4.7-2

Federal and State Listed Species Potentially Occurring in the Vicinity of the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Mammals					
Blue whale *Balaenoptera musculus*	FE	--	--	**Vessel Transit Route** (GA)	Thrive in deep waters off the continental shelf. Suitable habitat present along the waterway for LNG marine traffic.
Fin whale *Balaenoptera physalus*	FE	--	--	**Vessel Transit Route** (GA)	Thrive in deep waters off the continental shelf. Suitable habitat present along the waterway for LNG marine traffic.
Humpback whale *Megaptera novaeangliae*	FE	SE	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic
North Atlantic right whale *Eubalaena glacialis*	FE	SE	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.
Sei whale *Balaenoptera borealis*	FE	--	--	**Vessel Transit Route** (GA)	Thrive in deep waters off the continental shelf. Suitable habitat present along the waterway for LNG marine traffic.
Sperm whale *Physeter macrocephalus*	FE	--	--	**Vessel Transit Route** (GA)	Thrive in deep waters off the continental shelf. Suitable habitat present along the waterway for LNG marine traffic.
West Indian Manatee *Trichechus manatus*	FE	SE	SE	**Vessel Transit Route** (GA) m	Suitable habitat is not present within the Project area; no individuals identified during field surveys.
Reptiles					
American Alligator *Alligator mississippiensis*	T(S/A)	--	--	**Pipeline** -(GA**) -** All Counties	Suitable habitat present along pipeline route.
Eastern Indigo Snake *Drymarchon corais couperi*	FT	ST	--	**Pipeline** (GA) - Chatham, Effingham, Screven **Terminal** (GA) - Chatham	**Pipeline** - Suitable habitat present **Terminal** - No suitable habitat present
Gopher Tortoise *Gopherus polyphemus*	--	ST	SE	**Pipeline** (GA) - Chatham, Effingham, Screven, Jenkins, Burke, Jefferson **Terminal** (GA) - Chatham	**Pipeline** - Individuals were identified within the Project area. **Terminal** – No suitable habitat present
Green sea turtle *Chelonia mydas*	FT	--	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.
Hawksbill sea turtle *Eretmochelys imbricata*	FE	--	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.
Kemp's Ridley sea turtle *Lepidochelys kempii*	FE	--	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.

TABLE 4.7-2 (continued)

Federal and State Listed Species Potentially Occurring in the Vicinity of the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Leatherback sea turtle *Dermochelys coriacea*	FE	--	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.
Loggerhead sea turtle *Caretta caretta*	FT	--	--	**Vessel Transit Route** (GA)	Suitable habitat present along the waterway for LNG marine traffic.
Fish					
Atlantic Sturgeon *Acipenser oxyrhynchus oxyrhynchus*	FC	--	SSC	**Pipeline** (GA) - Chatham	**Pipeline** - Suitable habitat present
Bluebarred Pygmy Sunfish *Elassoma okatie*	--	SE	--	**Pipeline** (GA) - Burke, Jefferson, Warren, McDuffie	Habitat at all crossings of the Brier Creek system and its tributaries
Robust Redhorse *Moxostoma rubustum*	--	SE	--	**Pipeline** (GA) **-** Effingham, Screven, Wilkes, Elbert	**Pipeline** - Suitable habitat present
Sandbar Shiner *Notropis scepticus*	--	SR	--	**Pipeline** (GA) - McDuffie, Wilkes, Elbert, Hart	Suitable habitat present
Shortnose Sturgeon *Acipenser brevirostrum*	FE	SE	SE	**Pipeline, Terminal** (GA) – Chatham and **Vessel Transit Route** (GA)	**Pipeline** - No suitable habitat present, **Terminal** – Suitable habitat present
Birds					
Bald Eagle *Haliaeetus leucocephalis*	--	SE	SE	**Pipeline** (GA) - Chatham, Jefferson, McDuffie, Wilkes, Hart; (SC) – Anderson **Terminal** (GA) – Chatham and **Vessel Transit Route** (GA)	**Pipeline** - No individuals or nests observed. Suitable habitat occurs within 0.5 miles of waterbodies throughout pipeline route. **Terminal** – No suitable habitat present, but is present along the transit route.
Peregrine Falcon *Falco peregrinus*	--	SE	SE	Not listed in any counties crossed by the Pipeline or Terminal and Vessel Transit Route	No individuals or nests observed; however, suitable foraging habitat occurs throughout pipeline route. **.**
Swallow-tailed Kite *Elanoides forficatus*	--	SR	SE	**Pipeline** (GA) – All counties	Suitable habitat present
Wood Stork *Myctera americana*	FE	SE	SE	**Pipeline** (GA) - Chatham, Effingham, Screven, Jenkins, Burke, Jefferson, Glascock, Warren, McDuffie, Wilkes, Elbert, Hart; (SC) – Anderson **Terminal** (GA) – Chatham and **Vessel Transit Route** (GA)	**Pipeline** - Individuals were identified within the Project area. **Terminal** – No Suitable habitat present, but is present along the transit route.

TABLE 4.7-2 (continued)

Federal and State Listed Species Potentially Occurring in the Vicinity of the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Gull-billed Tern *Sterna nilotica*	--	ST	--	**Pipeline, Terminal** (GA) – Chatham **Vessel Transit Route** (GA)	Suitable habitat is not present within the terminal or pipeline area but is present along the transit route.
Wilson's plover *Charadrius wilsonia*	--	SR	ST	**Pipeline, Terminal** (GA) – Chatham **Vessel Transit Route** (GA)	Suitable habitat is not present within the terminal or pipeline area but is present along the transit route.
Amphibians					
Flatwoods Salamander *Ambystoma cingulatum*	FT	SR	SE	**Pipeline** (GA) - Chatham, Effingham, Screven **Terminal** (GA) – Chatham	**Pipeline** - Suitable habitat present **Terminal** – No suitable habitat present
Invertebrates					
Atlantic Pigtoe Mussel *Fusconaia masoni*	--	SE	--	**Pipeline** (GA) - Jenkins, Jefferson	Suitable habitat present
Crustacean					
Broad River Burrowing Crayfish *Distocambarus devexus*	--	ST	--	**Pipeline** (GA) - Wilkes, Elbert	Suitable habitat within the Broad River watershed
Lean Crayfish *Cambarus strigosus*	--	ST	--	**Pipeline** (GA) - Wilkes, Elbert	Suitable habitat within the Broad River watershed
Plants					
Canby's Dropwort *Oxypolis canbyi*	FE	SE	SE	**Pipeline** (GA) - Screven, Burke, Jenkins	Suitable habitat present
Granite Stonecrop *Sedum pusillum*	--	ST	--	**Pipeline** (GA) – Elbert, Wilkes	Suitable habitat present
Granite Whitlow-grass *Draba aprica*	--	SE	--	**Pipeline** (GA) - Wilkes, Warren, McDuffie	Suitable habitat present
Indian Olive *Nestronia umbellula*	--	ST	--	**Pipeline** (GA) - Burke, Jenkins, Glascock, Warren, McDuffie, Wilkes, Elbert, and Hart; (SC) – Anderson	Suitable habitat present
Ocmulgee Skullcap *Scutellaria ocmulgee*	--	ST	--	**Pipeline** (GA) - Burke and McDuffie	Suitable habitat present
Oglethorpe Oak *Quercus oglethorpensis*	--	ST	--	**Pipeline** (GA) - Hart, Elbert, Wilkes	Individuals were identified within the project area.
Parrot Pitcher Plant *Sarracenia psittacina*	--	ST	--	**Pipeline** (GA) – All counties	Suitable habitat present
Pondberry *Lindera melissifolia*	FE	SE	SE	**Pipeline** (GA) – Effingham, Screven **Terminal** (GA) – Chatham	**Pipeline** - Suitable habitat present **Terminal** – No suitable habitat present
Pondspice *Litsea aestivalis*	--	ST	--	**Pipeline** (GA) – Effingham, Chatham	Suitable habitat present

TABLE 4.7-2 (continued)

Federal and State Listed Species Potentially Occurring in the Vicinity of the Proposed Terminal Expansion and Elba Express Pipeline a/

Common Name	Status			Project Component (State) County Where Species May Occur in Project Area	Comments
	Federal b/	Georgia b/	South Carolina b/		
Pool Sprite *Amphianthus pusillus*	FT	ST	ST	**Pipeline** (GA) - Wilkes, Warren, McDuffie	Suitable habitat present
Sweet Pitcherplant *Sarracenia rubra*	--	SE	--	**Pipeline** (GA) - Effingham, Screven, Burke, Jefferson	Suitable habitat present

a/ Source: Georgia's and South Carolina's List of Federally Listed Species, the South Carolina Rare, Threatened, and Endangered Species Inventory and the List of Georgia "State Protected" Species.

b/ Legal Statuses:
Federal: Species with the Statuses of FE (Federal Endangered), FT (Federal Threatened), FC (Federal Candidate) T(S/A) (Threatened because of Similarity of Appearance) Are Legally Protected under the U.S. Endangered Species Act of 1973.
Georgia: Species with the Statuses of SE (State Endangered), ST (State Threatened), SR (Rare Species), SSC (State Special Concern) are Legally Protected under the Georgia Endangered Wildlife (1973) and the Georgia Wildflower Preservation Act (1973).
South Carolina: Species with the Statuses of SE (State Endangered), ST (State Threatened), and LS (Species of Special Concern) Are Legally Protected under the South Carolina Code of Laws Section 50.

TABLE 4.7-3

Recorded Occurrences of Federal and State Listed Threatened and Endangered Species within 1,500 Feet of the Elba Express Pipeline

County / State	Milepost	Genus and Species	Common Name	Distance from Centerline (ft)	Direction from Centerline	Comment
Elbert / GA	161.1	Quercus oglethorpensis	Oglethorpe oak	1190	West	Approximately 30 trees and seedlings
Elbert / GA	162.1	Quercus oglethorpensis	Oglethorpe oak	132	West	Coordinates are approximately 107 ft outside planned workspace. Not identified during field surveys.
Hart / GA	187.7	Notropis scepticus	Sandbar shiner	838	West	None

Source: GNHP 2006a.

Based on review of available literature and the results of field surveys conducted by Southern LNG and EEC, we believe that the projects would have *no affect* on 20 of these species because the Elba III Project would not be within the known range of the species or because the Elba III Project would not impact habitat for the species (table 4.7-1). These 20 species are not addressed further in this EIS. The remaining 41 species are listed in table 4.7-2 and discussed below.

The Natural Heritage Programs of Georgia and South Carolina maintain databases of known occurrences of federal and state threatened and endangered species. Table 4.7-3 identifies all occurrences of federal and state threatened and endangered species within 1,500 feet of the Elba Express Pipeline.

EEC submitted the results of its surveys to the FWS, GDNR, and SCDNR to request concurrence of its determination of no impact for species without potential habitat or individuals identified in the project area. Additionally, EEC asked the FWS, GDNR, and SCDNR to examine its species-specific surveys, monitoring, and/or mitigation, as necessary, for species with potential habitat in the project area. To further protect listed species that potentially occur within the project area, **we recommend where protected species or their habitat exists, and surveys were conducted over one year prior to the start of construction, EEC should consult with the FWS to assess the need for additional surveys prior to construction.**

4.7.1 Federally Listed Threatened and Endangered Species

Terminal Expansion and LNG Marine Traffic

Six federally protected species of whales (Blue, Fin, Humpback, North Atlantic right, Sei, and Sperm), West Indian manatee, and five sea turtle species (Green sea, Hawksbill, Kemp's Ridley, Leatherback, and Loggerhead) could potentially occur along the LNG vessel transit corridor.

Blue, Fin, Humpback, Sei, and Sperm Whales

Blue and Sei Whale

The distribution of the sei whale (*Balaenoptera borealis*) and blue whale (*Balaenoptera musculus)* are uncommon off the mid-Atlantic in the Project area. The sei whale's range is in northern waters. The southern limits of its spring and summer range include the Gulf of Maine and Georges Bank. It is often found in the deeper waters of the continental shelf edge. The blue whale's range extends from the Arctic Ocean to mid-latitude waters and is often sighted off of eastern Canada (NOAA Fisheries, 2007).

Fin Whale

The fin whale (*Balaenoptera physalus*) is common from Cape Hatteras north to the Gulf of Maine. In this area, fin whales may be the dominant large cetacean species year round, with the largest standing stock, food requirements, and impact on the marine ecosystem. It is likely that fin whales occurring in the eastern Atlantic undergo migrations into Canadian waters, open ocean areas, and subtropical or tropical regions (NOAA Fisheries, 2007).

Humpback Whale

The federally -endangered humpback whale is medium in size, attaining lengths of up to 50 feet and weights of up to 30 tons. Humpback whales are charcoal gray with lighter colored pectoral flippers. These whales are found in all the world's oceans but are less common in arctic areas. In winter, these whales seek out waters near coastal areas and islands in temperate and tropical areas where they probably mate and give birth.

The western north Atlantic stock of humpback whales includes whales using feeding areas in the Gulf of Maine, Gulf of St. Lawrence, Newfoundland, Labrador, western Greenland, and the

Iceland-Denmark strait. Humpback whales have been observed off Georgia and Florida during the winter. The NMFS has produced a recovery plan for the humpback whale. The major recommendations of the plan are to protect habitats that are important to humpback whales, continue prohibition on commercial harvesting of humpbacks, and reduce fishing gear entanglements.

Sperm Whale

Sperm whales (*Physeter macrocephalus*) are found throughout the world's oceans in deep waters to the edge of the ice at both poles. Sperm whales generally occur in waters greater than 984 feet and prefer continental margins, sea mounts, and areas of upwelling where food is abundant (NOAA Fisheries, 2007).

Blue, Fin, Humpback, Sei, and Sperm Whale Impacts

The Blue, Fin, Humpback, Sei, and Sperm whales usually do not occur in relatively shallow waters such as those found near the Elba III Project, however, they could potentially be impacted by collisions with LNG vessels that are transiting to and from the terminal in the Atlantic Ocean. A system of shipping safety fairways[26] and fairway anchorages has been established for the Atlantic Ocean and is shown on some, but not all, navigation charts. These fairways are near port entrances and along coastal trade routes, but do not extend across or into the deep waters of the Atlantic Ocean. The likelihood of these whales encountering LNG vessels in the open ocean would be inherently low given their ability to avoid oncoming vessels coupled with their overall rarity.

To reduce the risk associated with vessel strikes or disturbance of protected species, Southern LNG would include the NMFS Vessel Strike Avoidance Policy (see appendix K) as part of its Terminal Use Agreement with LNG Vessel operators. NMFS recently issued this policy to address vessels involved in the transport of LNG. This policy includes recommendations for vessel strike avoidance such as using a reference guide that includes and helps identify the whales and sea turtles that may be encountered; maintaining a vigilant watch for marine mammals and slowing down or stopping vessels to avoid striking protected species; maintaining a distance of 150 feet for sea turtles or small cetaceans and 300 feet for whales; maintaining a parallel direction to the animal's course and avoiding excessive speed or abrupt changes in direction when protected species are in the area; reducing vessel speeds to 10 knots or less when pods or large assemblages of cetaceans are observed near an underway vessel; and reducing speed and shifting engines to neutral when protected species are sighted in the vessel's path or near a moving vessel. In addition, the policy requires that crews report sightings of any injured or dead protected species immediately to the Mammal and Sea Turtle Stranding Hotline or the Marine Mammal Stranding Network.

Hull-transmitted noise and propeller cavitation could interfere with whale communication by increasing ambient noise levels and masking important signals in the environment. Southern

[26] 33 CFR 166.105 defines a shipping safety fairway as "a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted."

LNG's implementation of the NMFS Vessel Strike Avoidance Policy would reduce speed to 10 knots when cetaceans are observed near an underway vessel. This reduction in speed would reduce hull-transmitted noise and propeller cavitation.

Construction of the Terminal Expansion facilities or Elba Express Pipeline Project would have no impact on Blue, Fin, Humpback, Sei, and Sperm whales. However, an increase in LNG vessel traffic could impact these whale species. Due to their rarity in the project area, these whales are not likely to be encountered by LNG vessels calling on the terminal in the Savannah River. Although the source of LNG supplies for the proposed Terminal Expansion facilities have not yet been identified, LNG vessels calling on the terminal could be expected to arrive from production countries in North Africa, the Middle East, or the southern Caribbean.

In waters of the United States, the major shipping routes into the Savannah River would not cross key habitat areas of any of these whale species. In addition, implementation of the measures included in the Vessel Strike Avoidance Policy as discussed above would minimize potential impacts on these whale species. As such, we have determined that Southern LNG's Terminal Expansion project is *not likely to adversely affect* or significantly impact the Blue, Fin, Humpback, Sei, and Sperm whales.

North Atlantic Right Whale

The federally -endangered North Atlantic right whale (right whale) possibly occurs in the waters near Elba Island in Chatham County, Georgia as well as along the LNG marine traffic corridor (FWS, 2000). The right whale is the world's most endangered large whale and was considered to be extinct until rediscovered in the early 1980's. Right whales calve in shallow coastal waters between Savannah and Cape Canaveral, Florida. Their winter range is largely unknown. Their spring and summer range encompasses areas of the Cape Cod/Massachusetts Bay and waters north to the Bay of Fundy. The current population is estimated at 300 whales. Historical population decline has been linked to unregulated hunting. Current threats include entanglement with fixed fishing gear, vessel collisions, and pollution.

Because right whales are slow moving (estimated at less than a quarter of a mile per hour with a calf, slightly faster without) vessel strikes are a significant human caused threat to this species. Right whales are more likely to be found in shallow, coastal waters than other large whales (GDNR, 1999). Calving off of the coasts of Georgia and Florida is observed between December and March. Usually one calf per female is born every 2-5 years. Right whales feed by skimming at the waters surface through swarms of copepods, with mouths agape and their upper jaw protruding out of the water (GDNR, 1999). On February 17, 2006, a single adult right whale was observed about 20 miles southeast of the mouth of the Savannah River and was traveling in a southerly direction at a moderate rate of speed. This individual was observed in the vicinity of an LNG vessel that was traveling in an easterly direction away from the terminal (Bernhart, 2006). Additionally, a north Atlantic right whale was found dead at the inlet to the Savannah River in December of 2006. It is believed at this time that a vessel strike was the reason for its death.

Because right whales are known to occur in or adjacent to many major shipping corridors along the eastern United States and collisions are known to account for over 50 percent of human-induced mortality in right whales, NOAA Fisheries established a right whale vessel strike reduction program. Despite the measures implemented as part of that program (*e.g.,* aerial surveys to notify mariners of whale locations, supporting shipping industry liaisons, mandatory reporting programs, etc.), right whales continue to be killed by vessel strikes. In response to this continuing problem, NOAA Fisheries developed a Strategy to Reduce Vessel Strikes of right whales, which is intended to minimize the overlap between vessels and whales and reduce the likelihood of vessel strikes to the extent practicable.

Assuming that potential increase of 95 LNG vessels per year could unload cargo at the proposed terminal each year, about 47 would be expected to unload at the terminal during the 6 months, from November 1 to April 30, in which mothers and calves could be present within the transit corridor. These additional 95 vessels approaching and entering the Exclusive Economic Zone (EEZ) and then the Savannah river would be in addition to the existing vessel traffic entering the Savannah River and visiting various ports along the River. The additional vessel traffic likely increases the potential risk of a right whale vessel strike. However, Southern LNG's adherence to NMFS applicable speed restrictions for incoming and outgoing vessels as indicated in appendix K (*Vessel Strike Avoidance and Injured/Dead Protected Species Reporting Policy* [Vessel Strike Avoidance Policy])) would reduce the likelihood of the potential for strikes to right whales.

In addition to the measures that Southern LNG has agreed to, the NMFS further recommends:

- The vessels maintain a distance of 500 yards from right whales (and 100 yards from other listed whales);
- a seasonal speed restriction of 10 knots or less extending 30 nautical miles from shore during the calving season (November 1 to April 30);
- an Automated Identification System (AIS) contacting the inbound or outbound vessel and stating they are within a speed-restricted zone for right whales and requesting acknowledgement of the AIS message;
- the vessels take the most direct course through right whale habitat to reduce encounter rates with animals, while avoiding areas of recent whale sightings;
- distribution of educational materials to LNG vessel operators regarding right whales, information on how to report right whale sightings, and requirements to check maritime advisory information systems for right whale sightings within 30 nautical miles; and
- Southern LNG submit an annual report to NMFS Southeast Regional Office detailing compliance with seasonal speed restrictions within the 30 nautical mile boundary. The annual report would include AIS information recorded from all LNG vessels calling on the terminal in the last calendar year. For each LNG vessel calling on the terminal information submitted for inbound and outbound trips must include:
    - the types of information materials provided to LNG vessel operators regarding right whale identification, reporting, and compliance with protection for this species,
    - a map showing the geo-boundary and course of vessels calling on the LNG terminal,

- the time and date of each arrival and departure, including the name of each LNG vessel,
- the method, time and date the LNG vessel was informed of the speed restriction (by voice or by AID) and if acknowledgement was received from the LNG vessel.
- the speed of the vessel before and after entering the geo-boundary,
- any additional actions taken to inform non-compliant vessels of the speed requirement within the geo-boundary,
- the number of vessels not in compliance with the speed requirement within the geo-boundary,
- detailed reasons related to safe navigation why a vessel did not follow the speed requirements,
- the date and number of right whale sightings provided to LNG vessels, and
- any change of course by an LNG vessel or other measures taken to avoid right whales within the geo-boundary.

In its comments on the draft EIS, Southern LNG stated that it is continuing to consult with the NMFS to determine mitigation measures to further protect the right whale. These measures would include vessel strike avoidance procedures, right whale identification, and notification protocols. Southern LNG has agreed to file its final right whale protection measures with the Director of OEP. Southern LNG would not be authorized to construct the terminal expansion until staff completes Section 7 of the ESA consultation for this species.

Additionally, hull-transmitted noise and propeller cavitation could interfere with whale communication by increasing ambient noise levels and masking important signals in the environment. By Southern LNG's proposed use of the NMFS Vessel Strike Avoidance Policy (see appendix K), it would reduce speed to 10 knots when cetaceans are observed near an underway vessel. This reduction in speed would reduce hull-transmitted noise and propeller cavitation.

The potential for harassment is not expected to result in any significant response on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the level of the population. With implementation of agreed upon mitigation measures, by maintaining a lookout for listed species, and taking prudent actions to avoid collisions with them, we believe that the likelihood of collisions between the vessel and listed species would be reduced to discountable levels.

Construction of the Terminal Expansion facilities or Elba Express Pipeline Project would have no impact on north Atlantic right whales. Although LNG vessels servicing the proposed terminal have the potential to strike right whales in the vicinity of the EEZ and subsequently the Savannah River, adherence to agreed upon mitigation measures, speed restrictions, and other preventative measures proposed by Southern LNG would minimize the potential for strikes such that the proposed project *is not likely to adversely affect* or significantly impact the North Atlantic right whales.

West Indian Manatee

The federally-listed endangered West Indian manatee possibly occurs in the waters of the Savannah River near Elba Island. Winter ranges for manatees include natural and artificial warm water sites in Florida (GDNR, 1999). During summer they expand their range and have been seen as far west as Louisiana on the gulf coast. Manatees often return to the same wintering and summering habitats year after year. Breeding usually takes place in mating herds formed when several males are attracted to a female in estrus. Mating herds can remain together for a few days to over a month, during which time as many as 20 males may compete intensely for access to the focal female (GDNR, 1999). Habitat preferences include sluggish rivers, sheltered marine bays, and shallow estuaries. In Georgia, manatees forage for submerged vegetation such as marsh grass, pickerel weed, green algae, and red algae. Calves usually stay with the mother 1-2 years after conception.

Manatees have been observed infrequently in the Savannah River as far upstream as the King's Island Turning Basin about 11.0 miles upstream of the proposed Terminal Expansion site. However, the occurrence is very rare. Population decline has been mostly due to habitat destruction and vessel collisions, cold stress, and red tides. Population size is difficult to quantify (surveys conducted in Florida in 2001 counted approximately 3,300 individuals based on a single statewide count at warmwater refuges and adjacent areas).

Southern LNG reported that no manatees have been observed in or near its existing slip berth since it has been in operation. Existing mitigation measures would be implemented to prevent injury to manatees should they occur during docking at the terminal. Southern LNG would adhere to the measures contained in the "Standard Manatee Conditions" set forth in its existing COE permit authorizations. These measures include:

- advise all personnel associated with the project that there are civil and criminal penalties for harming, harassing or killing manatees;
- all vessels associated with dredging activities would operate at "no wake/idle" speeds at all times while in water where the draft of the vessel provides less than four feet clearance from the bottom and that vessels would follow routes of deep water whenever possible;
- ensure that all dredging activities in open water would cease upon the sighting of a manatee within 100 yards of the project area. Dredging activities would not resume until the manatees have not been seen in the project area for at least 30 minutes;
- report any collision with a manatee immediately to the COE, FWS, and GDNR;
- maintain a log detailing sightings, collisions, or injury to manatees, which have occurred during the contract period;
- prepare a report summarizing any incidents and sightings and submit the report to the FWS; and
- avoid performing authorized dredging work during the months of May, June and July, if practicable.

Manatees typically inhabit shallow coastal areas, and as such LNG vessels would only be expected to encounter manatees in the near shore areas of the Savannah River. LNG marine

vessels would be within deeper water than manatees would be expected to inhabit. Additionally, the slow speeds that LNG marine vessels travel in near shore areas and the deep propellers would further reduce the likelihood of vessel strikes. Noise associated with the incremental increase in vessel traffic would be minimal, due to the number of vessels currently transiting the Savannah River Channel.

Because of Southern LNG's proposed mitigation measures, we have determined that the proposed Terminal Expansion and vessel transit are *not likely to adversely affect* or significantly impact the West Indian manatee. The proposed Elba Express Pipeline Project does not cross any West Indian manatee suitable habitat. Therefore, we conclude the Elba Express Pipeline Project would have *no effect* on the West Indian manatee.

Sea Turtles

Five species of federally-listed endangered and threatened sea turtles possibly occur in the waters near Elba Island in Chatham County, Georgia (FWS, 2000) and are described below.

Green Sea Turtle

The green sea turtle is federally-listed as threatened. Green sea turtles inhabit shallow habitats with an abundance of marine algae and seagrass such as lagoons, bays, inlets, shoals, and estuaries. They use coral reefs and rocky outcrops near feeding areas to rest, and they feed on marine plants, mollusks, sponges, crustaceans, and jellyfish. They tend to nest on their natal beach (NOAA, 2006). Suitable nesting habitat for this species is not available within the project area.

Hawksbill Sea Turtle

The hawksbill sea turtle is federally-listed as endangered. This species inhabits coastal reefs, bays, rocky areas, estuaries, and lagoons at depths of 70 feet or less. Hawksbill sea turtle hatchlings may be found in the open sea floating on masses of marine plants while juveniles, subadults, and adults may be found near their primary foraging area along coral reefs. Hawksbill sea turtles are omnivorous; however, they prefer to feed on invertebrates such as sponges, mollusks, and sea urchins. Nesting occurs on undisturbed deep-sand beaches, from high-energy beaches to small pocket beaches bounded by crevices of cliff walls with woody vegetation near the waterline (NOAA, 2006).

Hawksbill sea turtles may occasionally pass through Georgia waters as transients. Of the 4,437 turtles in the GDNR stranding database, only two are confirmed for hawksbill sea turtle in Georgia. These records were for deceased turtles found on Cumberland and Jekyll islands (located about 75 and 100 miles south of the Savannah River) during 1998. Suitable nesting habitat for this species is not available within the project area.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is federally-listed as endangered. Kemp's ridley sea turtle inhabit shallow coastal and estuarine waters over sand or mud bottoms. Juveniles feed on sargassum while adults are largely shallow-water benthic feeders. Food items include shrimp, snails, bivalves, jellyfish, and marine plants. Juvenile Kemp's ridley sea turtle may range throughout the Atlantic Ocean, while adults are restricted to the Gulf of Mexico. The majority of this species nests along an 11-mile-long stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico (NOAA, 2006). Suitable nesting habitat for this species is not available within the project area.

Leatherback Sea Turtle

The leatherback sea turtle is federally-listed as endangered. Leatherback sea turtles spend most of their time in the open sea and come to land to nest. They may be found in coastal waters only when nesting or following jellyfish concentrations. They feed mainly on jellyfish and sea squirts as well as sea urchins, crustaceans, fish, and floating seaweed and prefer sandy beaches with a deepwater approach for nesting (NOAA, 2006). Suitable nesting habitat for this species is not available within the project area.

Loggerhead Sea Turtle

The loggerhead sea turtle is federally-listed as threatened. The greatest threats to this sea turtle are coastal development, commercial fisheries, and pollution. Loggerhead sea turtles inhabit continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. Along the Atlantic Coast, their range extends from Newfoundland to as far south as Argentina. Their primary nesting sites are along the east coast of Florida with other sites located on the Gulf Coast of Florida, in Georgia, and along the Carolinas. After hatching, loggerhead hatchlings move to the sea and commonly float on sargassum masses for three to five years. Subadults occupy near-shore and estuarine habitats, whereas adults occupy a variety of habitats that range from turbid bays to clear water. Loggerhead sea turtles feed on a variety of benthic and pelagic food. Loggerhead sea turtles nest on open, sandy beaches above the high tide mark and seaward of well-developed dunes. They prefer steeply sloped beaches with gradually sloped offshore approaches (NOAA, 2006). The loggerhead turtle is known to nest on Tybee Island located at the mouth of the Savannah River, about 8.5 miles downstream from the Terminal Expansion site; however, suitable nesting habitat for this species is not available at the terminal site.

Sea Turtle Impacts

Due to specific nesting habitat requirements, sea turtles would not likely be present onshore at the terminal. In general, sea turtles would be a rare visitor to the terminal area. However, if sea turtles were transient to the terminal area, they would be able to avoid the pile driving activities, sedimentation from dredging activities, and ballast water withdrawals. Effects from pile driving activities during the construction phase would be minimal due to the use of concrete piles. Noise associated with the pile driving activities would be expected to be a maximum of 210 db re 1µPa which is greater than the 195 db re 1µPa that elicit avoidance behaviors. However, a conservative impact zone of 328 feet and 170 db re 1µPa would not be expected to result in any pinch points on the Savannah River and migration would still be able to occur. In its comments on the draft EIS, NMFS indicated it is consulting with Southern LNG regarding these pile

driving concerns and Southern LNG would implement construction guidelines for protected species (see section 4.6.2.2 of this EIS). Due to the level of noise impacts associated with this project, we feel that our recommendation for Southern LNG to continue consultation with NMFS and file the results of those consultations would minimize noise impacts to a less than significant level.

Sedimentation would mostly be contained within the berthing slip. The sediment that would enter the Savannah River Channel would likely be minimal and below levels associated with a storm event. Dredging associated with enlarging the berth would be done with the use of a cutterhead dredge. There have been two reported incidents of "takings" related to sea turtles due to cutterhead dredging. However, given the slow speeds of cutterhead dredges, noise associated with the dredge, and the location of dredging being within the vessel berth, impacts to sea turtles from cutterhead dredges would not be expected. Impacts associated with the use of hydrolic cutterhead dredges are generally considered less than the alternative hopper style dredge that could entrain sea turtles and sturgeon. Withdrawals from ballast water would be similar to those currently underway at the existing terminal site. Ballast water would be taken on through 0.5 inch screens that would reduce the possibility of entrainment.

Many of the sea turtles discussed have feeding, swimming, or resting behaviors that keep them near the surface, where they may be vulnerable to boat strikes. In the open waters of the Atlantic Ocean, the LNG vessels would represent an incrementally small increase in boat traffic over current conditions, relative to the area traversed by sea turtles. The Elba III Project would include a potential increase of 95 LNG vessels per year transiting to the terminal, which would result in a miniscule increase in potential boat strike risk for sea turtles. On approach to the Savannah River Ship Channel, vessel speeds are minimal and boat strike hazards would be further reduced, even when considering the additional vessel traffic posed by the LNG vessels. Slower speeds would also reduce noise impacts that could occur with increased vessel traffic.

The Tybee National Wildlife Refuge provides nesting habitat for sea turtles. No reported increases in sedimentation have been documented due to the previous expansion of LNG shipping traffic due to increased wave action, and none would be expected with this increase in vessel traffic either.

As described above, to help reduce the risk associated with vessel strikes or disturbance of protected species, Southern LNG has agreed to include the NOAA Fisheries Vessel Strike Avoidance Policy as part of its Terminal Use Agreement with LNG Vessel operators (see appendix K). In section 4.6.2.2 of this EIS we further discuss the potential impacts on marine organisms, including sea turtles, which could result from dredging activities, pile driving, and discharge of hydrostatic test water.

With Southern LNG's adherence to NOAA Fisheries Vessel Strike Avoidance Policy and given the rare occurrences of sea turtles in the project area, we believe that the Terminal Expansion facilities are *not likely to adversely affect* or significantly impact sea turtles, and the Elba Express Pipeline Project would have *no effect* on sea turtles.

Atlantic and Shortnose sturgeon

Terminal Expansion and Elba Express Pipeline

The historic range of the federally-listed candidate and South Carolina-listed special concern Atlantic sturgeon extended from the Penobscot River, Maine to the St. Johns River, Florida. The current range has contracted somewhat and extends from the Kennebec River, Maine to the Satilla River, Georgia (NOAA Fisheries and FWS, 2007). The Satilla River is about 88 miles south of the Savannah River. Currently, Atlantic sturgeon are present in 32 rivers and spawning populations have been documented in 14 rivers, and possibly, in an additional five rivers. The NMFS, FWS, and USGS are currently in the process of updating the NOAA Fisheries and FWS 1998 status review report for Atlantic sturgeon due to concerns over the current status of this species throughout its range (NOAA Fisheries, 2007a). In its 1998 status review report, NOAA Fisheries and FWS indicted that the Savannah River supports a reproducing population of Atlantic sturgeon (NOAA Fisheries and FWS, 2007). Threats to the Atlantic sturgeon populations include over-harvest and habitat degradation (NOAA Fisheries, 2007b).

Because of the highly migratory nature of the Atlantic sturgeon, it requires access to an expansive variety of high quality freshwater and marine habitats. Adult Atlantic sturgeon migrate through nearshore Atlantic shelf waters and enter coastal sounds, bays and inlets to access the river basins in which they spawn. Atlantic sturgeon spawns in freshwater channel habitats from tidal river reaches to at least as far inland as the fall line in large, unobstructed river basins. Both spawning and egg survival to hatching are dependent upon habitats with low to moderate flows and limited sedimentation. During the fall and winter, Atlantic sturgeon move seaward into brackish and estuarine channels and it over winters in deep channels and holes within coastal sounds and bays (SCDNR 2007).

The federally-listed endangered and state-listed endangered shortnose sturgeon possibly occurs near Elba Island in Chatham County, Georgia (FWS, 2000) and in major waterbodies (greater than 100 feet wide) along the proposed pipeline route. Shortnose sturgeon are known to spawn within the Savannah River at spawning sites about 10 miles north of Elba Island. The shortnose sturgeon's range extends from the St. John's River in Florida to the St. John River in New Brunswick, Canada (GDNR, 1999). Threats to the shortnose sturgeon populations include over-harvest, incidental killing by drifting gill nets, and spawning habitat alteration due to dredging and alteration of the flows in rivers.

Shortnose sturgeon inhabit large coastal rivers and are considered anadromous, meaning they travel up large coastal rivers to spawn but reside in the lower river estuaries the rest of the year (GDNR, 1999). Their breeding preferences include swift waters over gravel or course substrate usually associated with submerged timber. Upstream migration begins in February when water temperatures exceed 9° C (48° F), and migration downstream to the estuaries begins in March (GDNR, 1999). Spawning in males begins at age 2-3, whereas females mature at age 6 in Georgia (GDNR, 1999). Females lay as many as 200,000 eggs on course substrates.

After hatching, larvae drift down river from the spawning site prior to becoming demersal. Young, juvenile, and adult stages of the shortnose sturgeon are known to be demersal and rely

upon benthic food resources. Young shortnose sturgeon reach a size of 5.5 to 11.8 inches in length and are capable of readily avoiding velocities of 1.0 foot per second.

As discussed in section 4.3.3, pump intakes would be appropriately screened with a 1/2-inch wire-mesh to prevent the entrainment of large particles during hydrostatic test water withdrawal. To prevent the impingement/entrainment of fish species on the screens, screen boxes would be sized such that the velocity of the inflowing water at the screen surface would be significantly less than the typical maximum swimming velocities of adult fish species of concern in the Savannah River (less than 0.5 foot per second). The LNG vessels calling on the Elba Island Terminal would take on ballast while discharging LNG. Ballast water intake by additional vessels at the terminal would be similar to ballast water intake by vessels that currently call on the terminal, as well as others that unload cargo at other points of call along the Savannah River transit corridor and this impact would not add appreciably to current impacts.

Noise associated with the installation of the sheet pile bulkhead would be minimal because of the use of a vibratory hammer. Conversely, noise associated with the pile driving activities would be expected to be a maximum of 210 db re 1µPa which is greater than the 195 db re 1µPa that elicit avoidance behaviors. However, a conservative impact zone of 328 feet at 170 db re 1µPa would not be expected to result in any pinch points on the Savannah River and migration would be able to occur. In its comments on the draft EIS, NMFS indicated that Southern LNG is consulting with the NMFS regarding these pile driving concerns and would implement construction guidelines for protected species (see section 4.6.2.2 of this EIS). We have also recommended that Southern LNG continue its consultation to further reduce noise impacts associated with pile driving activities.

Sedimentation would mostly be contained within the berthing slip. The sediment that would enter the Savannah River Channel would likely be minimal and below levels associated with a storm event. Dredging associated with enlarging the berth would be done with the use of a cutterhead dredge. Given the slow speeds of cutterhead dredges, noise associated with the dredge, and the location of dredging being within the vessel berth, impacts to shortnose sturgeon from cutterhead dredges would not be expected. Withdrawals from ballast water would be similar to those currently underway at the existing terminal site. Ballast water would be taken on through 0.5 inch screens that would reduce the possibility of entrainment.

Water quality impacts associated with dredging at the berth are discussed in section 4.3.3.

Both the Ogeechee River and Savannah River have historic (Atlantic) and known (shortnose) populations of sturgeon. The Elba Express Pipeline would cross Ogeechee Creek at MP 33.9 which is about 3.5 miles northeast of the Ogeechee River. Although a population of Atlantic sturgeon apparently persisted in the Ogeechee River, results of sampling efforts during 1991 to 1994, 1997, and 1998 suggest that juveniles were scarce and apparently absent in some years, indicating spawning or recruitment failure (NOAA Fisheries and FWS, 2007). EEC would not cross the Ogeechee River. The Elba Express Pipeline would cross the Savannah River at MP 187.5, below the New Savannah Bluff Lock and Dam and two dams above the Augusta Diversion Dam. Although potential sturgeon habitat occurs in this area, currently there is no passage at the Augusta Diversion Dam through which the shortnose or Atlantic sturgeon can

migrate into the northern reaches of the Savannah River. Since EEC would employ the HDD method for crossing the Savannah River no impacts are anticipated to the Atlantic or shortnose sturgeon (see section 4.6.2).

The currently proposed Elba III Project includes construction and operation of the Terminal Expansion and Elba Express Pipeline facilities as well as additional LNG vessels calling on the Elba Island Terminal. As discussed in section 4.6.2, Southern LNG and EEC would implement measures to avoid, minimize, or mitigate impacts on aquatic species, including the shortnose sturgeon. We believe that the proposed Elba III Project (*i.e.*, expansion of the LNG Terminal, construction and operation of the Elba Express Pipeline, and additional LNG vessels calling on the Terminal) is *not likely to adversely affect* or significantly impact the Atlantic or shortnose sturgeon.

Elba Express Pipeline

American Alligator

Numbers and distribution of the American alligator do not support federal listing of the alligator as threatened, but rather it is listed due to similarity in appearance with the American crocodile. The alligator inhabits freshwater swamps and marshes, but is also found in rivers, lakes, and smaller bodies of water. Nesting times vary, but can be expected to occur in late spring to early summer (FWS, 2000). This species may potentially occur in South Carolina and Georgia near the Elba Express Pipeline Project.

Impacts on this species resulting from construction of the Elba Express Pipeline Project would be temporary as individuals may be disturbed and displaced to adjacent wet habitat. It is likely that individuals would return to the wet habitats traversed by the pipeline ROW after the completion of construction. Additionally, although there would be the conversion of swamp forests to marsh and shrub swamps, long-term adverse effects on the species are not expected because American alligators use all of the above habitats. Thus, we conclude the Elba Express Pipeline Project is *not likely to adversely affect* the American alligator.

Eastern Indigo Snake

The federally-listed and Georgia state threatened eastern indigo snake possibly occurs in or near Elba Island in Chatham County, Georgia (FWS, 2000), and along the proposed pipeline route in Chatham, Effingham, and Screven counties, Georgia. Historically the eastern indigo snake ranged from southern South Carolina south and west to southeastern Mississippi. Current data show only small, fragmented populations in southern Georgia and Florida. Eastern indigo snakes are thought to rely heavily on burrows of the gopher tortoise for wintering, and the documented reduction in gopher tortoise populations is thought to have had a cause and effect relationship on the indigo snake. Another contributing factor to the decline of the eastern indigo snake is thought to be the lack of natural communities within the coastal plain, which is a result of agricultural and silvicultural development.

In warmer months, the eastern indigo snake prefers foraging habitat on the edge of wetland areas where frogs and snakes are present. Flood plains or the periphery of cypress ponds, either adjacent or interspersed with sandy uplands, are used during the summer months. Eastern indigo snakes are closely associated with longleaf pine habitats, such as sand hills and turkey oak. Prey consists of a variety of birds, small mammals, fishes, frogs, turtles, lizards, and snakes. Home range size is large during warmer months, sometimes greater than 250 acres. Upland sand ridges are preferred during the winter months. Breeding occurs from November until April, and females usually lay 5-10 eggs in May or June (GDNR, 1999). Nests are usually placed in tortoise burrows.

During field surveys, EEC initially identified gopher tortoise burrows in three locations along the proposed pipeline route in Screven County, Georgia (MPs 33.2, 33.3, and 34.5). There were a total of 26 gopher tortoise burrows identified during the initial field surveys conducted during April 2006. Of this amount, 18 were active burrows, 2 were inactive, and 6 were abandoned. Given the preference of indigo snakes to utilize gopher tortoise burrows during the winter season, the potential exists for snakes to be affected during construction through areas of gopher tortoise burrows. In order to avoid impacts on eastern indigo snakes occupying gopher tortoise burrows, EEC has proposed to implement the following measures along the Elba Express Pipeline Project:

- conduct pre-construction surveys of the proposed construction corridor, all proposed facilities sites, all pipe storage/contractor work yards, and all adjacent areas that have been previously identified as suitable habitat for gopher tortoises and commensal species (species that may also use gopher tortoise burrows), and that may be potentially disturbed during construction. Each burrow would be inspected with a remote video system to determine occupancy by tortoises and/or protected commensal species;
- scope and check gopher tortoise burrows for eastern indigo snake sign (tracks, shed skins, eggs, *etc.*) before they are excavated and collapsed. Any vertebrate species utilizing the burrows during this period would be allowed to vacate the burrow or would be relocated (excluding indigo snakes, which would be allowed to leave the burrows of their own accord and not relocated) to an unused burrow in adjacent habitat off of the ROW; and
- monitor any eastern indigo snake eggs found within a gopher tortoise burrow until the eggs hatch and the snakes leave the burrow. Once gopher tortoise burrows are vacated by eastern indigo snakes the burrows would be excavated and collapsed and the work area would be fenced to prevent the immigration of eastern indigo snakes and laying of eggs.

In its comments on the draft EIS, EEC stated that all construction activities within the vicinity of occupied gopher tortoise burrows would be monitored by biologists with previous gopher tortoise and indigo snake experience. All construction areas, open trenches, and spoil piles in the vicinity of the occupied gopher tortoise burrows would be inspected daily prior to the initiation of construction activities. If new burrows are found the measures described above would be implemented.

In the event that a new burrow is discovered during construction and it is determined it is being used by an eastern indigo snake, EEC would allow the snake to vacate the burrow prior to

resuming construction in that area. If an indigo snake is seen on the construction ROW, EEC would cease all activities until the snake has left the area.

Although capture and relocation of indigo snakes would likely avoid adverse direct impacts on the individuals, handling of snakes would be considered harm under the definition of the ESA and would require formal consultation between the FERC staff and the FWS. However, if EEC could allow individual snakes to leave burrows on their own accord or avoid those burrows occupied by snakes during construction and therefore avoid handling, adverse impacts on snakes could be also avoided. Given the low likelihood of encountering eastern indigo snakes along the Elba Express Pipeline project due to the relatively low number of burrows identified along the project corridor, we believe that EEC should be able to allow this to occur. Because we believe the likelihood of encountering eastern indigo snakes in gopher tortoise burrows occurring along the Elba Express Pipeline project is low and that EEC should be able to allow individual snakes to leave burrows on their own accord or avoid those burrows occupied by snakes during construction and avoid handling of individual snakes if identified during surveys, the Elba Express Pipeline Project is *not likely to adversely affect* the eastern indigo snake.

Wood Stork

The federally-listed endangered wood stork possibly occurs in or near Elba Island in Chatham County, Georgia (FWS, 2000), and along the proposed pipeline route in Anderson County, South Carolina and in Chatham, Effingham, Screven, Jenkins, Burke, Jefferson, Glascock, Warren, McDuffie, Wilkes, Elbert, and Hart counties, Georgia.

The wood stork's breeding range includes the southeastern United States including Florida, Georgia and South Carolina, both coasts of Mexico and Central America, Cuba, and South America from Columbia to Argentina. After the breeding season, wood storks are thought to disperse north to North Carolina, Tennessee, and Arkansas. The main cause of population decline is loss of habitat. The direct loss of feeding habitat through draining and filling of wetlands has caused much of the breeding habitat of Florida to become unsuitable (GDNR, 1999). The breeding population estimates from 1995 indicate around 7,853 breeding pairs in Florida, Georgia, and South Carolina (GDNR, 1999).

Wood storks use a variety of estuarine and freshwater wetlands for breeding, feeding, and roosting. Wood stork breeding generally begins in summer when the birds gather in large communal roosts along coastal areas. They are colonial nesters, and several nests are often located in the same tree. Colony sizes range from 12 to 500 nests. Nests are located in trees over standing water or in trees next to water. Storks sometimes forage considerable distances from nesting sites. Forage mainly consists of fish, crayfish, amphibians, and small aquatic animals. In Georgia and South Carolina breeding begins in March, with clutch sizes from 2 to 5 eggs (GDNR, 1999). Incubation takes from 27 to 32 days, and the young fledge around 12 weeks after hatching.

A known wood stork rookery is located approximately 5 miles west of the proposed pipeline route near MP 70.0 at the Big Dukes Natural Area in Jenkins County, Georgia, and is the largest

known wood stork breeding colony in Georgia. The proposed pipeline would occur within foraging habitat for the adult wood storks.

The FWS has developed *Habitat Management Guidelines for the Wood Stork in the Southeast Region* which include mitigation measures such as: establishment of a buffer zone (*i.e.*, no human intrusion) of 300 feet around feeding sites where a solid vegetation screen exists; establishment of a buffer zone 750 feet in areas with no vegetation screen; establishment of a 1,000- to 1,500-foot primary zone buffer in all directions from the actual colony boundary when there are no visual or broad aquatic barriers (never less than 500 feet when there are strong visual or aquatic barriers); establishment of a secondary zone buffer that extends to a radius of 2,500 feet from the outer edge of the colony; avoidance of human activities within 500 to 1,000 feet of roost sites during the seasons of the year and times of day when storks may be present, especially avoidance of nocturnal activities; and protection of vegetative and hydrological characteristics of the more important roosting sites, which are those that are used annually and/or used by flocks of 25 or more storks.

EEC indicated that foraging habitat is located within the project area. Any disruption to this habitat would be temporary. Further, EEC has agreed to stop construction in the event any wood storks are present during construction.

EEC indicated that it would address potential impacts and mitigation requirements for the wood stork in its Sensitive Species Mitigation Plan (SSMP), which would be prepared in consultation with the FWS, GDNR, SCDNR, and NOAA Fisheries. Implementation of mitigation measures agreed to by EEC and consultations with the appropriate federal and state agencies would minimize impacts on wood storks such that we believe that the Elba Express Pipeline project is *not likely to adversely affect* the wood stork.

Flatwoods Salamander

The federally-listed threatened and South Carolina endangered flatwoods salamander possibly occurs in or near Elba Island in Chatham County, Georgia (FWS, 2000). Initial field surveys conducted by EEC revealed that potentially suitable flatwoods salamander habitat occurs along the proposed pipeline route in Effingham, Chatham, and Screven counties, Georgia. The flatwoods salamander is restricted to the Coastal Plain of South Carolina, Georgia, Florida, and Alabama. This salamander is endemic to mesic flatwoods habitats within the vanishing longleaf pine, wiregrass community type (GDNR, 1999). Habitat loss has been the primary reason for the salamander's decline throughout its native range. Agricultural and silvicultural practices have diminished the once abundant longleaf pine flatwoods community. Ditching and draining often accompany these practices, altering the hydrology of the soils. This has an effect on the fossorial and aquatic existence of the salamander, as well as interfering with the successful migration of the species. Ditching and draining isolated wetlands used by breeding flatwoods salamanders significantly shortens their hydroperiod, halting larval development prior to metamorphosis (GDNR, 1999). Fire suppression has also reduced the amount of suitable habitat.

Flatwoods salamander habitat includes pine flatwoods, which are fire-dependent communities requiring periodic burns to promote grasses and forbs, while limiting shrubs and hardwoods. As

adults, flatwoods salamanders are fossorial, living in burrows below the soil surface. Breeding sites are typically shallow, ephemeral cypress and/or swamp tupelo ponds or "domes," though flooded roadside ditches and fire lines are occasionally used. Breeding areas also depend on frequent dry season fires to keep emergent and subemergent vegetation the dominant species composition. Breeding begins with the onset of cold rains in the fall to early winter (GDNR, 1999). Mature salamanders nocturnally migrate in large groups to isolated wetlands. Movements of up to a mile or more have been reported from the breeding site to a terrestrial retreat. After breeding, the female deposits up to 225 eggs singly or in groups in the dry portion of a pond basin or in grassy areas on pond margins, usually under leaf litter or logs, at the base of grassy clumps, or at the entrance of crayfish burrows. After hatching, an 11-18 week developmental period follows and larvae metamorphose in March or April. Since EEC would construct its pipeline during the summer and winter months, construction related activities could interfere with the breeding season. In its comments on the draft EIS, EEC indicated that biological surveys for flatwoods salamander, and other protected species, would be conducted in the spring of 2008, within one year of the start of construction. If flatwoods salamander are found in the construction work area, EEC would consult with the FWS to develop specific mitigation measures to avoid or minimize impacts to this species and incorporate those measures into its SSMP.

We recommend that EEC file with the Secretary completed surveys for flatwoods salamander habitat along the pipeline route (*i.e.*, MP location of suitable habitat), and provide copies of any correspondence with the FWS including recommended mitigation measures.

By conducting surveys prior to construction to identify areas of suitable flatwoods salamander habitat and implementing measures to avoid impacts on habitat and/or individual salamanders, we conclude the Elba Express Pipeline project *is not likely to adversely affect* flatwoods salamanders.

Canby's Dropwort

Initial field surveys conducted by EEC revealed that potentially suitable habitat for the federally-listed endangered Canby's dropwort possibly occurs in or near the project area in Screven, Burke, and Jenkins counties, Georgia. Historical range includes the Coastal Plain from southwestern Georgia to southeastern North Carolina, disjunct in Maryland, and possibly extirpated in Delaware (GDNR, 1995). Canby's dropwort is rare throughout its range and has experienced significant habitat loss due primarily to draining of its habitat for agricultural land.

Canby's dropwort can be found in peaty muck of shallow cypress ponds, wet pine savannas, and adjacent sloughs and drainage ditches (GDNR, 1995). The white flower of this species is noted as occurring from May through August, although past surveys indicate blooming in the project area occurs between late July and October.

Pondberry

The federally-listed endangered pondberry possibly occurs in or near the proposed Elba Express Pipeline Project in Chatham County, Georgia (FWS, 2000) and initial field surveys conducted by EEC revealed that potentially suitable pondberry habitat occurs along the proposed pipeline route in Effingham and Screven counties, Georgia. The historical range of pondberry is the Southeastern Coastal Plain from North Carolina to Louisiana and north to southeastern Missouri in the Mississippi Embayment (apparently extirpated in the Florida Panhandle). Pondberry is rare throughout its range, and has experienced significant habitat loss due to draining of its habitat for conversion to agriculture or pine plantation. The species is dioecious (with separate male and female plants), which makes it much more susceptible to habitat fragmentation. Due to habitat loss, plants become highly isolated, further reducing the chance that pollination would occur. Many remaining populations consist of male plants, usually sprouts from a single individual (GDNR, 1995).

Habitat preference for pondberry is shallow, depressional wetlands and ponds of sandhills, along margins of cypress ponds, and in seasonally wet, low areas among bottomland hardwoods (GDNR, 1995).

Pool Sprite

Initial field surveys conducted by EEC revealed that potentially suitable habitat for the federally-threatened pool sprite potentially occurs along the proposed pipeline route in Wilkes, Warren, and McDuffie counties, Georgia. The pool sprite occurs in shallow flat-bottomed depressions on granite outcrops in the Piedmont of Georgia. Flowering occurs in March and April (Patrick et al. 1995) and the plants disintegrate soon after fruiting. Pool sprite is threatened by disturbances such as cattle grazing, off-road vehicle traffic, and outcrop mining.

EEC has indicated that potentially suitable habitat for Canby's dropwort, pondberry, and poolsprite was present along the pipeline. EEC proposes to re-survey areas of potentially suitable habitat in 2007. **We recommend that if Canby's dropwort, pondberry, and/or poolsprite are identified during surveys, EEC should contact the FWS to obtain guidance regarding a course of action to be taken to avoid or minimize impacts on these species during construction. Prior to construction, EEC should file the completed survey report with the Secretary that contains the following information:**

a. **name(s) and qualifications of the person(s) conducting the survey;**
b. **method(s) used to conduct the survey;**
c. **date(s) of the survey;**
d. **area surveyed (include the MP surveyed); and**
e. **proposed mitigation that would substantially minimize or avoid the potential impacts.**

Copies of all coordination, including any recommended mitigation measures, should be filed for review and approval by the Director of OEP.

By developing construction methods for the project and implementing our recommendations, we believe that the Elba Express Pipeline project is *not likely to adversely affect* Canby's dropwort, pondberry, and poolsprite.

Effects of a Spill on Federally Listed or Special Status Species

Impacts on federally listed species resulting from the proposed increase of LNG vessel traffic in the Savannah River Channel are discussed above; the following discussion addresses potential impact on federally listed species resulting from an LNG hazardous incident. If an unignited LNG spill were to occur along the transit corridor within the Zones of Concern, any listed species within Zone 1 (as defined in section 4.12.4.3 of this EIS) could be impacted. Figures 4.7-1 to 4.7-3 show the locations of threatened and endangered species along the LNG transit route. Because LNG is lighter than water, the LNG would float on the water until it had vaporized.

If any listed species were to come into contact with the LNG, it would experience an extreme temperature change, and could be injured or expired. The LNG from any release along the transit would rapidly cool water within the LNG pool. Because the more dense cold water would settle to the bottom of the channel, it could temporarily impact the benthos and species beneath the pool of LNG. However, the temperature change would be greatest at the surface, with decreasing affects as depth is increased within the water column. Whales and sturgeon within the LNG marine traffic area would not be affected by the cold water or boil effect because they would to be in deep water or avoid the impacted area. Additionally, whales within the project area are less sensitive to colder temperatures than many other species. However, manatees and sea turtles would be expected to avoid, if possible, the colder water due to their sensitivity (as described in section 4.6.2.3 of this EIS). Formation of a cold, heavier-than-air vapor cloud could cause significant impacts on some terrestrial listed species within Zone 1 from asphyxiation. Transient wood storks flying over the spill could experience inhalation problems, and possibly asphyxiate. The marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS) make the likelihood of an LNG vessel spill from collisions, allisions, and terrorist attacks extremely remote. As a result, no significant impact on whales, manatees, sea turtles, wood storks, or sturgeon would be anticipated from an unignited marine LNG spill within Zone 1. No impacts would be expected outside of Zone 1 from a release of LNG.

If a pool fire were to occur in association with a release of LNG, species on or near the surface of the water within Zone 1 could be experience injury or mortality either by the fire or radiant heat. Species within Zone 2 may be impacted by radiant heat, while others may be impacted by displacement from its native habitat. However, given the resilience of vegetation in wet warm climates, and that root systems would likely remain in tact, these impacts would not be expected to be permanent. No impacts would be expected to species within Zone 3 from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any listed species it came in contact with.

Non-Internet Public

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Figure 4.7-1
Invertebrate, Bottlenose Dolphin, and Loggerhead Sea Turtle Areas within Zones of Concern

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

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Figure 4.7-2
Threatened and Endangered Birds within Zones of Concern

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Figure 4.7-3
Fish Species of Concern within Zones of Concern

Federally Listed or Special Status Species Conclusion

Section 7 of the ESA requires a federal agency to consult on a permitted "proposed action" and reasonably foreseeable events associated with that action. A spill event or other emergency type action is not a part of the defined proposed action. The marine transit safety and security measures make the likelihood of an LNG vessel spill from collisions, allisions and terrorist attacks extremely remote. Due to the extremely unlikely nature of a spill from an LNG vessel, we would not modify our affects determinations, as discussed above. If a release of LNG were to occur, and listed species were impacted, we would consult with the FWS and/or NMFS regarding impacts on those species under an emergency consultation (50 CFR §402.05).

Except for areas underlying permanent aboveground facilities, all areas disturbed by construction would be returned to pre-construction conditions, which would restore habitat value of these temporarily disturbed areas. Habitat at sites of permanent aboveground facilities would be converted to industrial use. We believe that implementation of the mitigation measures proposed to protect wildlife, aquatic resources, and habitat as described in section 4.6 of this EIS, as well as species-specific recommendations, would be sufficient to prevent significant adverse effects on threatened and endangered species. Therefore, we believe that the project would have no effect or would not be likely to adversely affect any federally or state-listed threatened or endangered species. However, because we have requested that the FWS and the NMFS consider this EIS as our Biological Assessment for the Terminal Expansion and Elba Express Pipeline Projects with respect to construction, maintenance, and associated operational activities, in order to comply with our responsibilities under Section 7 of the ESA, **we recommend that Southern LNG and EEC not begin construction of facilities for the respective projects until:**

1. **all outstanding biological surveys have been completed;**
2. **the staff completes any necessary consultations with FWS and NMFS; and**
3. **Southern LNG and EEC have received written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.**

4.7.2 State-Listed Threatened, Endangered or Species of Concern

Reptiles

Gopher Tortoise

Gopher tortoise is listed as threatened in the state of Georgia. The gopher tortoise potentially may occur in Chatham, Effingham, Screven, Jenkins, Burke, and Jefferson (MP 0.0 to 107.7) counties of Georgia. This species inhabits sandy coastal plain areas from extreme southern South Carolina to the southeastern corner of Louisiana, and throughout most of Florida. Individuals may occur on well-drained, sandy soils in transitional areas. Gopher tortoises also

are associated with a pine overstory and an open understory with a grass and forb groundcover and sunny areas for nesting. They are commonly found in self-made, unusually long burrows which often are used by other animals. Females lay eggs between late April and mid-July. These eggs hatch between August and September.

During field surveys, EEC initially identified gopher tortoise burrows at three locations along the proposed pipeline route in Screven County, Georgia (MPs 33.2, 33.3, and 34.5). There were a total of 26 gopher tortoise burrows identified during the initial field surveys conducted during April 2006. Of this amount, 18 were active burrows, 2 were inactive, and 6 were abandoned.

If occupied during construction, mechanical crushing of active burrows could result in injury or death of gopher tortoises. Additionally, if gopher tortoises occupying adjacent habitats were present on the ROW during construction, injury or mortality could also occur if the individuals were not avoided. To minimize impacts on this species, EEC has proposed mitigation plans for the gopher tortoise that would be implemented prior to and during construction, and during maintenance of the proposed facilities. Major points from the mitigation plans are summarized below. Any discussion pertaining to "protected commensals" is secondary to measures described for individual species elsewhere in this document, especially for the eastern indigo snake.

Preconstruction Measures

Prior to initiation of construction activities, EEC would survey for gopher tortoise burrows and the presence/absence of indigo snakes. At each identified location EEC would implement the following methodology:

1. Surveyors would walk transects and visually search the area for previously identified, as well as any unidentified, gopher tortoise burrows. The apron and entrance to any gopher tortoise burrow would be examined for snake activity and global positioning system (GPS) locations would be confirmed and/or recorded.

2. After visual observation of the habitat for the presence/absence of gopher tortoise burrows, and indigo snakes, efforts would be made to further analyze the habitat. All active, inactive and abandoned gopher tortoise burrows would be inspected with a remote video system to determine occupancy by indigo snakes, gopher tortoises and/or protected commensal species. Consultations with FWS would be conducted to determine the best alternatives to proceed with construction if indigo snakes are verified by surveyors. After the absence of indigo snakes at an area has been established, all protected commensal species would be given opportunity to leave burrows on their own, or trapped if necessary.

3. All burrows (active, inactive, and abandoned) would be excavated to conclusively determine that they are unoccupied by indigo snakes, gopher tortoises or vertebrate commensals. These activities would be directly supervised by a biologist with previous experience excavating gopher tortoise burrows. Throughout the excavation process, the burrow would be frequently inspected to insure that the tortoise/commensal has not

moved to a position where it might be injured by the backhoe or shovel. Following removal of any tortoise and/or commensal, all excavated burrows would be filled.

4. Gopher tortoise burrows adjacent to the construction corridor would be clearly identified and protected to prevent inadvertent impacts from heavy equipment and related construction activities. Barricade fencing would be erected along the edge of the ROW and would be monitored and repaired/replaced, as necessary, throughout construction. After construction, re-vegetation, and final cleanup of the ROW are complete the fencing would be removed.

5. A survey report documenting the results of the preconstruction survey, capture and displacement of gopher tortoises would include the name(s) and qualifications of the investigator(s); survey date(s); area surveyed (including mileposts); specific burrow location(s) (milepost, distance from pipeline center), and direction; survey method(s); burrow size, condition, and activity level (active, inactive, or old); the individual marking used to identify each relocated tortoise and their associated original and relocated burrow sites; mitigation measures to be implemented and, if applicable, relocation site and date of relocation; and conclusions.

Construction

1. A biologist with previous gopher tortoise and protected commensal experience would be on-site to monitor all construction activities within the vicinity of occupied tortoise burrows.

2. All construction areas, trenches, and spoil piles in the vicinity of occupied gopher tortoise burrows would be inspected daily prior to the start of any construction activities.

3. Any new burrows that are identified during daily surveys would be inspected for occupancy using a remote video system. Occupied burrows would be excavated and the tortoises and/or protected commensals handled for data collection and released into nearby unoccupied/starter burrows following preconstruction procedures.

4. Except in emergency situations, only project biologists and specifically trained EIs would be allowed to handle tortoises and protected commensal species. These individuals would wear pagers and have access to radios and/or cellular phones while in the field.

5. If a gopher tortoise or commensal species is encountered by construction personnel within the construction corridor, all activities that might harm the species would be stopped and a project biologist or EI would be summoned.

6. At no time would construction equipment or fuel be stored (overnight or long-term) within 100 feet of any occupied gopher tortoise burrows. No fueling of equipment would take place within 100 feet of any occupied gopher tortoise burrows.

7. If a gopher tortoise or protected commensal species is found dead during construction activities, the specimen would be frozen and the FWS or GDNR, would be notified within 24 hours of the incident.

Post-Construction ROW Maintenance and Operation

1. Mowing activities would be conducted during the gopher tortoise's inactive season, between November 1 and March 1.

2. EEC would train mowing personnel in gopher tortoise awareness and would provide maps showing the locations of known active/inactive burrows on or near the ROW.

3. Mowers would reduce the speed of power equipment within 50 feet of burrows.

4. Hand pushed mowers and hand-held equipment would be used within 15 feet of tortoise burrows, and maintenance personnel would avoid mowing across the burrow apron, burrow entrance, and the area immediately behind the entrance.

5. Except for travel on existing roads and paths, routine maintenance activities unrelated to vegetation maintenance would be restricted to areas at least 15 feet from tortoise burrows. Where these activities may be required to be closer than 15 feet from burrows, only handheld equipment would be used and the maintenance personnel would avoid the burrow apron, entrance, and area immediately behind the entrance.

6. Gopher tortoise burrows within 50 feet of maintenance activities requiring excavation would be clearly marked for avoidance, and all excavation areas within the vicinity of gopher tortoise burrows would be surrounded by a fence with a minimum two-inch mesh to exclude tortoises.

7. If maintenance activities require capture and displacement of gopher tortoises or protected commensal species, a qualified biologist would be called to trap/excavate the individual, collect data, and release the individual into a nearby unoccupied/starter burrow using preconstruction relocation procedures.

8. In the event of emergency repair, all efforts would be made to protect any tortoises and commensals that may be located in the area, and a biologist would be called to the site as soon as possible to assess the potential impacts of the emergency situation and repair work on nearby tortoises or protected commensal species. The nearest FWS or GDNR office would be immediately contacted concerning any adverse effects on these species.

9. If a gopher tortoise or protected commensal species is found dead during maintenance activities, the FWS or GDNR, would be notified within 24 hours of the incident.

No gopher tortoise burros were found during surveys of the terminal; therefore, no impacts to this species are expected from construction of the Terminal Expansion facilities. Impacts on the gopher tortoise from the proposed Elba Express Pipeline Project would be temporary due to

displacement of individuals during construction. The temporary loss of habitat during construction could also affect gopher tortoises. However, maintenance of the ROW during operation of the proposed pipeline facilities would create better foraging and refuge sites in areas of marginal habitat. With implementation of EEC's proposed mitigation measures, the impact of the proposed facilities on gopher tortoises would be minimized and the proposed project would not likely result in adverse impacts on this species.

Fish

Bluebarred Pygmy Sunfish

Bluebarred pygmy sunfish is listed as endangered in Georgia and is found in all crossings of Brier Creek system and its tributaries. EEC would cross Big Brier Creek at MP 119.2. Bluebarred pygmy sunfish are restricted to the lower Savannah River drainage in Georgia and South Carolina. It inhabits drainage ditches, stagnant ditches and the backwaters of creeks and rivers and is found in shallow water with abundant submerged and/or emergent vegetation that is rooted in soft detritus-rich substrate. It often inhabits disturbed areas such as roadside ditches and backwaters near boat ramps (SCDNR, 2007b).

The GDNR stated in a letter dated December 12, 2006, that all stream crossings within the Brier Creek system between the confluence of Brushy Creek and the upstream watershed boundary should be surveyed by a qualified biologist for the presence of this species. If the species, or suitable habitat, is found within a waterbody crossing, then the GDNR suggested that the HDD method be used at that crossing. However, if EEC decides to use the HDD method for all waterbody crossings within the Brier Creek system then the GDNR indicated that surveys would not be required. If bluebarred pygmy sunfish or suitable habitats for this species are identified during field surveys, **we recommend that EEC file, for the review and written approval of the Director of OEP, the results of consultation with the GDNR regarding avoidance or minimization of impacts on the bluebarred pygmy sunfish prior to construction.**

This recommendation would reduce the likelihood of construction related sedimentation impacting the bluebarred pygmy sunfish and therefore minimize the level of impacts to this species.

Robust Redhorse

Robust redhorse sucker is listed as endangered in Georgia and is found in the Ogeechee River and Broad River watersheds. This species is the focus of an intensive recovery effort by the interagency Robust Redhorse Conservation Committee (RRCC), designed to prevent federal listing under the ESA.

The historic range of the robust redhorse is believed to include Atlantic slope drainages from the Pee Dee River in North Carolina to the Altamaha River in Georgia. The only recent verified records from natural populations are from the Pee Dee River in North Carolina and the Savannah, Oconee and Ocmulgee Rivers in Georgia. However, in addition to these rivers, robust redhorse have also been reintroduced into the Broad River (crossed at MP 161.0) and Ogeechee

Rivers (the Ogeechee River is about 3.5 miles northeast of at MP 33.9) to restore the species within its historic range. The FWS typically recommends ceasing construction activities from April 1 to July 1 to protect the robust redhorse during its spawning, egg, and larval development period.

Robust redhorse spawn on gravel beds during April, May, and June. Clean gravel beds are necessary for recruitment because they provide the correct substrate, dissolved oxygen, flow, and protective requirements for the spawning and development of eggs and larvae. Great amounts of fine sediment are related to reduced survival, caused by increased egg or fry mortality within the substrate. Crossing the Broad River by the HDD method would reduce impacts to this species.

Sandbar shiner

Sandbar shiner is listed as rare in the state of Georgia. Sandbar shiners range from the Blue Ridge foothill and Piedmont streams in the Cape Fear River drainage of eastern North Carolina to the Savannah River drainage in eastern Georgia. Along the Elba Express Pipeline Project, the sandbar shiner may potentially occur in McDuffie, Wilkes, Elbert, and Hart (MP 116.2 to 187.7) counties of Georgia. The sandbar shiner is less common in mountain streams and uncommon within the Coastal Plain. Sandbar shiners occur in flowing, sand-bottomed pools, often near riffles, in creeks and small to medium sized rivers. Sandbar shiners spawn in late May to early July at water temperatures of 64-75ºF and peak in June at about 71ºF. Most are sexually mature in 2 years with some females mature in 1 year.

The FWS typically recommends ceasing construction activities from April 1 to July 31 to protect the sandbar shiner during its spawning, egg, and larval development period in the Broad River watershed. However, in its comments on the draft EIS, EEC indicated that impacts to sandbar shiner would be avoided at the Savannah River and Broad River crossing locations because it would cross these waterbodies using the HDD method. Therefore, no additional surveys for sandbar shiner would be necessary.

As currently proposed, EEC's hydrostatic test water withdrawals could take place in the Broad River during sensitive periods for both the sandbar shiner and robust redhorse. In order to minimize impacts on these species, **we recommend that EEC not withdraw water for hydrostatic testing from the Broad River or its tributaries during the period April 1 to July 31. However, if EEC believes water withdrawal must occur during this period, EEC should develop a hydrostatic test water withdrawal plan (containing measures to minimize impacts on the sandbar shiner and robust redhorse) for the Broad River in consultation with the GDNR. Either a statement indicating EEC's commitment to abide by the FWS time-of-year restrictions or copies of correspondence with the FWS and GDNR approving the hydrostatic test water withdrawal plan should be filed with the Secretary prior to construction.**

Birds

Peregrine Falcon

Peregrine falcon is listed as endangered in the states of Georgia and South Carolina. This species breeds from non-arctic portions of Alaska and Canada south to Baja California, central Arizona and Mexico; western limits follow the eastern front of the Rocky Mountains in the U.S. The original population in the eastern United States had been decimated; however, a captive breeding program has successfully reestablished the population. The ideal nesting habitat for the falcon is on cliffs or a series of cliffs, but they may also nest in river cutbacks, trees, and manmade structures. Threats to the species include loss of wetland habitat, loss of primary prey, poachers robbing nests, hunting, and food chain contamination. Depending on its nesting location, the falcon arrives in its breeding area late April to early May and begins departure in late August through early September. Breeding begins when pairs establish nesting territories; eggs are laid during late March and April.

No known occurrences of the peregrine falcon have been identified in any of the counties crossed by the proposed Elba Express Pipeline Project. If any transients are within the project area, they would likely avoid the construction ROW due to construction activities and use the abundant surrounding, undisturbed habitats to forage. Thus, construction of the Elba Express Pipeline project is unlikely to have any adverse impacts on this species.

Swallow-tailed Kite

Swallow-tailed kite is listed as a rare species in Georgia and an endangered species in South Carolina. This species potentially may occur in all Georgia counties along the proposed pipeline corridor. The swallow-tailed kite resides in river swamps and marshes. Breeding occurs in March with nesting in March through May. Swallow-tailed kites eat insects, snakes, frogs, lizards, birds, and small mammals.

Although potential roost locations could be lost during tree clearing and other project activities, the amount of habitat actually removed would be minimal relative to available habitat in the area. Thus, adverse impacts on the swallow-tailed kite are not expected.

Gull-billed Tern

Gull-billed tern is listed as a threatened species in Georgia. This species potentially may occur along the LNG vessel tranist route. The gull-billed tern inhabits beaches, bays, and large rivers and breeds on sand, gravel, shell beaches, or grassy areas of coastal inlands. They are colonial nesters and breeding occurs in May and extends into August. Gull-billed terns eat insects, aquatic invertebrates, and fish.

No known occurrences of the gull-billed tern have been identified along the LNG vessel tranist route, or near the terminal site. However, transients may occur within the project area or along the LNG vessel transit route but would not be expected to be impacted by the incremental increase in vessel traffic.

Wilson's Plover

Wilson's plover is listed as a threatened species in South Carolina. This species potentially may occur along the LNG vessel tranist route. The Wilson's plover inhabits sandy or shell beaches or

tidal mudflats. They are colonial nesters and breeding occurs in early April and extends into August. Wilson's plover eat mostly crustaceans and insects and feed both at night and during the day by moving on the ground in search of food at the water's edge.

Wilson's plover is known to occur along the LNG vessel tranist route in Jasper County, South Carolina. Transient or foraging plovers would not be expected to be impacted by the incremental increase in vessel traffic.

Invertebrate

Atlantic Pigtoe Mussel

Atlantic pigtoe mussel is listed as endangered in Georgia and is only found in Jenkins and Jefferson Counties (Georgia Museum of Natural History, 2006). This freshwater mussel has a medium, semi-triangular (rhomboidal) shaped shell (except in headwater areas where individuals are more elongate) that usually measures less than 2.4 inches. Fish hosts include the bluegill sunfish and shield darter. It is found in unpolluted, fast-flowing water in coarse sand/gravel substrate. Most Georgia populations have been coastal plain inhabitants in water underlain by limestone and dolomite. Primary threats are pollution, habitat degradation, impoundments, and sedimentation (see section 4.6.2.2). Like many of the endangered and threatened freshwater mussels, this species does not seem to be able to tolerate changes in its aquatic habitat.

The Atlantic pigtoe mussel is found within the Ogeechee Creek watershed within the construction area. The reproductive period for this species is generally considered to be from late June through July with pigtoe mussels being sensitive to sedimentation through August. The FWS recommends not constructing from June 1 to August 30 to minimize impacts during its sensitive period.

As currently proposed EEC's, construction is scheduled to cross the Ogeechee Creek watershed during Atlantic pigtoe sensitive period. While GDNR did not comment specifically on this species, we believe the FWS time of year restrictions to be reasonable to reduce impacts to the Atlantic pigtoe mussel. Therfore, **we recommend that EEC not construct its crossing of the Ogeechee Creek or its tributaries during the period June 1 to August 30 unless EEC receives written approval from the Director of OEP. Prior to construction, EEC should file with the Secretary either a statement indicating EEC's commitment to abide by the FWS time-of-year restriction or copies of correspondence with the GDNR approving a summer crossing plan that contains measures to minimize impacts on the Atlantic pigtoe mussel. Alternatively, EEC shall file documentation that the GDNR has determined that the proposed project would not likely affect the Atlantic pigtoe mussels.**

EEC has agreed to submit a hydrostatic test water withdrawal plan to the GDNR prior to construction.

These measures would reduce the likelihood of construction related sedimentation impacting the sandbar shiner, the robust redhorse, and the Atlantic pigtoe mussel, and therefore minimize the level of impacts to these species.

Crustacean

Broad River Burrowing Crayfish and Lean Crayfish

In Georgia, both the Broad River burrowing crayfish and the lean crayfish are listed as threatened. Both are found within Broad River watershed in Wilkes and Elbert Counties. Adult crayfish are found in complex burrows in sandy-clay soils in floodplain areas with a high water table and are susceptible to the degradation of wetland and floodplain habitats fringing streams. The GDNR stated in a letter dated December 12, 2006, that stream crossings south of the Broad River (MP 161.0) should be surveyed by a qualified biologist for the presence of these species. In EEC's comments on the draft EIS, it has agreed to this recommendation. If these species, or suitable habitat, are found within a waterbody crossing, then the GDNR suggested that the HDD method be used at that crossing. However, if EEC decides to use the HDD method for all waterbody crossings in this area, then the GDNR indicated that surveys would not be required. In order to protect the lean crayfish and the Broad River burrowing crayfish, or suitable habitat, **we recommend that prior to construction, EEC file survey reports for Broad River burrowing crayfish and lean crayfish with the Secretary. If Broad River burrowing crayfish or lean crayfish are found during surveys, then EEC should not begin construction in the Broad River watershed until it files the results of GDNR consultation regarding avoidance or minimization of impacts on these species for review and written approval by the Director of OEP.**

This recommendation would reduce the likelihood of construction related sedimentation impacting the Broad River burrowing crayfish and lean crayfish, and therefore minimize the level of impacts to these species.

Plants

Granite Stonecrop

Granite stonecrop is listed as threatened in Georgia. Along the Elba Express Pipeline Project it may potentially occur in Elbert (MP 161.0 to 182.4) and Wilkes (MP 135.0 to 161.0) Counties, Georgia. It is usually found growing among lichens in partial shade under large, open-grown eastern red cedar trees on granite outcrops. Normally it grows to 0.75 inch tall. The succulent leaves are up to 0.5 inches and are cylindrical and overlapping. This plant is often confused with "red moss" or Elf Orpine *(Sedum smallii)* which is abundant on most granite outcrops and has uniformly red leaves. The differences are only slight. Granite stonecrop is the larger of the two species and has bluish-green leaves, sometimes with tinges of red. It has small white flowers, consisting of four petals that are 0.1 inch long. The fruit is the most distinguishing feature.

Granite Whitlow-grass

Granite whitlow-grass is listed as endangered in Georgia and rare in South Carolina. It occurs in the Piedmont of Georgia and South Carolina. It may potentially occur in Wilkes (MP 135.0 to 161.0), Warren (MP 112.6 to 121.3), and McDuffie (MP 116.2 to 135.0) Counties, Georgia.

This small plant occurs in the shallow soils in and around granite outcrops especially beneath eastern red cedar (*Juniperus virginiana)*. Granite whitlow grass flowers in March and April but the best search time is during fruiting (May) when the branched hairs on the fruits are diagnostic. Exotic weeds such as honeysuckle are threats to this species.

Indian Olive

Indian olive is listed as threatened in Georgia and occurs on the Piedmont and Inner Coastal Plain from Alabama to Southern Virginia. Along the Elba Express Pipeline Project it may potentially occur in Jenkins, Burke, Glascock, Warren, McDuffie, Wilkes, Elbert, and Hart (MP 57.5 to 187.7 excluding Jefferson County [MP 93.8 to 107.7]) Counties, Georgia, and in Anderson (MP187.7 to 187.9) County South Carolina. This species is found in dry, open, upland forest of mixed hardwood and pine. Indian Olive flowers from April to May and bears greenish-yellow, olive shaped fruits in July.

Ocmulgee Skullcap

Ocmulgee skullcap is listed as threatened in Georgia. Along the Elba Express Pipeline Project it may potentially occur in Burke (MP 70.8 to 93.8) and McDuffie (MP 116.2 to 135.0) counties, Georgia. Ocmulgee skullcap is found on forested terraces, riverbanks, and nearby hardwood ravine slopes. Its flowers are dull-to violet-blue with white splotches, and it blooms late June through early October. The main threat to this species is development and exotic plants, especially Japanese honeysuckle.

Oglethorpe Oak

Oglethorpe oak is listed as threatened in Georgia. It occurs in the coastal plain of Georgia, South Carolina, Louisiana, and Mississippi. Along the Elba Express Pipeline Project it may potentially occur in Hart (MP 182.4 to 187.7), Elbert (MP 161.0 to 182.4), and Wilkes (MP 135.0 to 161.0) Counties, Georgia. Oglethorpe oaks are found in poorly drained soils of Piedmont seepage swamps and stream terraces. This deciduous tree is best found during the growing season when the characteristic leaves can be used for identification. Drainage and logging are major threats to this species.

Parrot Pitcher Plant

Parrot pitcher plant is state-listed as threatened in Georgia. It occurs from the Coastal Plain of northeastern Florida and southern Georgia, west to southeastern Louisiana. In Georgia, it has been recorded in 27 counties. Habitat for parrot pitcher plant includes acidic soils of open bogs, wet savannas, and low areas in pine flatwoods. It requires frequent, low-intensity fires to maintain open habitat and reduce competition. Draining, logging, and woody encroachment due to fire suppression are major threats to this species.

Pondspice

Pondspice is listed as threatened in Georgia and may potentially occur in Effingham (MP 4.7 to 31.8) and Chatham (MP 0.0 to 4.7) counties, Georgia. This species is mostly an outer coastal

plain species ranging from the coastal plain of Maryland to Florida, but appears in low numbers when found elsewhere. Suitable habitat includes pond and swamp margins and low wet woodlands. It also can be found within basins of limesinks or other depressional ponds (10 to 200m). Flowers appear in late winter through spring. Pondspice is threatened due to alterations in hydrology and by suppression of natural fire regimes.

Sweet Pitcher Plant

Sweet pitcher plant is state-listed as endangered in Georgia and South Carolina. Along the Elba Express Pipeline route it may occur in Effingham (MP 4.7 to 31.8), Screven (MP 31.8 to 57.5), Burke (MP 70.8 to 93.8) and Jefferson (MP 93.8 to 107.7) Counties, Georgia. Habitat for sweet pitcherplant includes open and sunny ecotones, bogs, and wet prairies and savannas, and gaps along streams and swamps with moist, acidic soil that is low in nutrients. It requires frequent, low-intensity fires to maintain open habitat and reduce competition. Draining, logging, and woody encroachment due to fire suppression are major threats to this species.

Granite stonecrop, granite whitlow-grass, Indian olive, Ocmulgee skullcap, Oglethorpe oak, parrot pitcher plant, pondspice, and sweet pitcher plant potentially occur along the proposed pipeline route. EEC has not yet determined if impacts on these species could occur as a result of the Elba Express Pipeline Project; however, in its comments on the draft EIS, EEC indicated that it would resurvey potential habitat for these state listed plant species during the spring/summer of 2008. EEC updated its SSMP to address measures that would be implemented to minimize impacts to granite stonecrop, granite whitlow-grass, Indian olive, Ocmulgee skullcap, Oglethorpe oak, parrot pitcher plant, pondspice, and sweet pitcher plant if they are found along the proposed pipeline route during the surveys. These measures include specialized construction techniques such as minimizing workspace requirements, preserving the seed bank through topsoil segregation, and ensuring germination by proper restoration of grade and avoidance of soil compaction. In addition, hydrologic conditions and soil profiles would be restored. EEC has submitted its revised SSMP to the GDNR and included revisions to further minimize impacts on these plant species.

Effects of a Spill on State Listed or Special Status Species

Impacts on state listed species resulting from the proposed increase of LNG vessel traffic in the Savannah River Channel are discussed above; the following discussion addresses potential impact on state listed species resulting from an LNG hazardous incident. State listed species that could occur within Zone 3 include the bald eagle, gull-billed tern, Wilson's plover, dwarf siren, spotted turtle, and Atlantic sturgeon. If an unignited LNG spill were to occur along the transit corridor within the Zones of Concern, any state listed species within Zone 1 (as defined in section 4.12.4.3 of this EIS) could be impacted. Figures 4.7-1 to 4.7-3 show the locations of threatened and endangered species along the LNG transit route. Because LNG is lighter than water, the LNG would float on the water until it had vaporized.

If any listed species were to come into contact with the LNG, it would experience an extreme temperature change, and could be injured or expired. The LNG from any release along the transit route would rapidly cool water within the LNG pool. Because the more dense cold water

would settle to the bottom of the channel, it could temporarily impact the benthos and species beneath the pool of LNG. However, the temperature change would be greatest at the surface, with decreasing affects as depth is increased within the water column. Transient bald eagles, gull-billed terns or Wilson's plovers flying over the spill could experience inhalation problems, and possibly asphyxiate. No dwarf sirens, spotted turtles, or Atlantic sturgeon would be expected to be affected by an LNG release unless they came in direct contact with the LNG. The marine transit safety and security measures (as described in sections 4.12.4 and 4.12.6 of this EIS) make the likelihood of an LNG vessel spill from collisions, allisions, and terrorist attacks extremely remote. As a result, no significant impact on bald eagles, gull-billed terns or Wilson's plovers would be anticipated from an unignited marine LNG spill within Zone 1. No impacts would be expected outside of Zone 1 from a release of LNG.

If a pool fire were to occur in association with a release of LNG, species on or near the surface of the water within Zone 1 could experience injury or mortality either by the fire or radiant heat. Species within Zone 2 may be impacted by radiant heat, while others may be impacted by displacement from its native habitat. Dwarf sirens, spotted turtles, bald eagles, gull-billed turns, Wilson's plover, and Atlantic sturgeon could be impacted by the radiant heat and possibly expire. No impacts would be expected to species within Zone 3 from a pool fire. The maximum flammable range for a vapor cloud could extend to the outer limits of Zone 3. If the vapor cloud were to come in contact with an ignition source, the resulting fire could burn back to the spill and impact any listed species within its path.

The marine transit safety and security measures make the likelihood of an LNG vessel spill from collisions, allisions and terrorist attacks extremely remote and reduce the impacts to a less than significant level. If a release of LNG were to occur, and listed species were impacted, we would consult with the SCDNR and/or GDNR regarding impacts on those species.

4.8 LAND USE, RECREATION, AND VISUAL RESOURCES

The existing Terminal is located in Chatham County, Georgia, approximately 8.5 miles upstream from the mouth of the Savannah River. The 224.47 acre terminal is completely contained on the 840 acre Elba Island and is the only facility located on the island, which is owned in its entirety by Southern LNG. Because Elba Island is zoned for industrial use and the terminal is the only facility on the island, the Terminal Expansion would not affect land use or recreation. There would be a minor impact on visual resources with the additional facilities.

EEC proposes to construct two pipeline segments and associated support facilities through Georgia to South Carolina for a total of 187.9 miles. Construction and operation of the proposed pipeline would include temporary and permanent impacts to upland forest, planted pine, open space, open water, ROW, residential, commercial/industrial, agriculture and scrub-shrub, and emergent and forested wetlands. In addition, the Project would affect planned developments and special land use areas including: wildlife management areas, a state park, COE Project and Mitigation Lands, a protected river, and the Georgia Coastal Management area. Mitigation measures would minimize effects to the affected land use types as described below.

4.8.1 Land Use

4.8.1.1 Land Use Requirements

The total land area disturbed by construction of all proposed facilities (Terminal Expansion and Elba Express Pipeline) would be 3,296.51 acres. Operation of all proposed facilities would affect 1,028.43 acres. Table 4.8-1 summarizes the acreage of each land use type that would be affected by the construction and operation of the Project while table 4.8-2 details the acreages of each land use type that would be affected by EEC's ancillary facilities.

Terminal Expansion

The area to be affected by the Terminal Expansion is commercial/industrial land and open water. Southern LNG proposes to use approximately 213.08 acres of the existing terminal property. All parts of the existing terminal not currently utilized would be covered by the proposed structures, parking, storage of materials, laydown areas, or other temporary activities during construction. Permanent terminal facilities would include the proposed LNG tanks, vaporizers, pumps, buildings and other ancillary facilities. The 34.26 acres of permanent impacts from construction would be covered by structures, earthworks, road/pads and gravel.

Elba Express Pipeline

Existing land uses along the pipeline route consist primarily of agricultural, forested, planted pine trees, and open space. The pipeline would consist of two segments as follows:

- Southern Segment – (MP 0.0 to MP 104.8) would consist of a 42-inch-diameter pipeline
- Northern Segment – (MP 104.8 to MP 187.9) would consist of 83.1 miles of mixed-diameter pipeline:
    - 10.0 miles of 42-inch-diameter pipeline (MP 104.8 to MP 114.8); and
    - 73.1 miles of 36-inch-diameter pipeline (MP 114.8 to MP 187.9).

Southern Segment – 42 inch

EEC proposes to use a 125-foot-wide construction ROW for the 42-inch-diameter Southern Segment. This construction ROW would include an overlap of Southern's existing ROW, which would vary based upon the existing ROW configuration (see table 4.8-3 and figure 2.2-1). Temporary construction and additional permanent ROW would be located on the western/southern side of the existing ROW. Additional site-specific areas would be required for extra workspace at various road, waterbody, wetland and waterbody crossings to provide extra space for spoil storage and associated construction activities. EEC would retain up to 20 feet of new permanent easement (in addition to the existing 90 feet of permanent easement currently held by Southern) along portions of this segment. The resulting permanent easement of up to 110 feet would be sufficient to maintain all of the existing pipelines and the new Elba Express Pipeline.

TABLE 4.8-1

Acres of Land Affected by Construction and Operation of the Proposed Project

	Residential		Industrial/ Commercial		Agriculture		Scrub-Shrub Wetland c/		Emergent Wetland c/		Forested Wetland c/	
	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/
Terminal Expansion												
Terminal Facilities	0.00	0.00	179.77	34.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pipeline												
Mainline- Georgia	22.03	7.92	7.43	2.52	366.99	103.51	10.91	4.94	119.18	66.76	106.04	47.94
Mainline-South Carolina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aboveground Facilities												
Georgia	0.01	0.00	0.55	0.28	0.05	0.00	0.00	0.00	0.09	0.07	0.23	0.23
South Carolina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse/Storage Yards												
Georgia	11.67	0.00	51.06	0.00	109.36	0.00	0.46	0.00	0.18	0.00	0.00	0.00
South Carolina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pig Launcher/Receiver d/												
Georgia	0.00	0.00	1.61	1.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
South Carolina	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL PROJECT	**33.71**	**7.92**	**240.42**	**38.67**	**476.40**	**103.51**	**11.37**	**4.94**	**119.45**	**66.83**	**106.27**	**48.17**

TABLE 4.8-1 (continued)

Acres of Land Affected by Construction and Operation of the Proposed Project

	Upland Forest		Planted Pine		Open Space		Open Water		ROW		Total	
	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/	Cons a/	Oper b/
Terminal Expansion												
Terminal Facilities	0.00	0.00	0.00	0.00	0.00	0.00	33.31	0.00	0.00	0.00	**213.08**	**34.26**
Pipeline												
Mainline- Georgia	917.35	335.43	534.78	161.26	625.45	215.78	5.21	2.35	28.08	9.76	**2,743.45**	**958.17**
Mainline-South Carolina	3.95	1.85	0.00	0.00	0.00	0.00	0.54	0.54	0.00	0.00	**4.49**	**2.39**
Aboveground Facilities												
Georgia	1.34	0.59	26.97	24.58	1.05	1.05	0.00	0.00	1.15	1.15	**31.44**	**27.95**
South Carolina	6.51	4.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	**6.52**	**4.05**
Warehouse/Storage Yards												
Georgia	11.89	0.00	0.03	0.00	109.03	0.00	1.07	0.00	1.17	0.00	**295.92**	**0.00**
South Carolina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
Pig Launcher/Receiver d/												
Georgia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1.61**	**1.61**
South Carolina	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**	**N/A**
TOTAL PROJECT	**941.04**	**341.92**	**561.78**	**185.84**	**735.53**	**216.83**	**40.13**	**2.89**	**30.41**	**10.91**	**3,296.51**	**1,028.43**

a/ Construction impacts include permanent ROW, temporary ROW and additional temporary work spaces associated with the construction corridor.
b/ Operation impacts are permanent.
c/ Numbers in the “Cons” column depict a 30-foot-wide permanent ROW in wetlands.
d/ “N/A” indicates the pig launcher/receiver occurs within aboveground facility limits.

TABLE 4.8-2

Land Requirements for the Ancillary Facilities associated with the Elba Express Pipeline

Facility	County/State	Milepost	Land Affected During Construction (acres) a/	Land Use	Land Affected During Operation (acres)	
Warehouse/ Storage Yards						
CSC-001 (F1ACSC001)	Screven/GA	N/A	8.75 0.09 0.08	AG ROW UF	0.00	N/A
CSC-002 (F1ACSC002)	Screven/GA	N/A	22.57 0.25	AG UF	0.00	N/A
PSC-001 (F1APSC001)	Screven/GA	N/A	15.19 0.05 0.15	OS ROW UF	0.00	N/A
PSC-002 (F1APCS002)	Screven/GA	N/A	15.15	AG	0.00	N/A
RSC-001 (F1ARSC001)	Screven/GA	N/A	0.90	RE	0.00	N/A
CBU-001 (F1ACBU001)	Burke/GA	N/A	35.39 3.97 0.98 0.46 1.47 0.73	CI OS ROW PSS RE ROW	0.00	N/A
PBU-001 (F1APBU001)	Burke/GA	N/A	18.80 0.13	AG UF	0.00	N/A
PFJ-001 (F1ACJF001)	Jefferson/GA	N/A	55.84 1.26 0.03	OS AG PP	0.00	N/A
RGL-001 (F1ARGL001)	Glascock/GA	N/A	10.37 0.94	OS RE	0.00	N/A
CMC-001 (F1ACMC001)	McDuffie/GA	N/A	2.53 0.18	OS PEM	0.00	N/A
CMC-002 (F1ACMC002)	McDuffie/GA	N/A	6.74	RE	0.00	N/A
CEL-001 (F1ACEL001)	Elbert/GA	N/A	15.67	CI	0.00	N/A
CEL-002 (F1CREL002)	Elbert/GA	N/A	3.40	UF	0.00	N/A
PEL-001 (F2CPEL001)	Elbert/GA	N/A	17.97 0.02	OS ROW	0.00	N/A
REL-001 (F1APHA001)	Elbert/GA	N/A	42.83 1.62 0.37 7.78	AG RE ROW UF	0.00	N/A
REM-001 (F1AREM001)	Emanuel/GA	N/A	3.16 0.10	OS UF	0.00	N/A
	Total Warehouse/Storage Yard		**295.92**		**0.00**	
Aboveground Facilities						
Elba Express Compressor Station	Jenkins/GA	58.3	23.21 1.15 0.68	PP ROW OS	23.21 1.15 0.68	PP ROW OS
Port Wentworth Meter Station	Chatham/GA	0.0	0.23 0.15	PFO CI	0.23 0.07	PFO CI
McIntosh Meter Station	Effingham/GA	9.7	0.88 0.33 0.07	PP OS PEM	0.88 0.33 0.07	PP OS PEM
EEC/Cypress Meter Station	Effingham, GA	9.7	Included in McIntosh Station	Included in McIntosh Station	Included in McIntosh Station	Included in McIntosh Station

TABLE 4.8-2 (continued)

Land Requirements for the Ancillary Facilities associated with the Elba Express Pipeline

Facility	County/State	Milepost	Land Affected During Construction (acres) a/	Land Use	Land Affected During Operation (acres)	
Effingham Meter Station	Effingham/GA	10.3	2.88	PP	0.49	PP
			0.09	CI		
			0.04	OS	0.04	OS
			0.02	PEM		
Wrens Meter Station	Jefferson/GA	104.8	0.31	CI	0.21	CI
			0.05	AG		
			0.01	RE		
Transco Zone 4 Meter Station	Hart/GA	187.1	1.34	UF	0.59	UF
Transco Mixing Station	Anderson/SC	187.9	2.75	UF	2.75	UF
Plant Rainey Meter Station	Anderson/SC	187.9	2.64	UF	0.50	UF
			0.32	UF		
			0.01	UF		
Transco Zone 5 Meter Station	Anderson/SC	187.9	0.80	UF	0.80	UF
	Aboveground Facility Total		**37.96**		**32.00**	
Main Line Valves b/						
MLV-001	Effingham/GA	9.70	N/A	N/A	N/A	N/A
MLV-002	Effingham/GA	18.25	N/A	N/A	N/A	N/A
MLV-003	Screven/GA	36.46	N/A	N/A	N/A	N/A
MLV-004	Screven/GA	53.28	N/A	N/A	N/A	N/A
MLV-005	Burke/GA	71.95	N/A	N/A	N/A	N/A
MLV-006	Burke/GA	89.44	N/A	N/A	N/A	N/A
MLV-007	McDuffie/GA	124.55	N/A	N/A	N/A	N/A
MLV-008	Wilkes/GA	143.89	N/A	N/A	N/A	N/A
MLV-009	Elbert/GA	163.86	N/A	N/A	N/A	N/A
MLV-010	Hart/GA	183.42	N/A	N/A	N/A	N/A
	Main Line Valves Total		**N/A**	**N/A**	**N/A**	**N/A**
Pig Launcher/Receiver						
Port Wentworth 42-inch Pig Launcher c/	Chatham/GA	N/A	N/A	N/A	N/A	N/A
Wrens 42-inch Pig Receiver	Warren/GA	N/A	1.61	CI	1.61	CI
Wrens 36-inch Pig Launcher	Warren/GA	N/A				
Transco Zone 5 Pig Receiver c/	Anderson/SC	N/A	N/A	N/A	N/A	N/A
	Pig Launcher/Receiver Total		**1.61**		**1.61**	
	Ancillary Facility Total		**336.73**		**33.61**	

a/ Extra Workspace within the construction ROW is included in pipeline land requirements.
b/ Occurs within ROW or existing/proposed aboveground facility limits.
c/ Occurs within meter station limits.
Land Use Classifications:
AG: Agriculture; CI: Commercial/Industrial; OS: Open Space; OW: Open Water; PEM: Palustrine Emergent Wetland; PFO: Palustrine Forested Wetland; PSS: Palustrine Scrub-Shrub Wetland; RE: Residential; ROW: Right-of Way; UF: Upland Forest; PP: Planted Pines
N/A: Not Applicable

TABLE 4.8-3

ROW Configurations for the Elba Express Pipeline

County/State	MP	Total Miles Collated	Type of ROW	Width of Existing ROW (ft)	Overlap of Temporary Construction ROW a/	Additional Permanent ROW (ft)	Additional Temporary ROW (ft) b/
Chatham/GA	0.0 – 4.7	4.7	Southern Pipeline	90	35	20	70
	4.7 – 9.7	4.8	Southern Pipeline	90	35	20	70
Effingham/GA	9.7 – 27.3	17.8	Southern Pipeline	90	35	20	70
	27.3 – 31.8	4.5	Southern Pipeline	90	55	0	70
Screven/GA	31.8 – 57.5	25.7	Southern Pipeline	90	55	0	70
Jenkins/GA	57.5 – 70.8	13.3	Southern Pipeline	90	55	0	70
Burke/GA	70.8 – 89.4	18.6	Southern Pipeline	90	55	0	70
	89.4 – 93.8	4.4	Southern Pipeline	90	35	20	70
	93.8 – 104.8	11.0	Southern Pipeline	90	35	20	70
Jefferson/GA	104.8 – 106.1	1.3	Southern Pipeline	90	35	20	70
	106.1 – 107.8	0.0	Greenfield	0	0	50	75
Glascock/GA	107.8 – 112.6	0.0	Greenfield	0	0	50	75
Warren/GA	112.6 – 114.8	0.0	Greenfield	0	0	50	75
	114.8 – 116.2	0.0	Greenfield	0	0	50	60
McDuffie/GA	116.2 – 117.5	0.0	Greenfield	0	0	50	60
Warren/GA	117.5 – 121.3	0.0	Greenfield	0	0	50	60
McDuffie/GA	121.3 – 135.0	0.0	Greenfield	0	0	50	60
Wilkes/GA	135.1 – 161.1	0.0	Greenfield	0	0	50	60
Elbert/GA	161.1 – 182.5	0.0	Greenfield	0	0	50	60
Hart/GA	182.5 – 187.7	0.0	Greenfield	0	0	50	60
Anderson/SC	187.7 – 187.9	0.0	Greenfield	0	0	50	60
Total South Segment	**104.8**	**104.8**					
Total North Segment	**83.1**	**1.3**					
Total Georgia	**187.5**	**106.1**					
Total South Carolina	**0.4**	**0.0**					
Total Pipeline	**187.9**	**106.1**					

a/ Upland configuration.

b/ Additional temporary ROW would occur primarily in uplands and in limited wetlands only where required due to site-specific conditions.

Northern Segment – 42 inch

EEC proposes to use a 125-foot-wide construction ROW for the 42-inch-diameter portion of the Northern Segment. The first 1.3 miles of the Northern Segment (MP 104.8 to MP 106.1) would be collocated with Southern's existing pipeline ROW. Temporary construction and additional permanent ROW would be located on the southern side of the existing ROW. EEC would retain up to 20 feet of new permanent easement in addition to the existing 90 feet of permanent easement currently held by Southern along this segment. The resulting permanent easement of up to 110 feet would be sufficient to maintain both the existing pipelines and the new Elba Express Pipeline. The remaining 8.7 miles (MP 106.1 to MP 114.8) of 42-inch-diameter pipeline would be greenfield construction. EEC would retain 50 feet of the 125-foot-wide construction corridor to maintain the proposed pipeline.

Northern Segment – 36 inch

EEC proposes to use a 110-foot-wide construction ROW for the 36-inch-diameter portion of the Northern Segment (MP 114.8 to MP 187.9). This pipeline would be greenfield construction. EEC would retain 50 feet of the 110-foot construction corridor for new permanent easement to maintain the new Elba Express Pipeline.

Aboveground Facilities

One compressor station, 8 meter stations, one mixing station, 10 MLVs, 2 pig launchers, and 2 pig receivers would be constructed as part of the Project. Table 4.8-1 summarizes the land requirements for these facilities.

The Elba Express Compressor Station would require approximately 25.04 acres for construction and operation, and to provide visual screening and noise buffers, near MP 58.30 in Jenkins County, Georgia. The compressor station site is surrounded by older growth pine plantation, which would visually screen the compressor station from nearby residences, and is bordered to the south by an existing Southern ROW. The majority of land that would be affected by construction and operation of the proposed compressor station would be early stage planted pine, which would be converted to a commercial/industrial cover type for the life of the Project.

The eight new meter stations (see table 2.2-2 for name and MP location) would require 10.17 acres for construction and 4.21 acres for operation. The majority of the land use for the meter stations would be upland forest and planted pine, which also would be converted to a commercial/industrial cover type for the life of the Project. One new mixing station would require about 2.7 acres for construction and operation. The majority of land use for this mixing station would be upland forest.

MLVs would be installed at intervals required by the DOT regulations to facilitate operation, repair, and ESD of the pipeline system. MLVs would be located within the footprint of the permanent pipeline ROW and would not result in additional land requirements beyond those noted for the permanent ROW.

Two pig launcher/receiver facilities, the 42-inch-diameter Port Wentworth pig launcher and 36-inch-diameter Transco Zone 5 pig receiver, would be located within their associated meter station sites, and would not result in additional land requirements beyond those noted for those facilities. The Wrens 42-inch-diameter pig receiver and Wrens 36-inch-diameter pig launcher would permanently occupy 1.61 acres of existing commercial/industrial land, and would not result in a change in current land use cover type.

Warehouse/Storage Yards

Sixteen warehouse/storage yard sites are proposed to store pipe and equipment for the Project, as well as to provide areas for temporary contractor office space. The sites were selected for their convenient location in relation to each of the pipeline spreads and were surveyed for biological and cultural resource concerns. Approximately 295.92 acres would be required for construction of the warehouse/storage yards. Most of the land that would be affected would be industrial/commercial, agriculture and open space. Location maps for the warehouse/storage yard sites are included in appendix B.

Extra Work/Staging Areas

EEC has identified 247.1 acres of ATW that would be required adjacent to the proposed permanent and temporary pipeline ROW. Land requirements for ATWs are included within the pipeline land requirements in table 4.8-1. The ATWs would be located primarily in upland forest, planted pine, open space, and agricultural land; however, EEC has identified 6 ATW areas that would be required in wetlands due to site-specific construction conditions to allow conventional bore of roadways and a railroad. Deviations from this 50-foot setback would require our approval prior to construction. We have reviewed the route and alternatives to minimize the level of impact to wetlands. Additionally, we have reviewed EEC's Procedures for crossing wetlands and found them acceptable.

Access Roads

EEC would use 96 public and private roads that intersect or parallel the proposed pipeline route to access the ROW during construction (see appendix C for a complete list of access roads). EEC anticipates that several of these access roads may require improvements. These roads and the anticipated improvements are discussed in section 2.3.2.2.

4.8.1.2 Land Use Impacts and Mitigation

Forested Wetlands

Forested wetlands cleared for construction of the Project would undergo both short and long-term impacts. Following pipeline installation, the temporary construction ROW would be allowed to revert to its pre-construction condition. Forested wetlands within this area would regenerate to pre-construction conditions within 20 to 40 years, depending on the woodland species and management practices. The regeneration of forested wetlands in the temporary

construction ROW would not be immediate, but construction in these areas would not result in permanent impacts.

Permanent ROW generally would be maintained in an herbaceous state in accordance with DOT regulations for safe operation and maintenance of the pipeline. Therefore, forested wetlands located within the permanent pipeline ROW would endure long-term impacts, as they would be converted permanently to scrub-shrub or emergent wetlands. These modifications would result in a change in wetland habitat type, but would not result in a net loss of wetlands. In wetland areas, the maintained area of the permanent ROW would be 0 to 30 feet, depending on the amount of permanent ROW overlap with existing corridors. The remaining 20 feet of construction ROW, where needed, would be allowed to revegetate from existing rootstocks and seed banks to pre-construction conditions. EEC's limitation of the maintained 30-foot-wide permanent ROW in wetlands would greatly reduce permanent impacts to forested wetlands.

Scrub-Shrub and Emergent Wetlands

Scrub-shrub and emergent wetland areas would be disturbed temporarily during construction. No long-term impacts to these wetlands are anticipated because, following construction, the ROW would be restored to its pre-construction topographical and hydrological patterns, and would be allowed to revegetate from the existing seed bank and root stock material found within the topsoil. This process would result in no net loss of wetland acreage within the pipeline corridor. Wetlands within the ROW would be maintained in an emergent or scrub-shrub state after construction by periodic clearing for pipeline maintenance and safety reasons.

Upland Forest and Planted Pine

Both short- and long-term impacts are expected to occur in upland forest and planted pine as the result of construction and operation of the Project. Trees would be cleared from the construction corridor as a necessary part of construction. Several landowners voiced concern regarding protecting and/or minimizing the impacts of construction to large, old growth hardwoods on the proposed construction ROW and/or near residences. In response, EEC has stated that it would consider making adjustments to the work plan, construction procedures, and workspace requirements to minimize impacts to trees where it is practicable and feasible. Possible methods to minimize impacts include moving or re-configuring workspaces and using special construction methods such as "stovepiping", relaying trench spoil, matting workspaces, and open cutting roads, all of which could serve to reduce overall workspace. EEC has also stated that it would work with landowners during the easement acquisition process to identify the appropriate alternate methods for their property. For additional discussion, see section 4.8.2, Landowner and Easement Requirements.

Following construction, the temporary workspace outside of the permanent ROW used for construction would be allowed to revert to pre-construction conditions. Upland forest and planted pine areas would regenerate to pre-construction conditions within 20 to 40 years, depending on the woodland species and management practices. The disturbed areas would be re-contoured and re-vegetated following pipeline construction to control soil erosion. The permanent ROW would be maintained in a herbaceous state by seeding with a grass mixture

recommended by the appropriate state and federal agencies, including the NRCS, and mowed periodically for safety and maintenance reasons.

Open Space

Open space is considered to be non-agricultural fields and open land in the early stages of succession. Open space would be cleared of herbaceous growth during grading operations before construction. The construction ROW would remain unvegetated until pipeline construction is completed. After final construction clean-up, these areas would be re-seeded and mulched according to recommendations from state agencies and the NRCS. After the vegetation is established, these areas are expected to revert to pre-construction land uses. No long-term impacts are expected from construction of the pipeline on open land dominated by herbaceous vegetation.

Existing ROWs

During construction, the pipeline would traverse public roads. In order to minimize public disturbance, the pipeline would be installed by boring underneath the roadway. In the event that a public road is open cut, at least one traffic lane would be maintained, except for brief periods essential to laying the new pipeline. If pipeline construction crosses roads that access private residences or businesses and no alternate entrance exists, measures would be taken to maintain passage for landowners during construction. Attempts would be made to avoid peak traffic time periods during construction that temporarily closes roads.

To maintain safe conditions, EEC would keep roads free of mud that may be left by crossing construction equipment. Track-driven equipment would cross paved roads on tires or equipment pads to minimize damage to the road surface. EEC would make efforts to minimize road damage by enforcing local weight limitations and restrictions. Roadways damaged during construction would be repaired to pre-construction conditions.

Open Water

Open water is considered to be perennial waterbodies greater than 100 feet wide. Construction of the Project would temporarily affect about 40.13 acres of open water. The pipeline would impact 6.82 acres of open water during construction. Any impacts on open water are expected to be short-term. Efforts would be made before, during, and after pipeline construction to minimize the extent and duration of project-related disturbances to water resources. EEC would follow procedures found in its Plan and Procedures to minimize short-term impacts on open water during construction. Recommended construction timing constraints requested by federal and state agencies would be incorporated into the construction schedule. No long-term impacts are anticipated to occur from the construction of the Project facilities across open water.

Commercial/Residential Lands

The level of impact on adjacent commercial and residential lands would be moderate and short-term and would stem primarily from construction activities such as increased levels of noise and

dust. After the pipeline has been installed and all construction-related activities have been completed, the landowners may use the ROW provided they do not interfere with the rights granted to EEC. Typically, no trees or bushes greater than five feet in height would be permitted on the permanent ROW because they impair access to the pipelines, and roots can damage the coating or positioning of the pipeline. No structures, including houses, tool sheds, garages, guy wires, catch basins, swimming pools, trailers, leach fields, septic tanks, and any other objects not easily removable would be permitted on the permanent ROW.

The principal measures that would be used to mitigate impacts on existing commercial and residential areas are to ensure that construction proceeds quickly through such areas (thus minimizing exposure to nuisance effects such as noise and dust) and to limit the hours during which construction activities with high decibel noise levels (*i.e.*, drilling and boring) would be conducted.

Landowners and commercial property owners would be notified prior to construction; access and traffic flow would be maintained during construction activities, particularly for emergency vehicles; open ditches would be secured during non-construction activities; and dust from construction would be minimized by utilizing dust abatement techniques. In addition, mature trees and landscaping would be preserved to the extent possible while ensuring the safe operation of construction equipment. Immediately after backfilling the trench, all lawn areas and landscaping within the construction work area would be restored consistent with the requirements of EEC's Plan. Accordingly, the edge of the construction work area adjacent to a residence would be fenced for a distance of 100 feet on either side of the residence to ensure that construction equipment and materials, including the spoil pile, would remain within the construction work area. Lighted barricades would be used for locations where the trench must be kept open after work hours.

At a minimum, fencing would be maintained throughout the open trench phases of pipe installation. If the pipeline centerline is within 25 feet of a residence, EEC would ensure that the trench is not excavated until the pipe is ready for installation and that no ditch would be left open for more than 48 hours. EEC has developed site-specific drawings depicting how it would construct in the vicinity of each residence within 50 feet of the proposed construction workspace.

Although the route would require clearing of wooded areas along the ROW, several methods for mitigating the long-term effects of a cleared ROW would be utilized. During construction, precautions would be taken to protect trees located outside the specified construction ROW. In addition, landowners would be compensated for the trees removed during construction. If the ROW is visible from an adjacent thoroughfare or residential area, mitigation measures such as screen plantings to reduce line-of-sight visibility may be utilized to the extent practicable.

ROW Vegetation

The establishment of a 50-foot-wide permanent ROW maintained in a grassy condition located within an otherwise open field, scrub-shrub, or forested landscape would not necessarily increase the risk or spread of fire over current conditions. The permanent ROW could in fact act as an advantageous fire break for uncontrolled forest fires that may result from either lightening

strikes, accidental fires, or an uncontrolled prescribed burn associated with management of private or commercial forest lands.

4.8.2 Landowner and Easement Requirements

Terminal Expansion

The existing Terminal is completely contained on Elba Island which is owned by Southern LNG in its entirety; therefore, no landowner or easement requirements would be necessary.

Elba Express Pipeline

Prior to initiating construction, EEC would secure an easement to convey both temporary (for construction) and permanent (for operation) ROWs. The easement acquisition process is designed to provide fair compensation to the landowners for the right to use the property for construction and operation. During the easement acquisition process, EEC would compensate landowners for loss of value to specific parcels. The easement agreement between the company and landowner typically specifies compensation for loss of use during construction, loss of nonrenewable or other resources, damage to property during construction, and allowable uses of the permanent ROW after construction. During negotiations, EEC and affected landowners may address the following:

- allowable uses within the ROW;
- minor route adjustments to accommodate landowner needs (provided the route adjustments do not affect environmentally sensitive areas or other non-consenting landowners); and
- mechanisms required to allow the pipeline to be traversed by heavy equipment such as log skidders; and

For instance, EEC has stated that during easement negotiations it would work to accommodate those landowners who have identified a need to frequently cross the pipeline ROW with heavy logging loads (such as tandem axle trucks with loads up to 30,000 pounds per axle) or have plans for a future permanent road crossing at a specific location along the ROW. EEC can accommodate a reasonable number of these crossings with additional depth of cover, heavier wall pipe, or other suitable methods of protection for the pipeline if needed. However, these needs must be identified as early as possible in the negotiations.

If an easement cannot be negotiated with a landowner and the Project has been authorized by the FERC, EEC could use the right to eminent domain granted to it under Section 7(h) of the NGA and the procedure set forth under the Federal Rules of Civil Procedure (Rule 71A) to obtain the ROW and extra workspace areas. The company would still be required to compensate the landowner for the ROW and for any damages incurred during construction. However, a court would determine the level of compensation. In either case, the landowner would be compensated for the use of the land. Eminent domain would not apply to lands under federal ownership.

4.8.3 Proposed Alternative Measures to the FERC Plan

EEC stated that in residential areas, landowners commonly request annual vegetation maintenance to address concerns regarding aesthetics and increased interaction with nuisance wildlife (*e.g.*, rats, snakes, opossums, and mosquitoes). EEC would limit vegetative maintenance to a frequency of not greater than once every 3 years, except in DOT Class 3 Locations where annual maintenance may be preformed only *if requested by the landowner*.

4.8.4 Residences and Planned Developments

In residential areas, the two most significant impacts associated with construction and operation of natural gas facilities are disturbance during construction and encumbrance of property for future uses (*e.g.*, the limitation on future permanent structures within the permanent ROW). Residences within 50 feet of construction work areas would be most likely to experience the effects of construction and operation of the Project.

Temporary construction impacts on residential areas can include inconveniences caused by noise and dust generated by construction equipment, personnel, and trenching through roads or driveways; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and/or adjacent ROW; potential damage to existing septic systems or wells; and removal of aboveground structures, such as shed or trailers, from within the ROW. Impacts on residential areas are discussed by facility below.

Terminal Expansion

There are no residences within one mile of the proposed Terminal Expansion facilities. The nearest residence is approximately two miles southeast of the existing Terminal.

There is one development that has been proposed within one mile of the proposed Terminal Expansion facilities, the Jasper County Port. Pursued by Jasper County, South Carolina officials since the early 1990s, the port is proposed to be constructed along the northern banks of the Savannah River Channel directly across from the Terminal. The South Carolina State Ports Authority, however, has long opposed the development, and most recently won a court case to condemn the land on which the port is proposed to be developed. Despite the condemnation, both state governors have vowed to build the port and hope to come to an agreement with all state agencies in order to do so.

Elba Express Pipeline

EEC identified five houses, seven mobile home structures, three sheds, two carports and one non-specified structure that would be within 50 feet of the proposed construction work area (table 4.8-4). At these locations, EEC would line the construction boundary with hay bales and silt fence and reduce construction work areas in order to minimize impacts on residences. EEC developed site-specific drawings depicting how construction in the vicinity of these residences would be conducted. We have reviewed these drawings and believe EEC's implementation of the measures depicted on the drawings would lessen impacts on most of the affected residences.

However, the proximity of five residences to construction work areas merits further consideration. Therefore, **we recommend that for each residence closer than 25 feet to the construction work area, EEC file a site-specific plan for the review and written approval of the Director of OEP before construction. These plans should include:**

(1) a description of construction techniques to be used (such as reduced pipeline separation, centerline adjustment, use of stovepipe or drag-section techniques, working over existing pipelines, pipeline crossover, bore, etc.), and include a dimensioned site plan that shows:
   i. the location of the residence in relation to the new and existing pipelines;
   ii. the edge of the construction work area;
   iii. the edge of the new permanent ROW; and
   iv. other nearby residences, structures, roads, or waterbodies.

(2) a description of how EEC would ensure the trench is not excavated until the pipe is ready for installation and the trench is backfilled immediately after pipe installation; and

(3) evidence of landowner concurrence if the construction work area and fencing would be located within 10 feet of a residence.

Additionally, to help us monitor the implementation of construction procedures and mitigation measures used on these areas, we would require EEC to file weekly status reports during construction that would include a description of landowner/resident complaints and how these complaints were addressed or resolved (see section 5.5, recommendation 7). Our Environmental Compliance Monitors would be available to follow-up on these issues or concerns.

EEC contacted local planning commissions in all counties within the Project area to identify any proposed or planned development projects that might be affected by the Elba Express Pipeline facilities. Table 4.8-5 outlines all planned developments crossed by and within 0.25 mile of the proposed pipeline.

The Effingham County Industrial Development Authority owns the Research Forest - Tract B parcel. This parcel consists of 1,752 acres intended for industrial development within the next 5 to 10 years.

The proposed Effingham Parkway near MP 3.5, near Moss Loop and Squirrel Run, is on the opposite (east) side of the existing Southern ROW from the proposed pipeline alignment, paralleling the existing ROW for approximately 15,000 feet. The proposed parkway ROW would abut the pipeline ROW. A 6-foot-wide paved shoulder would be located approximately 48 feet from the existing ROW edge and the area would be sloped for drainage. The developer intends to license the work with an environmental assessment to the Federal Highway Administration, but it may become an EIS. The developer is acquiring a 200-foot-wide easement, with acquisition to begin in the middle of 2008.

TABLE 4.8-4

Residences and Structures Within 50 Feet of the Elba Express Pipeline Construction ROW

Facility	County/State	Milepost	Distance to Construction Work Area (feet) a/	Distance to Pipeline Centerline (feet) a/	Proposed Mitigation b/
House	Effingham/GA	5.65	23	100	1, 2,3
House	Effingham/GA	6.35	45	65	1,2
Carport	Effingham/GA	6.35	2	22	1,2
Shed	Effingham/GA	6.45	within workspace	15	
Shed	Effingham/GA	6.45	within workspace	13	
Shed	Effingham/GA	6.45	within workspace	12	
Carport	Effingham/GA	6.45	within workspace	11	
House	Effingham/GA	6.45	24	44	1,2,3
House	Effingham/GA	6.55	43	120	1,2
Structure	Effingham/GA	13.80	25	67	1, 2
House	Effingham/GA	13.83	31	73	1, 2
Mobile	Effingham/GA	14.15	2	32	1, 2,3
Mobile	Screven/GA	32.27	1	31	1, 2,3
Mobile	Screven/GA	32.31	38	67	1, 2
Mobile	Screven/GA	39.65	within workspace	26	1, 2,3
Mobile	Jefferson/GA	101.74	25	67	1, 2
Mobile	Jefferson/GA	105.92	28	58	1, 2
Mobile	Hart/GA	183.90	34	59	1, 2

a/ Distances are approximate.

b/ Proposed Mitigation:

1. Reduce construction work area to minimize impact on residence.
2. Line the construction boundary with hay bales and silt fence.
3. Condition regarding residences closer than 25 feet applies.

TABLE 4.8-5

Planned Developments Crossed or Within 0.25 Mile of the Elba Express Pipeline Construction ROW

Planned Development	County/State	Milepost
Crossed by the Elba Express Pipeline Construction ROW		
Newport Subdivision	Chatham/GA	2.25
Keller Works Trust Properties	Chatham/GA	2.85
Effingham Parkway (Southern Connector)	Effingham/GA	3.50
Coldbrook Plantation	Effingham/GA	5.25
Research Forest Tract ("Tract B")	Effingham/GA	7.45
Effingham County Industrial and Economic Commission	Effingham/GA	7.45
Parkway Place	Effingham/GA	14.15
Highway 17 Widening Project	Wilkes/GA	140.35
Within 0.25 miles of the Elba Express Pipeline Construction ROW		
Planned Development	**County/State**	**Distance (ft)[a/]**
Herman Woods	Effingham/GA	100
Stafford Shire Estates	Effingham/GA	1,050

Northpoint Industrial Park	Chatham/GA	1,000
Pine Hill Estates	Effingham/GA	100
Windsor Forest Subdivision	Effingham/GA	200
Highway 17 Widening Project near Tignall	Wilkes/GA	150

a/ Distances are approximate.

Stafford Shire Estates, Pine Hill Estates, and Windsor Forest Subdivision are proposed housing developments in Effingham County, Georgia. There are two housing developments in the construction phase; Newport Subdivision in Chatham and Parkway Place in Effingham. EEC is in consultation with the Effingham County Board of Commissioners concerning the phase of development of these housing projects.

Coldbrook Plantation is an established residential subdivision in Effingham County, Georgia. A restrictive covenant was placed on the undeveloped wetland areas within the subdivision by the developer to mitigate for dredge and fill activities associated with the subdivision road. Because the existing pipeline corridor transects the covenanted properties, construction is unavoidable through this area. Additionally, EEC would require temporary workspace through this area. Affected wetlands would be located outside of the existing permanent ROW and allowed to revert to preconstruction conditions. The areas impacted would remain within the restrictive covenant. EEC plans to negotiate a waiver to the restrictive covenant with affected landowners and regulatory agencies**.**

Currently, the widening of State Highway 17/U.S. 1 to four lanes is proposed. This 331-mile highway traverses Georgia from U.S. 441 in Habersham County to the Florida state line at Folkston, Georgia. Approximately 133 miles of the corridor is open to traffic or under construction. EEC is evaluating alignment shifts where the proposed pipeline crosses the corridor in Wilkes County.

As shown in table 4.8-5, the pipeline would traverse two proposed highway or highway expansion projects, two planned industrial developments, three planned residential developments and one established residential subdivision. With the exception of the Highway 17 Widening Project (which is crossed by the non-collocated Northern Segment), the proposed route would minimize potential land use impacts on these planned development projects by collocating with the existing Southern pipeline corridor, thus avoiding multiple crossing locations and minimizing the width of the pipeline easement across each planned development. To further minimize impacts, EEC proposes to construct the pipeline prior to construction of the industrial facility and individual residences that would be located adjacent to the pipeline easement, thus avoiding temporary construction-related impacts (*i.e.*, land disturbance, access, noise, visual impacts) on these areas. Prior to initiating construction, EEC would secure an easement to convey temporary and permanent ROWs from affected developers, per the procedures described in section 4.8.2, Land Ownership and Easement Requirements.

Based on consultations to date, the developers have not requested any site-specific construction and mitigation measures or restoration plans. However, because all construction - the proposed developments listed in table 4.8-5 and the proposed pipeline - is at least one to two years from commencing, consultations between EEC and developers remain on-going and will continue

until construction activities are imminent for either EEC or the developer. Therefore, **we recommend that prior to construction, EEC file with the Secretary updated documentation of consultations detailing any site-specific construction and mitigation measures or restoration plans requested by developers crossed by or immediately adjacent to the pipeline route, and identifying what measures EEC has agreed to implement.**

4.8.5 Recreation and Special Interest Areas

No designated recreational or special interest areas would be directly affected by implementation of the Terminal Expansion Project. Construction of the Elba Express Pipeline facilities would affect three recreational areas.

Terminal Expansion

No parks, conservation easements, recreation areas, or other public land or designated areas are located on Elba Island. Neither the Terminal Expansion site nor the waterway for LNG marine traffic is located within a portion of the Savannah River that is designated under the National Rivers Inventory pursuant to the Wild and Scenic Rivers Act (P.L. 90-542). Designated areas in the general vicinity of Elba Island include Ft. Pulaski National Monument (approximately 7 miles to the visitor's center on Cockspur Island; park property boundary is 0.63 mile from the existing Terminal in the marsh land across the South Channel), Savannah River National Wildlife Refuge (NWR) (approximately 7 miles), Tybee NWR (approximately 4 miles), and Savannah's Oatland Island Education Center (approximately 3 miles). The City of Savannah lies approximately 5 miles upstream of the Project, and is home to the 8th largest shipping port in the U.S. None of these areas would be directly affected by construction or operation of the proposed Terminal Expansion Project. The Savannah River could be subjected to increased vessel traffic in the areas of Ft. Pulaski National Monument and Tybee NWR during operation of the new facilities, but any additional shipping in the river channel would be controlled by the Georgia Ports Authority and Coast Guard.

Elba Express Pipeline

One of the primary concerns in crossing public areas is the impact that pipeline construction and operation can have on recreational activities. Disruption and noise during construction could be a nuisance to hikers, hunters, fisherman, sightseers, and campers, and could cause disturbance to wildlife, especially in protected management areas. Because pipeline construction is generally scheduled for summer, when recreational activities are typically at their peak, this impact to a large extent, is unavoidable. The duration of this impact in any one area, however, would be short-term, lasting several days to several weeks.

The pipeline would cross three recreation and public interest areas that are used for public recreational purposes. Table 4.8-6 lists the public recreation areas crossed by the proposed pipeline.

TABLE 4.8-6

Recreational and Public Interest Areas Crossed or Within 0.25 Mile of the Proposed Elba Express Pipeline

Facility	Recreation and Public Interest Area	Centerline Crossing		Crossing Distance (miles)	Comment
		Enter MP	Exit MP		
Wilderness/Wildlife Areas					
Pipeline-Southern Segment	Di-Lane Wildlife Management Area	74.43	78.13	3.70	None
Pipeline-Northern Segment	Clarks Hill Wildlife Management Area	134.84	135.27	0.43	None
National and State Forests/Parks/Landmarks					
Pipeline-Southern Segment	Magnolia Springs State Park	Not Crossed	Not Crossed	0.00	Within 0.25 mile from MP 67.91 to MP 68.54
Pipeline-Northern Segment	Richard B. Russell Lake Project b/				
	Beaverdam Creek	170.73	171.08	0.35	None
	Coldwater Creek	177.92	178.08	0.16	
		170.73	171.08	0.35	None
Pipeline-Northern Segment	Richard B. Russell Lake	Not Crossed	Not Crossed	0.00	Within 0.25 miles from MP 171.13 to MP 171.15
		177.92	178.08	0.16	None
Protected Rivers					
Pipeline-Northern Segment	Broad River	160.96	161.01	0.05	The Broad River would be crossed by utilizing the HDD construction technique.

Di-Lane Plantation WMA consists of 8,100 acres in Burke County, GA, and is managed by the GDNR and owned by the COE. Recreational activities include hunting, camping, interpretive trails, fishing, hiking, bird watching, field trails, and picnicking. Our review of the pipeline route in this area indicates that active construction could impact recreational activities within the Di-Lane Plantation WMA. EEC has consulted with the GDNR and the COE in regard to construction within the Di-Lane Plantation WMA.

Clarks Hill WMA consists of 12,700 acres in McDuffie, Wilkes, and Lincoln Counties, Georgia, and is managed by the GDNR and owned by the COE. Recreational activities within Clarks Hill WMA consist of hunting, fishing, hiking, and bird watching. EEC has consulted with the GDNR and the COE in regard to construction within the Clarks Hill WMA.

Magnolia Springs State Park consists of 1,071 acres and is located in Jenkins County, Georgia. It is managed by the Georgia State Parks and Historic Sites Division within the GDNR (Georgia State Parks 2006a). Magnolia Springs State Park is within 0.25 mile of the proposed pipeline route from MPs 67.91 to 68.54 and within 50 feet at approximate MP 68.3. EEC is analyzing a minor route variation to avoid impacting the park. If it is determined that EEC cannot avoid impacting the Magnolia Springs State Park, EEC would discuss possible mitigation measures with GDNR. EEC is currently consulting with GDNR to determine crossing methods, easement acquisitions and permitting required. Therefore, **we recommend that <u>prior to construction,</u>**

EEC file with the Secretary updated documentation of consultations with the appropriate local officials or managers of the Di-Lane Plantation and Clark Hill WMAs regarding field surveys, easement acquisitions, and permitting processes. The documentation should identify any agree-upon mitigation measurers or restoration plans developed during the consultations.

The proposed Elba Express Pipeline would cross the Broad River, which is designated a protected river. A protected river is defined in the State statute as a Georgia river that has an average flow rate of at least 400 cubic feet per second. A protected river corridor is all land, inclusive of islands, in areas of a protected river and being within 100 feet horizontally on both sides of the river as measured from the uppermost part of the river bank (usually delineated by a break in the slope). The protected area also includes the area between the uppermost part of the riverbank and the water's edge; however, this strip of land is not included as part of the 100-foot buffer requirement contained in the minimum standards (Miness, 2001). EEC would cross the Broad River utilizing the HDD crossing technique; therefore, impact on the protected river and its corridor would be avoided or minimized.

COE Project Lands

The COE's Savannah District operates three interconnected dams and lakes (COE Projects) in the upper reaches of the Savannah River Basin: Hartwell, Richard B. Russell, and J. Strom Thurmond. These three COE Projects form a 120-mile-long chain of lakes that are managed as a multipurpose integrated system. The COE manages these projects giving consideration to all Congressionally authorized purposes including hydropower, flood control, recreation, fish and wildlife, water quality, water supply, and downstream navigation (COE, 2006a).

The Hartwell Project is the northern most COE Project located on the Georgia and South Carolina border. It was built by the COE between 1955 and 1963 as part of a flood control, hydropower, and navigation project and authorized purposes include recreation, water quality, water supply, and fish and wildlife management. Hartwell Lake contains 55,900 acres of water, 962 miles of shoreline, and is surrounded by 23,563 acres of public land (COE, 2006b). The Hartwell Project lies about 1.6 miles northwest of the Elba Express Pipeline at MP 187.9.

The Richard B. Russell Project is located on the upper Savannah River about 30 miles downstream from Hartwell Dam and 37 miles upstream from J. Strom Thurmond Dam. It was built by the COE between 1974 and 1984 and was authorized for power production, incidental flood control, recreation, additional stream flow regulation, water supply, and fish and wildlife management. Lake Russell contains 26,650 acres of water, 540 miles of shoreline, and is surrounded by 26,500 acres of public land (COE, 2006b). The Russell Project lies about 7.0 miles northeast of the Elba Express Pipeline at MP 157.0; however, the proposed route cross two tributaries, Beaverdam Creek and Coldwater Creek.

The J. Strom Thurmond Project is located on the Georgia and South Carolina border about 22 miles northwest of Augusta, Georgia and 240 miles from the mouth of the Savannah River. It was built by the COE between 1946 and 1954 as part of a flood control, hydropower, and navigation project. Authorized purposes now include recreation, water quality, water supply,

and fish and wildlife management. Thurmond Lake contains 71,100 acres of water, 1,200 miles of shoreline, and is surrounded by 79,900 acres of public land (COE, 2006b). The Thurmond Project lies about 5.0 miles northeast of the Elba Express Pipeline at MP 131.0.

COE Mitigation Lands

During construction of the COE's Hartwell, Russell, and Thurmond Projects, unavoidable and significant loss of wildlife and fisheries resources occurred. Terrestrial habitats of wildlife were converted to open water and fish habitat was converted from streams to open water. The Fish and Wildlife Coordination Act of 1958 required the COE to mitigate for the loss of habitat due to the construction of Russell Dam. Since the Thurmond and Hartwell Projects were authorized and construction was initiated before passage of the Fish and Wildlife Coordination Act of 1958 they were not required to purchase and manage additional mitigation land to compensate for habitat loss; however, each of these COE Projects has an active wildlife management program.

Lands that were purchased to mitigate for the loss of habitat by the Russell Project are specifically managed for wildlife and consist of a total of 49,236 acres of Mitigation Land in and around Russell Lake. Mitigation Land that would be crossed by the Elba Express Pipeline include the Di-Lane Plantation WMA and 20,590 acres of "collar land" (that extends for a distance of 300 feet from the shoreline) surrounding Richard B. Russell Lake. Table 4.8-7 identifies the COE Project and Mitigation Lands that would be crossed by the pipeline.

TABLE 4.8-7

COE Project and Mitigation Lands Crossed by the Elba Express Pipeline

Name	MP	COE Land		Acreages Affected	
		Project	Mitigation	Construction	Operation
Di-Lane Plantation WMA	74.43 – 78.13	Yes	Yes	18.3	4.7
Little River	134.8 – 135.2	Yes	No	9.3	2.8
Richard B Russell Lake / Beaverdam Creek	170.5 – 171.0	Yes	Yes	10.7	3.3
	173.1 – 173.3			3.2	1.4
Coldwater Creek	179.3 – 179.5	Yes	Yes	6.5	1.1
Savannah River	187.1 – 187.2	Yes	No	1.1	0.4
	187.4 – 187.7	Yes	No	4.6	2.1
	187.7 – 187.9	Yes	Yes	3.0	1.2
Total	**-**	**-**	**-**	**56.7**	**17.0**

EEC met with the COE on May 7, and subsequently developed a mutually-acceptable mitigation plan for the crossing of COE-managed properties. The FWS and GDNR have submitted a concurrence to the mitigation plan. A summary of the mitigation plan is located in appendix M.

Additional information in regard to potential construction related impacts and proposed impacts on COE lands associated with Beaverdam Creek and Coldwater Creek are discussed in section 4.3.3.

4.8.6 Visual Resources

Terminal Expansion

The degree of visual impact that may result from a proposed project is typically determined by considering the general character of the existing landscape and the visually prominent features of the proposed facilities. The Terminal Expansion facilities would be constructed entirely on unused portions of the existing terminal site.

The existing LNG storage tanks and the north and south dock LNG unloading arms adjacent to the slip currently are the dominant visual elements in the vicinity and can be seen from the Savannah River from points adjacent to downtown Savannah. The older three existing storage tanks stand 168 feet high and 166 feet in diameter, whereas the newer existing tank (D-4) stands 185 feet high and 258 feet in diameter. The proposed new LNG tanks (D-5 and D-6) would be 192 feet high and 289 feet in diameter and would be the largest tanks on Elba Island. The new LNG tanks would be painted in the same color as the existing tanks (sky blue) and would blend in with the visual environment, which includes the existing four tanks.

There would be a noticeable impact on the visual environment of the site vicinity due to construction of the Terminal Expansion. The new LNG tanks would be larger in diameter (31 feet) and taller (7 feet) than the next largest existing tank (D-4). The proposed new tanks, however, would be visually consistent with the adjacent existing tanks and would be visually consistent with the current visual environment in the area.

Elba Express Pipeline

Clearing, pipeline construction, and maintenance of the ROW would result in short-term and long-term adverse impacts on local visual resources. At the overall project level, the majority of the proposed pipeline facilities would be located in rural areas or pine or other forest with low population densities. Along the looping portion of the proposed route (MP 0 to MP 104.8), there would be only an incremental change to the existing viewscapes. The construction ROW would be cleared and the establishment of new permanent ROW would be limited. Visual impact on private or commercial pine plantations would be negligible as plantations are periodically harvested. Although long-term, these changes would not be significant.

Along the greenfield portion of the route (MP 104.8 to MP 189.7), we have identified no areas of particular visual sensitivity where pipeline construction or establishment of a new ROW would be frequently seen by a large number of individuals. Therefore, the visual impact of the overall project would not be significant. At the level of individual properties, the severity of the long-term visual impact of tree removal would depend on the sensitivity of the landowner. Restoration measures are available which could mitigate visual impact on individual properties, but these would be the subject of easement negotiations. The effectiveness of mitigation measurers can only be judged by the landowner.

The pipeline route crosses two tributaries of Russell Lake – Beaverdam Creek and Coldwater Creek. A 110-foot wide work area would be cleared along the pipeline route on both sides of these two tributaries. Once construction is completed the area would be reseeded. Sixty feet of the 110 feet would be allowed to return to its natural state, and the remaining 50 feet would be maintained as a permanent ROW. The permanent ROW would be periodically mowed and would appear somewhat like a 50-foot wide, rough golf fairway. This ROW would not be visible to campers at the Richard B. Russell State Park campground as it is approximately 6 miles from Beaverdam Creek pipeline crossing and approximately 5 miles from the Coldwater Creek crossing. Without mitigation, the ROW would be visible, however, to people who may be boating or fishing on the tributaries and would be an unavoidable visual impact along these tributaries. The COE, however, plans to require EEC to replant shallow rooted shrubs adjacent to the lake 20+ feet from the shoreline to provide a visual buffer.

Construction and operation of the aboveground facilities would result in minor permanent visual impacts. Existing hedge rows or landscaping would be maintained where practical to lessen the visual impact of construction to landowners. One residence at MP 105.92 would be within 50 feet of MLV-010; and nine residences within 50 feet of the edge of the construction ROW

4.8.7 Coastal Zone Management

The Georgia Coastal Management Program is administered by the GDNR Coastal Resources Division under the authority of the Georgia Coastal Marshlands Protection Act. The Act requires review of certain activities and structures within tidal water areas in order to protect habitat, nursery sites, and food sources for marine and wildlife, as well as to protect those areas that act as a buffer against flooding and erosion, and as a filter to help control and disseminate pollutants. The portion of the Project located within the designated coastal zone management area in Georgia consists of the Terminal Expansion site and the Elba Express Pipeline facilities from MP 0.0 to MP 31.8.

To date, GDNR Coastal Resources Division has modified or issued all necessary permits to Southern LNG, including a Coastal Zone Management Act (CZMA) consistency determination, for work on the Terminal site. The permits examined the affect of the Project on both right whale and manatee populations within the waterway for LNG marine traffic. GDNR Coastal Resources Division has not yet, however, issued its final determination of consistency with the CZMA for the pipeline portion of the Project however. Therefore, **we recommend that EEC not begin construction of the Elba Express Pipeline facilities until it files a copy of the Coastal Zone consistency determination issued by the GDNR.**

Waterway for LNG Marine Traffic

For the purposes of determining potential impacts associated with a release of LNG, section 4.12.4.3 identifies thermal radiation hazard zones (Zones of Concern). The zones move with the LNG vessel along the transit route and are depicted in figures 4.12-1 and 4.12-2. The waterway considered in this analysis extends beyond the Savannah River Channel to include the islands within the channel and the banks along its sides, which is an area approximately 4.4 miles wide and 20 miles long comprised of a static Zone 1-3. The banks along both the north and south

sides of the channel are largely undeveloped and primarily comprised of wetlands, with some bare lands, grasslands, and forests. Elba, Long and Cockspur Islands are located within the channel. Elba Island is classified industrial as it is the location of the Terminal. Long Island is undeveloped. Commercial and recreational facilities are located on Cockspur Island, which hosts a USCG Station, the Savannah River Pilot Boat Dock Facility, and the Fort Pulaski National Monument, a National Park Service site that continues along the southern banks of the channel.

On the northern banks of the channel are Jones, Hog and Turtle Islands. The eastern half of Jones Island is set aside for the Tybee Island National Wildlife Refuge, a sanctuary for migratory birds that is closed to all public use. The remainder of Jones Island and Hog Island are undeveloped and used by the Georgia Department of Transportation to dispose of dredge spoil in maintaining the Savannah River Channel. Turtle Island, just north of Jones, hosts the South Carolina Department of Natural Resources Turtle Island Wildlife Management Area, a migratory bird nesting and roosting area.

Located at the south side of the mouth of the channel are a three islands that have residential, commercial, and recreation areas. Tybee Island is home to Tybee Island City, a year-round beach community of 3,392 people that swells to approximately 9,000 during the summers as tourists come to visit the beach and/or the national register historic properties of Fort Screven Historic District and the Tybee Lighthouse. Just west of Tybee Island is Wilmington and Talahi Islands with a collective population of 14,213.

Additional uses in the waterway include commercial and recreational crabbing, fishing and boating; shellfish harvest areas; and an ocean dredged material disposal site.

Residences within the Zones of Concern are limited to those on Tybee, Wilmington, and Talahi Islands (see figure 4.12-2). Residences on Tybee Island are within both Zones 2 and 3, and a fraction of the residences on Wilmington and Talahi Islands are within Zone 3. According to the Chatham County Islands Area Community Plan, island residents want to maintain the area's low density housing. Currently, 76 percent of the community's area is in residential land use; 74 percent of the total area is single family. The Islands Area Community Plan proposes that it remain above 70 percent as a matter of public policy. Planned developments such as higher density housing and limited commercial areas are proposed for the town centers which are further inland, beyond of Zone 3.

Possibilities for other development along the waterway are limited as much of the land is set aside as national park lands or wildlife refuges. One development plan that has been pursued by Jasper County, South Carolina officials since the early 1990s is the construction of a port along the northern banks of the Savannah River Channel directly across from the Elba Island Terminal. The South Carolina State Ports Authority, however, has long opposed the development, and most recently won a court case to condemn the land where the port was proposed for development. Despite the condemnation, both state governors have vowed to build the port and hope to come to an agreement with all state agencies in order to do so.

The Port of Savannah is one of the busiest ports in country, with passage of large cargo vessels along the Savannah River Channel a recurrent aspect along the waterway. The majority of land along the waterway is undeveloped shoreline and the developed areas are comprised of smaller residential and commercial buildings. The most prominent structure in the waterway is the Tybee Lighthouse, which is 154 feet high (approximately 13 stories).

Under normal operations of the LNG vessel, there would be nominal impacts to land use, residences, or visual resources. While the likelihood of an emergency leading to a marine LNG spill is very remote, potential hazards resulting from an ignited or unignited LNG release are considered in this EIS (as detailed in section 4.12.4.3). Due to its physical properties, released LNG would quickly disperse in the atmosphere or, if ignited, burn in a pool of fire. A substantial unignited LNG release and dispersion would be a short-lived event that would have no impact on land use, residences or visual resources. Impacts from a substantial release of LNG with ignition would depend on the location of the incident within the waterway and the scope of the incident. In general, damage to man-made structures and vegetation ranges from mild to severe with the greatest impacts occurring within Zone 1 and decreasing outward through Zones 2 and 3. However, the implementation of safety and security measures during marine transit (see section 4.12, Reliability and Safety), make the likelihood of a spill from an LNG vessel extremely remote.

4.9 SOCIOECONOMICS

Several potential socioeconomic effects may result from construction and operation of the proposed LNG facility. Many of these potential effects are related to construction and are associated with the number of local and non-local construction workers who would work on the Project, payrolls and local expenditures, and impacts on population, public services, and housing during the construction period. Other potential effects related to construction include increased traffic or disruption of normal traffic patterns in the Project vicinity, and increased expenditures for construction materials for the Project. Potential economic benefits associated with operation of the Project include increased property tax revenue, increased job opportunities and income, and ongoing local expenditures by the operating company.

4.9.1 Population

Terminal Expansion

The existing Southern LNG Terminal, site of the proposed Terminal Expansion facilities, is located on Elba Island, Chatham County, Georgia. Table 4.9-1 provides a summary of select population characteristics for Chatham County. The majority of Chatham County's population resides in the city of Savannah.

TABLE 4.9-1

Existing Socioeconomic Conditions in the Vicinity of the Terminal Expansion

State/County	Estimated 2005 Population a/	2000 Population Density (people/mile^2) a/	1999 Median Household Income a/	2000 Labor Force a/	Feb. 2006 Unemployment Rate b/
Georgia	9,072,576	141	$42,433	4,129,666	5.0%
Chatham	238,410	530	$37,752	113,087	4.3%

a/ Data were obtained from the U.S. Census Bureau website 2005 (www.census.gov).
b/ Data were obtained from the Department of Labor website 2005 (www.dol.gov).

Population impacts resulting from Terminal Expansion Project activities would be associated with any temporary increase in residents, and would be a function of the total number of non-local construction workers required for the expansion, plus any family members accompanying them to the area. Based on workforce estimates provided by Southern LNG, a maximum of 208 workers would relocate to the Savannah area. Accounting for additional family members coming to the area, Southern LNG calculated that a maximum of a total of 518 people would move to the area for the duration of construction of the Terminal Expansion facilities. The population increase would have minimal impact as this represents an increase of less than 0.01 percent of the total population of Chatham County.

Following construction, 20 full-time positions would be created to maintain and operate the new Terminal Expansion facilities. This small staff would likely be comprised of both existing residents and non-local personnel.

Elba Express Pipeline

The Elba Express Pipeline facilities would be located in twelve counties in Georgia (Chatham, Effingham, Screven, Jenkins, Burke, Jefferson, Glascock, Warren, McDuffie, Wilkes, Elbert and Hart) and one county in South Carolina (Anderson). Table 4.9-2 provides a summary of select population characteristics for the areas affected by the Elba Express Pipeline. Chatham County is the largest and most dense population center affected by the pipeline. The majority of Chatham County's population resides in the city of Savannah.

Population impacts resulting from pipeline activities would be a function of the total number of non-local construction workers required for the project. Construction of the proposed Elba Express Pipeline would be organized into two construction phases (Phase A and Phase B). Construction on Phase A is scheduled to begin in mid 2009 and be completed early-to-mid 2010, lasting approximately 8 months. Phase A construction is proposed to be divided into two construction spreads, one spread for the southern portion of the pipeline route, and a second spread for the northern portion of the pipeline route. Each spread would require approximately 450 construction personnel and 50 additional personnel to perform survey, radiographic and inspection services. Phase B construction, which would require approximately 30 construction personnel, is scheduled to begin in early-to-mid 2012 and would be completed by December

TABLE 4.9-2

Existing Socioeconomic Conditions in the Vicinity of the Elba Express Pipeline

State/County	Estimated 2005 Population a/	2000 Population Density (people/mile^2) a/	1999 Median Household Income a/	2000 Labor Force a/	Feb. 2006 Unemployment Rate b/
Georgia	**9,072,576**	**141**	**$42,433**	**4,129,666**	**5.0%**
Chatham	238,410	530	$37,752	113,087	4.3%
Effingham	46,924	78	$46,505	18,229	3.2%
Screven	15,430	24	$29,312	6,569	5.2%
Jenkins	8,729	25	$24,025	3,728	5.6%
Burke	23,299	27	$27,877	9,108	6.8%
Jefferson	16,926	33	$26,120	6,747	7.3%
Glascock	2,705	18	$29,743	1,237	5.4%
Warren	6,101	22	$27,366	2,581	8.2%
McDuffie	21,743	82	$31,920	9,712	6.4%
Wilkes	10,457	23	$27,644	4,754	6.5%
Elbert	20,799	56	$28,724	9,291	7.5%
Hart	24,036	99	$32,833	11,004	8.1%
South Carolina	**4,255,083**	**133**	**$37,082**	**1,974,222**	**6.4%**
Anderson	175,514	231	$36,807	81,305	7.9%

a/ Data were obtained from the U.S. Census Bureau website 2005 (www.census.gov).
b/ Data were obtained from the Department of Labor website 2005 (www.dol.gov).

2012. As the two large construction spreads would be operating in different counties, the maximum population increase to any county is approximately 500 people. This would result in population increase ranging from less than 0.01 percent in Chatham County (the largest county) to an increase of 18 percent in Glascock County (the smallest county). Although this population increase is substantial in small counties, the impacts of the population are expected to be minimal because of the short construction time frame associated with the pipeline work.

Following construction, operational activities associated with the pipeline facilities would require an estimated three new staff to provide daily operational support. This small increase in permanent residents would have a negligible effect on overall population of the area.

4.9.2 Economy and Employment

Terminal Expansion

The information from the 2005 U.S. Census for Chatham County shows that the educational, health, and social services sector employed the largest number of individuals. This sector was followed by retail trade, and arts, entertainment, recreation, accommodation, and food services. The 1999 median household income in the Chatham area ($37,752) was lower than the 1999 median household income for Georgia ($42,433).

The Terminal Expansion Project would be constructed over a 64-month period and would employ an average of 120 workers per month with a peak work force of 208 personnel. Southern LNG has stated that it would use local workers to the extent they possess the necessary skills and would hire workers from outside the local area as necessary.

During the proposed 64-month construction period, the total payroll for the Terminal Expansion Project is estimated at $33 million (after subtracting an average of 25 percent for federal income tax, Federal Insurance Contributions Act (FICA) payments, and other fixed deductions). The total amount spent on local goods and services (construction materials and equipment, housing, food, *etc.*) is also estimated at $33 million. The payroll and dollars spent on goods and services would have a positive impact on the local economy of the region.

Construction of the Terminal Expansion facilities would increase economic activity within the area through the sum of three effects: 1) the direct effect – hiring of local construction workers and purchases of goods and service from local businesses; 2) the indirect effect – the additional demands for goods and services, such as replacing inventory from the firms that sell goods and services directly to the project; and 3) the induced effect – the spending of disposable income by the construction workers at local businesses, which in turn order new inventory from their suppliers. The temporary increase in economic activity resulting from the sum of these three effects would provide a positive economic impact for the region.

The Terminal Expansion Project would employ on average 120 personnel over a 64-month construction period. In addition to the direct employment and payroll impacts generated by implementation of the Terminal Expansion Project, secondary economic impacts also would occur, including both indirect and induced effects. The U.S. Department of Commerce, Bureau of Economic Analysis (BEA) has developed a methodology for determining these secondary impacts. Use of their Regional Input-Output (I-O) Modeling System (RIMS II) provides means for estimating secondary effects (combining both indirect and induced effects across all industries), based on the direct impacts (jobs and payroll) as inputs to the model. The use of RIMS II multipliers shows that in addition to the 120 jobs at the Terminal site during construction, the Terminal Expansion Project has the potential to result in approximately 99 secondary impact jobs, and that in addition to the $8,250,000 in annual direct earnings by construction personnel during construction, there is the potential for approximately $5,979,600 in secondary earnings within the region for the duration of construction. With respect to operation, Southern LNG anticipates a need for up to 20 additional permanent staff to operate the LNG facility with an estimated annual payroll of $1.2 million. The use of economic multiplier here shows the potential for an additional 42 secondary impact jobs in other industries in the region and an additional $1.2 million in secondary earnings.

Elba Express Pipeline

In Chatham, the area where the pipeline begins, the 2005 census information indicates that the educational, health, and social services sector employed the largest number of individuals. This sector was followed by retail trade, and arts, entertainment, recreation, accommodation, and food services. In the other counties located along the pipeline, manufacturing was the leading employment sector. The 1999 median household income in the Chatham area ($37,752) was

lower than the 1999 Georgia median household income of $42,433. In the other counties along the pipeline, median household income ranged from $24,025 in Jenkins County, to $46,505 in Effingham County.

EEC has stated that it would use local workers to the extent they possess the necessary skills and would hire workers from outside the local area as necessary. It is estimated that the resultant labor costs during construction would be over $30 million (after subtracting an average of 25 percent for federal income tax, FICA payments, and other fixed deductions). In addition, it is anticipated that workers would spend between 25 and 30 percent of their total income locally, which would equal nearly $7.5 million (during the construction of the pipeline facilities).

In addition to the direct employment and payroll impacts generated by the Elba Express Pipeline, secondary economic impacts are also expected to occur, including both indirect and induced effects. Indirect impacts are the additional demands for goods and services from local businesses that sell directly to the project. Induced effects are the increases in employment and income generated by the expenditure of disposal income of the new workers at local businesses. Use of the U.S. Department of Commerce, BEA Regional I-O RIMS II multipliers provides a means for estimating potential secondary effects (combining both indirect and induced effects across all industries) based on the direct impacts (jobs and payroll).

Based on the use of RIMS II multipliers from BEA 2003 regional economic accounts data, it is estimated that the Elba Express Pipeline has the potential to result in approximately 446 secondary impact jobs during construction, in addition to the 538 jobs (average) at the project site within the region, and 16 secondary impact jobs for Phase B (in addition to the average of 19 direct construction jobs). In addition to the earnings paid to pipeline project employees, the multipliers indicate the potential for approximately $29,424,000 in secondary earnings to be generated by the pipeline project within the region for Phase A construction and $687,786 in secondary earnings for Phase B construction.

Additional beneficial impacts of the Elba Express Pipeline would result from payments for construction materials, as well as for the rental of space for field offices and for temporary storage of construction materials.

Operation of the pipeline is also expected to have positive secondary economic impacts. The use of RIMS II multipliers for the "pipeline transportation" sector showed the potential of approximately 16 secondary impact jobs, in addition to the three operations jobs at the project site, within the region. In addition, the use of the RIMS II multipliers showed the potential for approximately $636,675 in secondary earnings to be generated by the Elba Express Pipeline, in addition to the $250,000 of earnings paid to pipeline project employees within the region.

4.9.2.1 Economic Impacts to Forestry

EEC would impact 516.78 acres of planted pine forest during construction, 375.94 acres of which would be within temporary easement, and 185.84 acres of which would be within permanent easement. For the 375.94 acres of forested land temporarily cut and cleared for pipeline construction, EEC would pay the landowner a fee to use the property during

construction and for the value of the timber EEC cuts, thereby mitigating short-term economic impacts on timber production. These temporary ROWs would be returned to the landowner following construction and available for future planting and use in timber production, thereby resulting in no long-term economic impact on future timber crops. For the 185.84 acres permanently impacted, production of future timber crops would be prohibited within the permanent easement during the life of the project. EEC would pay the landowner for the value of the timber EEC removes on permanent ROW, thereby mitigating short-term impacts on timber production. Additionally, EEC would compensate the landowner for loss of the permanent ROW easement and its use (including the loss of timber production if applicable), in accordance with the procedures identified in section 4.8.2, Land Ownership and Easement Requirements. Accordingly, minimal long-term economic impact is expected from this loss of timber production.

4.9.3 Local Taxes and Government Revenue

Terminal Expansion

Construction and operation of the Terminal Expansion facilities would have a positive effect on local tax revenue, based on tax projections. During construction, sales and use tax of approximately $5 million would be paid on materials used for the project and once in service, operation of the Terminal would contribute additional ad valorem taxes of approximately $3 million per year and generate annual sales tax revenues of $129,000 per year.

Elba Express Pipeline

The pipeline would provide total annual ad valorem taxes of approximately $4.1 million during Phase A of the proposed Project, and approximately $4.9 million during Phase B, which extends through the life of the Project. The ad valorem taxes are a property tax on public utility equipment. These ad valorem taxes would generate revenues for the counties along the pipeline route (see table 4.9-3). Construction of the Pipeline is expected to generate $5.2 million in sales taxes, which will also generate revenues for the counties along the pipeline route (see table 4.9-4). Operation of the pipeline is expected to generate approximately $10,000 per year in local sales taxes on pipeline facilities during Phase A, and approximately $15,000 per year in local sales taxes during Phase B.

4.9.4 Housing

Terminal Expansion

According to the U.S. Census Bureau, Census 2000, there were 99,683 housing units in Chatham County, Georgia, in 2000. Of all the housing units, not just single-family homes, 89,865 were occupied and 9,818 were vacant. Of the vacant housing units, 1,137 were for seasonal, recreational, or occasional use. Table 4.9-5 provides a summary of housing statistics for C hatham County, as well as the state of Georgia.

TABLE 4.9-3

Annual Ad Valorem Tax Estimates by County for the Elba Express Pipeline Project

County/State	2005 Effective Tax Rates (%)	Annual Estimated Ad Valorem Tax Based on 2005 Rates and Annual Increases in Assessments of 1% per Year ($)	
		Phase A - 2010	Phase B - 2012
Chatham/Georgia	1.3143	138,500	157,429
Effingham/Georgia	1.2221	711,736	809,011
Screven/Georgia	1.0381	554,472	630,253
Jenkins/Georgia	1.1068	303,638	549,929
Burke/Georgia	0.8846	424,693	482,737
Jefferson/Georgia	1.0996	339,180	385,537
Glascock/Georgia	1.3528	148,192	168,446
Warren/Georgia	1.3292	193,566	220,021
McDuffie/Georgia	0.9620	271,947	309,115
Wilkes/Georgia	1.0176	505,388	574,460
Elbert/Georgia	1.0772	425,932	484,145
Hart/Georgia	0.7133	100,330	114,043
Anderson/South Carolina	1.9800	58,741	66,769
Total		4,176,315	4,951,895

TABLE 4.9-4

Construction Cost Estimates by County for the Elba Express Pipeline Project

County/State	Labor Costs a/ ($)	Material Purchases b/ ($)	Expenditure By Construction Workers c/($)	Estimated Sales Tax Revenues d/ ($)
Chatham/Georgia	850,000	3,700,000	200,000	125,000
Effingham/Georgia	4,600,000	22,300,000	1,100,000	746,000
Screven/Georgia	4,200,000	20,300,000	1,000,000	679,000
Jenkins/Georgia	2,100,000	10,500,000	520,000	351,400
Jenkins/Georgia (Phase B)	700,000	8,800,000	175,000	275,000
Burke/Georgia	3,700,000	18,100,000	900,000	606,000
Jefferson/Georgia	2,300,000	10,900,000	500,000	362,000
Glascock/Georgia	750,000	3,800,000	200,000	128,000
Warren/Georgia	1,100,000	5,800,000	300,000	195,000
McDuffie/Georgia	2,200,000	11,600,000	600,000	390,000
Wilkes/Georgia	3,900,000	20,600,000	1,100,000	695,000
Elbert/Georgia	3,000,000	16,800,000	850,000	563,500
Hart/Georgia	1,100,000	4,100,000	200,000	137,000
Anderson/South Carolina	200,000	550,000	30,000	18,600
PROJECT TOTAL	**30,700,000**	**157,850,000**	**7,675,000**	**5,271,500**

TABLE 4.9-4

Construction Cost Estimates by County for the Elba Express Pipeline Project

a/ Labor costs are based on historical experience and contractor estimates.

b/ Material costs are costs for materials installed in each county and are based on manufacturer's published prices or quotations, conversations with equipment suppliers, and on historical experience.

c/ It is estimated that workers can be expected to spend between 25 percent – 30 percent of their income locally. In areas where aboveground facilities will be installed, estimates may be higher due to an extended presence of workers.

d/ Estimated tax revenues are generated by combining the sales taxes from estimated material purchases (3% tax rate used) and sales taxes from estimated expenditures by construction workers (7% tax rate used). It does not include annual ad valorem taxes or other annual taxes generated by the operation of EEC's facilities.

TABLE 4.9-5

2000 Housing Characteristics in Chatham County a/

County/State	Total Housing Units	Occupied Housing Units	Owner Occupied (percent)	Renter Occupied (percent)	Owner Vacancy Rate (percent)	Rental Vacancy Rate (percent)
Chatham, Georgia	99,683	89,865	60.4	39.6	1.7	9.8
Georgia	3,281,737	3,006,369	67.5	32.5	1.9	8.4

a/ Data from U.S. Census Bureau 2000

In addition to the large number of rental units available in Chatham County, there are 11,085 total motel/hotel rooms there as well. Accordingly, we find the available housing stock and hotel/motel stock, more than sufficient to address the maximum population scenario which would include the relocation of 518 construction workers and family members into the area for the duration of the Terminal Expansion Project.

Elba Express Pipeline

With respect to the pipeline work, employees are more likely to stay in short term housing units due to the short duration of the work and frequent movement of the work location as the pipeline installation progresses. There are 2,789 hotel/motel/rental units and 251 RV/campsites for the southern section of the pipeline, and 2,133 hotel/motel/rental units and 689 RV/campsites for the northern section of the pipeline. Based upon the estimate made by Elba Express of non-local workers required during construction, an estimated maximum of 350 housing units (70 percent of 500 workers) would be required for each construction spread during Phase A. Even assuming an 80 percent occupancy rate at the above referenced facilities, there would still be sufficient lodging available to support the estimated maximum demand of 350 housing units for short-term temporary housing. Our review of this information concludes that there is adequate housing capacity to address this increase in population and any population impacts would be minimal and of short duration.

4.9.5 Public Services

Terminal Expansion

In the area of the Terminal there are a wide range of public services and facilities. In Chatham, services and facilities include full-service law enforcement (575 officers and 180 civilian personnel), paid and volunteer fire departments, 48 primary and secondary public schools, six hospitals with a total of 876 beds, emergency response services that employ over 285 civilian personnel, water and sewer services, a library system, and social services.

Because the non-local workforce would be small relative to the current population of the area, construction of the Terminal Expansion facilities would result in only minor temporary impact, or no impact to local community facilities and services such as police, fire, medical, and waste disposal services. Local communities have adequate infrastructure and community services to meet the needs of the relatively small increase of non-local workers that would be required for the expansion. Other construction-related demands on local agencies could include increased enforcement activities associated with issuing permits for vehicle load and width limits, local police assistance during construction to facilitate traffic flow, and emergency medical services to treat injuries resulting from construction accidents.

We conclude that construction and operation of the proposed Terminal Expansion facilities would not result in significant impacts on local public services in the project area.

Elba Express Pipeline

In Chatham, services and facilities include full-service law enforcement (575 officers and 180 civilian personnel), paid and volunteer fire departments, 48 primary and secondary public schools, six hospitals with a total of 876 beds, emergency response services that employ over 285 civilian personnel, water and sewer services, a library system, and social services. The other counties in the area of the pipeline are more rural and municipal services are more limited, but all counties have police/sheriff departments and fire/rescue departments. The effect of in-migration on municipal services in the area of the pipeline would also be minimal as pipeline construction crews would be spread out over a large distance. Therefore, there would be no large influx of people on any one municipality. Additionally, construction at any given location would take place over a short period of time, so no permanent additions to the region's infrastructure would be necessary. Finally, few workers are expected to bring family members, which further reduces any need for public services.

We conclude that construction and operation of the proposed Elba Express Pipeline would not result in significant impacts on local public services in the project area.

4.9.6 Transportation

LNG Terminal Traffic

Access for transporting equipment, materials and personnel to the proposed Terminal Expansion site would be provided by existing roads. The entrance to the Terminal is located on Elba Island Road near its intersection with the Islands Expressway. The Islands Expressway is classified as a four-lane divided major county road. Based on this classification, the daily capacity of Islands Expressway is 33,900 vehicles per day.

The intersection of Islands Expressway with Elba Island Road and Runaway Point Road was evaluated to determine individual approach delay and corresponding level of service. No mitigation at this intersection is recommended, because 1) all projected vehicle queues can be accommodated so that the mainline through-traffic is not impeded, 2) the relatively low side street volumes during the peak hours would not warrant a traffic signal or turn lane improvements, and 3) it is expected that some of the construction traffic would occur outside the A.M. and P.M. peak hours.

Site access patterns for trucks were established for the Elba Island Recommissioning Project in 2000 (FERC 2000). In order to avoid truck traffic in the downtown area of Savannah, Terminal-generated truck traffic would access the site by traveling Interstate 516 east to Harry S. Truman parkway, ending as Islands Expressway eastbound, and accessing Elba Island Road via a left turn. Conversely, all exiting truck traffic would follow this route in reverse. Approximately 70 percent of the automobile traffic is expected to access Elba Island Road from Islands Expressway west, and 30 percent is expected to access Elba Island Road from Islands Expressway east.

Construction and operation worker parking and equipment storage would be provided on the Terminal site. Material deliveries to the site would occur throughout the majority of the construction phase, peaking in the thirtieth month at approximately 210 vehicles per month. On average, 80 to 100 material deliveries per month would be anticipated through all but the final three months of the construction period. Southern LNG has stated it would schedule the arrival of material deliveries to occur during the non-peak traffic periods to the extent possible.

An average of approximately 120 workers would be employed over the 64-month construction period. A conservative estimate in accordance with industry norms indicates that the occupancy rate for each vehicle transporting workers to and from the Terminal Expansion site would average 1.3 persons per vehicle. This number translates into about 92 cars per day transporting workers to and from the site twice per day (total of 184 trips to and from the site each day). At the peak of construction, approximately 208 workers would travel to and from the site. This figure translates into approximately 160 cars per day to and from the site twice per day (total of 320 trips to and from the site each day).

We conclude based on the Traffic Impact Analysis that no new intersection traffic control improvements would be necessary to offset increased intersection approach delays resulting from construction and operation of the Terminal Expansion facilities. In addition, no mitigative

measures would be necessary to maintain an acceptable level of service for the intersection during current and future projected construction and operational phases.

The Traffic Impact Analysis does, however, make recommendations for posting speed limit signs on Elba Island Road to ensure adequate sight distance and paving the shoulders at the intersection of Elba Island Road and Islands Expressway to improve the turning radii. Southern LNG has provided the Traffic Impact Analysis to the Chatham County Department of Engineering and asked for guidance on whether and how the report's recommendations should be implemented. We request that Southern LNG comply with recommendations made by the Chatham County Department of Engineering.

4.9.6.1 Marine Traffic Impacts

Expected LNG Vessel Volume

When fully operational and assuming full utilization, the Terminal Expansion Project would result in approximately an additional 95 shipments of LNG, annually. Assuming full utilization of the post-Elba III capacity of the Terminal and assuming LNG vessel capacities of either 125,000 m^3 on the low end or 266,000 m^3 on the high end, the Terminal would receive LNG from a total of 142 to 299 LNG vessel visits per year. Assuming an even spread of 95 visits among 52 weeks in a year, the number of additional LNG vessel visits per week resulting from the Elba III Project would average less than two. This represents approximately three percent increase to the 3,041 vessel calls to the Port of Savannah in the year 2020.

As experienced with Elba Island operations thus far, it is not anticipated that LNG shipments would immediately fill new Terminal capacity when it first becomes available, but would ramp up with the upstream liquefaction projects and with the downstream demand for natural gas. The new Elba III capacity is expected to phase in to service from 2010 through 2012.

Existing Vessel Traffic in the Port of Savannah

Vessel traffic on the Savannah River has increased by approximately 15 percent over the last decade, based on data provided by the Savannah Pilots Association in the Elba II Expansion application. If this rate of increase continues, then the number of vessel calls to the Port of Savannah would be as shown in Table 4.9-6. In its most recent annual report, the Georgia Ports Authority indicates even more rapid growth rates. According to press releases, in fiscal year 2002, the Georgia Port Authority served 2,180 vessels carrying 1.137 million twenty foot equivalent containers units (TEUs) handled by the Port of Savannah. In fiscal year 2005, total TEUs increased to 1.76 million, which is an annual growth rate of approximately 15 percent. By 2015, Georgia Port Authority projects the Port of Savannah would have the capacity to handle 4.37 million TEUs, an almost 11 percent annual increase in the number of containers over the 2002 level.

TABLE 4.9-6

Summary of Vessel Calls to the Port to be Handled by the Savannah Pilots Association Over the Next 50 Years a/

Year	No. of Vessels
2010	2,645
2020	3,041
2030	3,497
2040	4,021
2050	4,624

a/ Data from Southern LNG

Savannah Harbor Expansion Project

Current traffic in the Port of Savannah is typified by a container vessel of approximately 4,614 TEUs. Many of the container vessels currently calling on the Port of Savannah are already considered operationally constrained, meaning the vessels cannot carry full loads at all tides. Due to constrained operations, Georgia Port Authority is spearheading a Savannah Harbor Expansion Project (SHEP) now undergoing NEPA review by the COE. The SHEP would relieve the tidal constraints on commercial vessels and would prepare the Savannah River for the next generation of post-Panamax container vessels. Larger vessels associated with the SHEP are represented by a container vessel of approximately 7,226 TEUs.

The SHEP, by deepening the navigable channel, would increase the time each day during which commercial vessels can get underway while complying with the under-keel clearance guidelines set by the Savannah River Pilots and acknowledged by the Coast Guard. Both the SHEP and the Terminal Expansion Project can proceed fully independent of each other. The stretch of river from Elba Island downstream to the sea buoy already is deep enough for current and projected LNG vessels to get underway and meet the under-keel clearance guidelines throughout the entire tide cycle. However, by relieving the tide constraints on other commercial vessels with deeper drafts and those traveling farther upstream to the Port of Savannah, the SHEP would reduce the opportunities for commercial vessels to delay each other.

Impacts on Commercial Shipping

While moored at the Elba Island LNG Terminal, LNG vessels do not affect other commercial vessels, since having LNG vessels moored in the new marine slip avoids the need for other commercial vessels to obtain tug escorts past Elba Island. The only physical restriction on commercial vessels operating near the Terminal while LNG vessels are moored is to limit the speed to "bare steerage way." This limit, if continued following the Terminal Expansion Project, should not itself cause LNG operations to impact commercial vessels. "Bare steerage way" clarified a pre-existing limit of "minimum safe speed" from the Marine Safety Information Bulletin issued on December 20, 2005. Existing safety/exclusion zones surrounding the LNG vessels while they are underway were established in 2004 and consist of a minimum two-mile

distance from other commercial traffic. The zone moves with the LNG vessel while transiting the Savannah River. There is no evidence to date of the zones causing significant delays.

A discrete-event stochastic simulation model of shipping in the Port of Savannah was used to assess delays associated with vessel traffic now and in the future. The model showed that in 2005, approximately 3.5 percent of the total delays to non-LNG vessels were caused by LNG vessels, half of the delays were caused by the adverse effect of ocean tides on vessel movement in the river, and the remaining delays were attributable to adverse weather, non-LNG vessel movement conflicts, or waiting for a berth to become available. In percentage terms, the current cost of delays caused by LNG vessels represents less than one percent of the total cost of delays to non-LNG vessels. In the future, assuming LNG received at Elba Island is 100 percent of expected contract volumes, the model shows that the percentage of delay cost attributable to LNG vessels would increase to approximately 2.5 percent in 2011, but return in 2012 to around one percent after the assumed completion of the harbor deepening project. After 2012, assuming LNG received is 100 percent of contract volumes, the model shows the percentage increases to approximately 2.75 percent in 2015. Each year the percentage of delay cost caused by LNG vessels is significantly less than the percentage of total traffic represented by LNG vessels, which is only about six percent.

In terms of dollars, the simulation model showed that total costs of delays caused by inbound LNG vessels in 2005 were around $165,000 and by outbound LNG vessels around $22,500. The total costs of delays to non-LNG vessels (all causes) in 2006 are around $12 million. Of these costs, about $75,000-$150,000 (depending on the percentage of contract volumes delivered to Elba Island) are direct results of LNG vessels in 2006. The costs of delays to non-LNG vessels caused by LNG vessels go up to at most $375,000 in 2011 under the scenario with 100 percent contract volumes and with the existing outbound Regulated Navigation Area (RNA) Rule continued. Costs in 2012 are expected to drop considerably, due to the effect of the harbor deepening project. After 2012, costs are expected to slowly rise again, because of an increasing number of LNG and non-LNG vessels.

One intended purpose of the simulation model is to evaluate and predict the impact or benefit of modifications to the Coast Guard RNA. At present, the local Coast Guard COTP has proposed to discontinue the RNA Outbound Rule for unloaded LNG vessels (*i.e.*, vessels carrying less than 5 percent of LNG). This modification was evaluated as a part of this report and is predicted to result in a reduction of the delay costs caused by outbound LNG vessels by up to $65,000 per year in 2015.

We note that the referenced simulation model analysis discussed above likely provides an overestimation of the delays and costs of delays caused by LNG vessels because it cannot make intuitive human-like decisions to anticipate and prevent shipping conflicts. In practice, the pilots and Coast Guard routinely work to coordinate shipping activities between LNG and other commercial vessels to reduce delays. In addition, the shipping model does not take into account that the Terminal is highly unlikely to receive 100 percent of its contracted LNG volume each year due to weather and market forces, and thus the model overestimates total deliveries.

Based on the lack of traffic issues experienced today at the existing Terminal, and the simulation model results predicted above, we do not foresee the additional 95 LNG vessels per year causing a significant marine traffic or navigational issue in the Port of Savannah.

Waterway for LNG Marine Traffic

The socioeconomic impacts of normal operations of the LNG vessels are detailed above in the subsection, Impacts on Commercial Shipping. While the likelihood of an emergency leading to a marine LNG spill is very low, potential hazards (as described in section 4.12.4.3) are considered in this EIS. Without proper safety measures and mitigation, there is a potential for significant socioeconomic impacts from an ignited or unignited LNG spill depending on the location, severity, and the time of year the incident occurred. However, marine transit safety and security mitigation measures committed to in Section 4.12.4.5 render socioeconomic impacts to a level comparable with the level of impacts associated with existing LNG vessel operation/transit. In all likelihood, ship traffic would be halted until the affected LNG vessel could be safely removed from the river channel. The time and cost associated with removing an LNG vessel would be substantially the same as that required to remove any other similarly incapacitated large vessel from the channel. The complexity and costs of removal would vary greatly depending on the location of the vessel when damaged and the extent to which it is damaged.

Because of its physical properties, released LNG would quickly disperse in the atmosphere or, if ignited, burn in a pool fire. A substantial unignited LNG release and dispersion would be a short-lived event and may result in a temporary closure of the port. Based on information from the University of Georgia's The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy, the associated cost could be up to $50 million and would consist primarily of the cost to transport and repair the LNG vessel. A substantial release of LNG with ignition resulting in a pool fire may cost more than $650 million as a result of severe damage to the shore-side facilities, potential total loss of the LNG vessel and cargo, fatalities, and closure of the port for up to 14 days. Any substantial release of LNG would require the response of local and state emergency responders – police, fire, and medical personnel, which would put a financial burden on those agencies. To address any potential financial impacts to those agencies from emergency response, the FERC, under Section 3A(e) of the NGA, requires an applicant to include a Cost-Sharing Plan in the Emergency Response Plan that contains a description of any direct cost reimbursements to these agencies. (See section 4.12.5, Emergency Response and Evacuation Planning.)

Elba Express Pipeline

Because construction would move sequentially along the pipeline route, any transportation impacts would be temporary on any given roadway, and the transportation system would be minimally impacted by construction. An increased number of vehicles would be encountered during morning and evening peak times, corresponding to normal workday hours.

Where the pipeline route crosses major roadways, the pipeline would be installed by boring underneath the roadways. Crossing of minor roadways and dirt roadways would usually be performed by open trenching which may cause minor disruptions in local traffic patterns.

Access across these minor roadways and dirt roadways would be maintained for emergency vehicles and passenger vehicles through the use of metal plates and other measures. Appropriate control measures would be used during construction, such as detouring of traffic where possible, flagmen, signage, and flashing lights. All roadways would be repaired to their preconstruction condition when installation of the pipeline is completed in those areas. We note that EEC must prepare and file information with counties and other appropriate agencies for permitting the installation of the pipeline under roads.

An increase in traffic is expected from commuter (both local and non-local workers) traffic and from the transportation of equipment and materials for the Elba Express Pipeline. Because of the general nature linear natural gas pipeline construction, the location of worksites would migrate along the 187.9-mile pipeline throughout the construction process. Construction materials moved to and from the worksites along the route generally would be transported first to predetermined staging and storage areas near the route and then dispatched from those areas on an as-needed-basis to the worksites. The initial staging, which would involve transporting the bulk of the construction equipment and materials to the respective staging and storage areas, and the daily transportation of additional equipment and materials, may temporarily affect local transportation systems. To minimize the effect, major highways would be used as much as possible to transport slow-moving, heavy construction equipment to the staging and storage areas. The specific travel routes utilized to transport work materials from the staging areas to the worksites generally would follow the shortest accessible public or private roads near the pipeline ROW.

As construction progresses, much of the equipment movement would occur along the construction ROW. When it is necessary for construction equipment and material to cross roadways, traffic flow may be interrupted. The transportation of equipment and materials would be minimized through planning and coordination. For example, the scheduling of heavy loads and delivery of materials would be coordinated so that it would not conflict with commuting hours.

Operation and maintenance of the pipeline facilities would not significantly affect traffic flow on any of the paved roads or highways. Periodic maintenance and inspection procedures would be required and involve a low frequency of light vehicle movement on and off roadways. Because these occasions would be infrequent, no additional impact is expected.

In summary, no significant long-term impact of the transportation infrastructure is anticipated. Temporary and minor disruptions of traffic flow and pattern are expected to result from pipeline facility construction.

4.9.7 Environmental Justice

Terminal Expansion

Executive Order 12898 on Environmental Justice requires that each federal agency address disproportionately high and adverse human health or environmental impacts of its programs, policies, and activities on minority and low-income populations. Federal agencies'

responsibilities under this Order also apply equally to Native American programs. Table 4.9-7 presents the general ethnic mix and economic status in the Project Area.

The Terminal Expansion site in Chatham County has a minority population of 45.8 percent, which is somewhat higher than the state average of 37.4 percent. The county also shows 11.8 percent persons living below the poverty level, which is only slightly higher than the state average of 9.9 percent. The Terminal Expansion Project would be located on the existing Terminal site on Elba Island, Georgia, which is owned entirely by Southern LNG and has no resident population. Therefore, we conclude implementation of the Terminal Expansion Project would not result in any disproportionately high or adverse environmental and human health impacts to low-income and minority populations.

Zones of Concern

To address concerns about the potential for minority and low-income populations within the Zones of Concern, census track data for these areas were reviewed. As figure 4.9-1 shows, the census tracks extend well beyond Zone 3, making it impossible to determine with any accuracy the numbers of these populations specifically within the Zones of Concern. The figure shows that the majority of residential development is on Tybee Island in census tract 111.03. Skirting the edge of Zone 3 west of Tybee Island are other residential areas. The largest development is located at the western end of Zone 3 in census tract 101.01 and consists of two existing industrial facilities with over 300 employees combined.

However, because the proposed project would only increase the number of offloading vessels and storage capacity at the Terminal, and under No-Action Alternative current operations would continue, there would not be a significant change from an operational standpoint, and therefore no change to the current effects on low-income and minority populations.

Waterway for LNG Marine Traffic

It is important to consider the population that could potentially be exposed to the effects of a substantial marine LNG release. Cockspur Island, located within Zone 1 (described in section 4.12.4.3), does not have a resident population. The island does, however, house three non-residential structures: a Coast Guard Station; the Savannah River Pilot Boat Dock Facility; and the Fort Pulaski National Monument, a National Park Service site that hosts an average of 900 visitors a day. Within Zones 2 and 3, the majority of the land along the LNG marine transit route is largely undeveloped and unpopulated, consisting of wetlands, bare lands, grasslands and forests.

Two populated areas that are partially in Zones 2 and 3 (see figure 4.12-2) are Tybee and Talahi-Wilmington Islands. According to the 2000 Census, Tybee Island City, a beach community and tourist attraction located at the northeast end of the island, has a year round population of 3,392,

TABLE 4.9-7

A Comparison of Racial/Ethnic Mix and Income Statistics Within the Project Area a/, b/, c/

County	Total Minority	White	Black or African American	Native American	Hispanic or Latino of any Race	Asian	Native Hawaiian and Other Pacific Islander	Other race	Two or more races	White alone, not Hispanic	Median Household Income 1999	Individuals Below Poverty Level (%)
Georgia Counties												
Chatham	45.8%	55.3%	40.5%	0.2%	2.3%	1.7%	0.1%	0.9%	1.3%	54.2%	37,752	11.8
Effingham	16.1%	84.7%	13.0%	0.3%	1.4%	0.5%	0.0%	0.5%	1.0%	83.9%	46,505	7.1
Screven	46.8%	53.6%	45.3%	0.1%	1.0%	0.3%	0.1%	0.2%	0.5%	53.2%	29,312	15.5
Jenkins	44.4%	56.3%	40.5%	0.2%	3.3%	0.2%	0.1%	2.1%	0.7%	55.6%	24,025	22.3
Burke	53.5%	46.9%	51.0%	0.2%	1.4%	0.3%	0.0%	0.6%	1.0%	46.5%	27,877	23.8
Jefferson	58.2%	42.1%	56.3%	0.1%	1.5%	0.2%	0.0%	0.8%	0.5%	41.8%	26,120	19.3
Glascock	9.7%	90.6%	8.3%	0.2%	0.5%	0.0%	0.0%	0.1%	0.7%	90.3%	29,743	9.4
Warren	60.8%	39.5%	59.5%	0.2%	0.8%	0.1%	0.0%	0.3%	0.5%	39.2%	27,366	24.1
McDuffie	39.7%	60.8%	37.5%	0.2%	1.3%	0.3%	0.0%	0.3%	0.8%	60.3%	31,920	14.1
Wilkes	46.1%	55.1%	43.1%	0.2%	2.0%	0.2%	0.0%	0.5%	0.9%	53.9%	27.644	13.0
Elbert	34.2%	66.9%	30.9%	0.2%	2.4%	0.2%	0.0%	1.1%	0.7%	65.8%	28,724	14.6
Hart	21.4%	79.1%	19.4%	0.2%	0.9%	0.5%	0.0%	0.2%	0.6%	78.6%	32,833	14.8
Project Average	39.7%	60.9%	37.1%	0.2%	1.6%	0.4%	0.0%	0.6%	0.8%	60.3%	30,818	15.8
State Average	37.4%	65.1%	28.7%	0.3%	5.3%	2.1%	0.1%	2.4%	1.4%	62.6%	42,433	9.9
South Carolina Counties												
Anderson	19.1%	81.6%	16.6%	0.2%	1.1%	0.4%	0.0%	0.4%	0.8%	80.9%	36,807	9.1
State Average	33.9%	67.2%	29.5%	0.3%	2.4%	0.9%	0.0%	1.0%	2.4%	66.1%	37,082	10.7

a/ All information was provided by the U.S. Census Bureau – Census 2000 Summary (www.census.gov), the latest information available as of April 2006

b/ Percent Total Minorities was calculated by taking the percent white alone, not Hispanic and subtracting it from 100 percent.

c/ Census data on individual minority percentages of the total population plus the white percentage do not add up to 100 percent as Hispanic category includes other races.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED ELBA III PROJECT
Docket Nos. CP06-470-000, CP06-471-000, CP06-472-000, CP06-473-000, and CP06-474-000

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Figure 4.9-1
Census Tract Location within Zones of Concern 1, 2 and 3

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

but the island itself is considered to be a medium population density area (between 1,000-9,000 people per square mile). During the summer, Tybee Island hosts a tourist population of up to 9,000. Similarly, Talahi and Wilmington Islands, with a combined resident population of 14,213, is also considered a medium population density area. The highest population densities within Savannah are located beyond Zone 3 at a distance greater than 3,500 meters (approximately 2.2 miles) from the Terminal location and the LNG marine transit route.

Socioeconomic impacts of a substantial marine LNG release would not differentiate effects based on demographic characteristics of the population. Therefore, there would not be any disproportionately high or adverse environmental and human health impacts to low-income and minority populations. The severity of impacts on populations within Zones 1-3 would depend on the location of the incident relative to the population, the scope of the incident, and whether the LNG released ignited or evaporated. This could be a significant impact, with injuries ranging from mild to fatal, being most severe in Zone 1 and decreasing outward through Zones 2 and 3. However, because of the implementation of safety and security measures during marine transit (See section 4.12, Reliability and Safety), the likelyhood of a marine LNG spill is extremely remote and significant socioeconomic impacts are not expected.

Elba Express Pipeline

Table 4.9-7 presents the general ethnic mix and economic status by county and state affected by the Elba Express Pipeline facilities. In Georgia, nine of the 12 counties through which the pipeline passes have minority populations higher than the state average of 37.4 percent. These minority populations range from 39.7 percent in McDuffie County to 60.8 percent in Warren County. Similarly, 10 of the 12 counties have a percentage of individuals below the poverty level greater than the state average of 9.9. These low income populations range from 11.8 percent in Chatham County to 24.1 in Warren County. In South Carolina, both the percentage of minority and low income populations in Anderson County were below the state averages.

To further assess the potential for impact on areas of minorities and low income populations, the information on percent minorities and poverty rates was evaluated using a smaller geographic unit (*i.e.* census tract). This further analysis was focused on the Northern Segment of the pipeline (from Elbert County, Georgia to Anderson County, South Carolina), where there is currently no other pipeline along the route. This information is shown below in Table 4.9-8.

Similar to the Georgia county data for the whole pipeline route, 6 of the 11 census tracks showed minority populations higher than the state average with percentages ranging from 32.5 in Elbert County to 60.8 in Warren County. Nine of the 11 census tracks showed higher than state average for the percentage of individuals below the poverty line, ranging from 10.9 in Elbert County to 24.1 in Warren County.

Although percent minorities and poverty rates are well above the state average in some of these tracts, the pipeline project once buried would have minimal impact on the environment and surrounding population of these areas. Therefore, we conclude that implementation of the Elba Express Pipeline would not result in any disproportionately high or adverse environmental and human health impacts to low-income an dminority populations.

TABLE 4.9-8

Data on Minorities, Income and Poverty Rates for Census Tracts Crossed by the Greenfield Portion of the Pipeline.

County	Census Tract No.	Total Minority a/	White	Black or African American	Native American	Asian	Native Hawaiian and Other Pacific Islander	Other	Two or more races	Hispanic	White alone, not Hispanic	Median Household Income 1999	Individuals Below Poverty Level (%)
Elbert, GA	9905	32.5	67.5	30.9	0.2	0.1	0.03	0.07	0.5	2.2	67.5	28,531	10.9
Elbert, GA	9902	17.8	82.2	14.8	0.04	0.1	0	2.2	0.5	4.1	82.2	30,114	8.9
Glascock, GA	9901	9.7	90.6	8.3	0.2	0	0	0.2	0.7	0.5	90.3	29,743	9.4
Hart, GA	9605	21.4	79.1	19.4	0.2	0.5	0.004	0.4	0.6	0.9	78.6	32,833	12.2
Jefferson, GA	9601	58.2	42.1	56.3	0.1	0.2	0.006	1.03	0.5	1.5	41.8	26,120	19.3
McDuffie, GA	9501	7.6	92.4	6.1	0.7	0.04	0.08	0.1	0.5	0.8	92.4	45,813	10.5
McDuffie, GA	9503	49.3	50.7	47.7	0.3	0.5	0	0.03	0.7	1.5	50.7	35,784	17.3
McDuffie, GA	9504	39.1	60.9	37.4	0.2	0.5	0.04	0.3	0.7	1.2	60.9	32,313	11.8
Warren, GA	9704	60.8	39.5	59.5	0.2	0.1	0	0.4	0.5	0.8	39.2	27,366	24.1
Wilkes, GA	9801	36.2	63.8	33.4	0.3	0.2	0	1.2	1.2	3.6	63.8	26,544	13.4
Wilkes, GA	9803	49.3	50.7	48.1	0.2	0.3	0.06	0.1	0.7	1.6	50.7	28,720	12.7
Anderson, SC	122	19.1	81.6	16.6	0.2	0.4	0.4	0.6	0.8	1.1	80.9	36,807	9.1
GA State Average		37.4	65.1	28.7	0.3	2.1	0.05	2.4	1.4	5.3	62.6	42,433	9.9
SC State Average		33.9	67.2	29.5	0.34	0.9	0.04	1.0	1.0	2.4	66.1	37,082	10.7
National Average		30.9	75.1	12.9	0.9	3.6	0.14	5.5	2.4	12.5	69.1	41,994	9.2

a/ Percent Total Minorities was calculated by taking the percent white alone, not Hispanic and subtracting it from 100 percent

b/ Census data on individual minority percentages plus white percentage do not add up to 100% as Hispanic category includes other races

4.10 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires the FERC to take into account the effect of its undertakings (including issuance of a certificate) on properties listed, or eligible for listing, on the NRHP and to afford the ACHP an opportunity to comment on the undertaking. Southern LNG and EEC, as non-federal parties, are assisting the FERC in meeting its obligations under Section 106 and the implementing regulations in 36 CFR 800 by preparing the necessary information, analyses, and recommendations.

Construction and operation of the proposed expansion facilities could potentially affect historic properties (*i.e.,* cultural resources listed on or eligible for listing on the NRHP). These could include prehistoric or historic archaeological sites, districts, buildings, structures, and objects, and locations with traditional value to Native Americans or other groups. Such properties generally must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and must meet one or more of the criteria specified in Title 36 CFR 60.4.

4.10.1 Cultural Resource Surveys

Terminal Expansion

Southern LNG completed a cultural resources survey (both archaeological and architectural) of the proposed Terminal Expansion site. A 106-acre parcel was studied. The remaining areas to be disturbed by the expansion construction activities, as well as the turning basin, had been previously surveyed with no historic properties identified. The report resulting from the current survey was provided to the FERC and the Georgia State Historic Preservation Office (SHPO) (Lackowicz 2006). The report also summarized the results of previous surveys at the Terminal site (Kraus et al. 2002, 2003; Pelletier et al. 2001). Of the 106 acres studied, 74 acres consisted of existing plant facilities and were found to be previously disturbed. The remaining 32 acres were examined for cultural resources through pedestrian survey and 35 backhoe trenches. No cultural resources were identified. In a letter dated May 25, 2006, the Georgia SHPO concurred that the proposed undertaking would have "no effect on archaeological or historic resources eligible for inclusion in the NRHP." We also concur.

Elba Express Pipeline

In Georgia, EEC conducted a Phase I cultural resources survey, which included both archaeological and historic architectural resources (Eberwine et al. 2006). The report resulting from this survey was provided to the FERC, the Georgia SHPO, and the COE. A 300-foot-wide corridor was examined for the pipelines. For those areas where the proposed pipeline would parallel an existing pipeline ROW, the survey corridor was 100 feet wide east of the proposed centerline, and 200 feet west of the proposed centerline. For greenfield areas of the proposed pipeline, the survey corridor was 150 feet on either side of the proposed centerline. In addition, a compressor station site, meter station sites, contractor yards, pipe storage yards, rail sidings, and numerous access roads and extra work spaces were also surveyed. Approximately 6.8 miles of the pipeline ROW, six access roads, and numerous extra work spaces have not been surveyed due to denied access.

A total of 295 cultural resources were identified in Georgia, including 152 archaeological sites, 110 archaeological non-site loci, 28 architectural resources, and five cemeteries. Eleven of these archaeological sites, one historic structure, and three non-site loci were identified on COE property, with the survey conducted under ARPA Permit No. DACW21-4-07-5203 (of these resources, only one, archaeological site 9BK144, was recommended as potentially eligible for the NRHP). In all, six archaeological sites have been recommended as potentially eligible for the NRHP. The sites consist of five prehistoric artifact scatters (9SN223, 9BK435, 9BK444, 9JF329, and 9EB739), and one scatter of prehistoric and historic artifacts (9BK144). Avoidance or further work has been recommended to evaluate the NRHP eligibility of these six sites. An additional eight sites have not been assessed for their NRHP eligibility and would be avoided. The five cemeteries identified (9JF332, 9GL15, 9MF931, 9WS365, and 9EB748) would be avoided during construction; those that are within the proposed construction corridor would be fenced to ensure avoidance. In a letter dated December 22, 2006, the Georgia SHPO agreed with these recommendations for archaeological sites, non-site loci, and cemeteries, and requested additional information for ten historic structures. In a letter dated February 23, 2007, the SHPO agreed that historic structures JE-0505-01, CMC-001-03, and CMC-001-04 were eligible for the NRHP, and in addition, historic structures CMC-001-01, and CMC-001-02 were also eligible for the NRHP. In its January 10, 2007 comments, the COE agreed with the recommendations for the eleven archaeological sites and three non-site loci on COE property, and requested additional information regarding the historic structure on COE property. EEC has provided this information.

EEC submitted a supplemental report for Georgia for the Savannah River crossing reroute, two access roads, two extra work spaces, and the Transco Zone 4 meter station. As a result of this survey, only one archaeological non-site loci was identified and recommended as not eligible for the NRHP. In a letter dated April 19, 2007, the SHPO indicated that "no archaeological or historic resources…will be affected…". EEC submitted an additional supplemental report for a denied access segment, five access roads, two realignments, and one extra work space, and included an assessment for site 9EB729 and the additional information requested (noted above) by the SHPO for ten historic structures. Two archaeological sites, two non-site loci, and one historic structure were identified. None of the archaeological resources, including 9EB729, were recommended as eligible for the NRHP. The historic structure, along an access road, would be avoided. In a letter dated June 29, 2007, the SHPO concurred wit these conclusions. We also concur.

In South Carolina, EEC completed a Phase I cultural resources survey (both archaeological and architectural) for its originally proposed route. The report resulting from the survey was provided to the FERC and the South Carolina SHPO. The survey corridor was 300 feet wide, and included a 150-foot area on either side of the centerline. Two cultural resources were identified in the South Carolina portion of the pipeline: one previously recorded site that was not relocated, and one new historic archaeological site defined during the survey, which was recommended as not eligible for the NRHP. In a letter dated December 28, 2006, the South Carolina SHPO concurred that the proposed undertaking would have "no effect on historic properties."

EEC submitted a supplemental report for South Carolina for the Savannah River crossing reroute, two access roads, and the Transco Zone 5/Plant Rainey meter station, thus completing surveys in South Carolina of all project components identified to date. As a result of this survey, only one archaeological site was identified and recommended as not eligible for the NRHP. In a letter dated May 11, 2007, the SHPO indicated that "there will be no effect to historic properties by the proposed project." We agree.

Waterway for LNG Marine Traffic

A records search identified 18 previously recorded archaeological sites situated along the Savannah River shoreline within 1,600 meters of Elba Island. In addition, three historic properties listed on the NRHP (Fort Pulaski National Monument, Fort Screven Historic District, and Tybee Island Lighthouse) and eight shipwrecks (five of these offshore) were identified up to 3,500 meters from the waterway centerline. Of the 18 archaeological sites, 12 have been assessed as not eligible for the NRHP, three have not been assessed, two are potentially eligible, and one has been mitigated through Phase III excavations. Of the eight shipwrecks, two were considered potentially eligible for the NRHP, with the remainder not assessed.

No significant impact on cultural resources (archaeological sites or historic structures) is expected as a result of routine LNG and support vessel transit. The Lower Savannah River already experiences a high volume of vessel traffic, and wave induced erosion resulting from increased vessel traffic is expected to be minimal. Similarly, no significant impact on cultural resources is expected as a result of an unignited release of LNG, since LNG is less dense than water and would vaporize upon contact with water and air.

A portion of Fort Pulaski National Monument is located in Zone 1. The Fort Screven Historic District and Tybee Island Lighthouse are both located within Zone 2 (see figure 4.12-1). Potential significant impact on these historic aboveground properties may occur from an ignited release of LNG, depending on the scope of the incident and their proximity to the incident location. However, marine transit safety and security mitigation measures committed to in section 4.12.4, greatly reduce the likelihood of an ignited LNG release from a transiting LNG vessel and, thus, minimize impacts on cultural resources to a level of insignificance. No significant impacts on submerged cultural resources in the Zones of Concern or offshore cultural resources are expected as a result of routine LNG and support vessel transit, unignited release of LNG, or an ignited release of LNG because of the submerged nature of the resources.

No concerns have been expressed regarding tribal fishing rights from any of the Native American groups contacted.

4.10.2 Unanticipated Discoveries Plan

Terminal Expansion

Southern LNG submitted a *Plan for the Unexpected Discovery of Cultural Resources and Human Remains* to be used in the event that any unanticipated historic properties or human remains are encountered during construction of the proposed Terminal Expansion Project. We

requested revisions to the plan. Southern LNG has provided a revised plan which we find acceptable.

Elba Express Pipeline

EEC submitted a *Plan for the Unexpected Discovery of Cultural Resources and Human Remains* to be used in the event that any unanticipated historic properties or human remains are encountered during construction of the proposed Elba Express Pipeline facilities. We requested revisions to the plan. EEC provided a revised plan which the COE commented on. We requested that EEC revise the plan in light of the COE's comments. EEC has provided a revised plan to the FERC and the COE.

4.10.3 Native American Consultation

Terminal Expansion

Southern LNG contacted the federally-recognized Catawba Indian Nation, Eastern Band of Cherokee Indians, Muscogee (Creek) Nation of Oklahoma, and Poarch Creek Indian Tribe, as well as the state-recognized Georgia Tribe of Eastern Cherokee, Lower Muscogee Creek Tribe and the Cherokee of Georgia Tribal Council (letters dated June 6, 2006) to elicit any concerns about the proposed Terminal Expansion Project with regard to potential impacts to traditional cultural properties and historic properties. Follow-up letters were submitted to each Native American group listed above on September 4, 2006. No responses have been received to date.

Elba Express Pipeline

EEC contacted the federally recognized Catawba Indian Nation, Eastern Band of Cherokee Indians, Muscogee (Creek) Nation of Oklahoma, and Poarch Creek Indian Tribe, as well as the state-recognized Georgia Tribe of Eastern Cherokee, Lower Muscogee Creek Tribe and the Cherokee of Georgia Tribal Council (letters dated June 6, 2006) to elicit any concerns about the proposed Elba Express Pipeline with regard to potential impacts to traditional cultural properties and historic properties. Follow-up letters were submitted to each Native American group listed above on September 7, 2006.

The Muscogee (Creek) Nation responded by letter and indicated that the pipeline project area is within their aboriginal lands. Although the Muscogee (Creek) Nation was aware of cultural sites in the general area, they indicated that they were not aware of any particular site that may be impacted by the pipeline project. They also requested to be informed if any cultural resource sites are encountered during pipeline construction. The Eastern Band of Cherokee responded in a telephone call, stating that the Elba Express Pipeline is anticipated to cross an area of significance to the group, and requested contact information so that the information could be forwarded directly to EEC. No information has currently been received by EEC from the Eastern Band of Cherokee to date, and EEC submitted an additional letter requesting their continued input on June 7, 2007.

A letter also was received from the Cherokee of Georgia stating that they had no concerns about the pipeline project unless it interferes with American Indian burial sites or artifacts. No other responses have been received to date.

4.10.4 Compliance with the NHPA

Terminal Expansion

Cultural resources surveys have been completed for the Terminal Expansion Project site, and the Georgia SHPO and the FERC agree that no historic properties would be affected. Therefore, compliance with Section 106 of the NHPA is complete.

Elba Express Pipeline

In South Carolina, cultural resources surveys have been completed for all project components identified to date, and the South Caroline SHPO and the FERC agree that no historic properties would be affected. Therefore, compliance with Section 106 of the NHPA is complete in South Carolina. In Georgia, evaluation of sites, and survey of some portions of the project still need to be completed. Consequently, we have not completed the process of complying with Section 106 of the NHPA. When the surveys and evaluations are completed and comments addressed, the FERC, in consultation with the Georgia SHPO and the COE, as appropriate, will determine whether construction of the Elba Express Pipeline project would affect any properties listed, or eligible for listing, on the NRHP. If a property would be adversely affected, mitigation would be proposed.

To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that EEC defer construction of the pipeline, compressor station, meter stations, and establishment and use of all staging, storage, and temporary work areas and new or to-be-improved access roads until:**

a. EEC files a cultural resources survey report for the denied access areas, and any additional or newly identified areas requiring survey, evaluation report(s), any required avoidance or treatment plan(s), and the Georgia SHPO's comments and any COE comments, as appropriate, on the reports and any plan(s); and
b. the Director of OEP reviews all cultural resources survey and evaluation reports and plans and notifies EEC in writing that construction may proceed.

All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."

4.11 AIR QUALITY AND NOISE

4.11.1 Air Quality

4.11.1.1 Regional Climate

The State of Georgia has a humid, subtropical climate, with long, hot summers and short, mild winters. The average temperatures range from 46.8 degrees Fahrenheit (ºF) in January to 80.0°F in July. The coldest month is January when the daily mean maximum and minimum temperatures are 60.3 F and 38.3 F, respectively. July is the warmest month with the daily mean maximum and minimum temperatures of 91.6°F and 72.2°F, respectively. The average annual temperature is 66.4 ºF. The average annual rainfall is 50.18 inches. July has the highest average monthly rainfall at 5.64 inches. For Savannah the annual prevailing wind direction is West at a mean wind speed of 8 miles per hour (mph) and a peak gust of 68 mph (NOAA, 1998). The region typically receives 49.58 inches of annual precipitation (water equivalent), including a typical annual snowfall of 0.6 inches. The precipitation is generally well distributed throughout the year with winter being the driest season and late summer receiving the most rainfall.

4.11.1.2 Existing Air Quality

Ambient Air Quality Standards

The EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants for the purpose of protecting human health (primary standards) and public welfare (secondary standards). The EPA set NAAQS for the following air contaminants designated "criteria pollutants": nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), SO_2, lead (Pb), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$).

As of June 15, 2005 the 1-hour O_3 standard was revoked in all but 14 Early Action Compact (EAC) Areas and replaced by the new 8-hour O_3 standard. Revisions to the particulate matter standards, affecting both PM_{10} and $PM_{2.5}$ were approved by the Administrator of the EPA on October 10, 2006. These revised standards which became effective December 18, 2006 include; a reduction in the $PM_{2.5}$ 24-hour standard from 65 to 35 $\mu g/m^3$, retention of the $PM_{2.5}$ annual and PM_{10} 24-hour standards and revocation of the PM_{10} annual standard. The secondary standards were revised to match the primary standards. In addition, the form of the $PM_{2.5}$ annual standard was revised in regard to the criteria for spatial averaging.

The State of Georgia has essentially adopted the NAAQS as state standards. However, the recent changes to the particulate matter standards have yet to be incorporated in state regulations.

Air Quality Control Regions and Attainment Status

Air quality control regions (AQCR) are areas established for air quality planning purposes in which implementation plans describe how ambient air quality standards will be achieved and

maintained. The existing terminal is located in Chatham County part of the Savannah (Georgia)-Beaufort (South Carolina) Interstate Air Quality Control Region. The proposed compressor station would be located in Jenkins County, part of the Augusta (Georgia)-Aiken (South Carolina) Interstate Air Quality Control Region.

AQCRs were established by the EPA and local agencies, in accordance with Section 107 of the CAA, as a means to implement the CAA and comply with the NAAQS through state implementation plans. The AQCRs are intra- and interstate regions such as large metropolitan areas where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under three categories as follows: "attainment" (areas in compliance with the NAAQS); "nonattainment" (areas not in compliance with the NAAQS); or "unclassifiable". The existing terminal is located near Savannah, Georgia in Chatham County, an attainment area for all criteria pollutants. The Elba Express Pipeline facilities would be located in twelve Georgia counties and one South Carolina county, and the proposed Elba Express Compressor Station would be located in Jenkins County, Georgia, which are all attainment areas for all criteria pollutants except Anderson County, SC. EPA has classified Anderson County as non-attainment for the 8-hour O_3 standard for which NO_x and CO are precursors. However, because Anderson County has entered into the EAC, its effective date of non-attainment designation is deferred until April 15, 2008. The EAC process requires each area involved to reduce ground-level O_3 pollution earlier than the CAA requires.

General Conformity

40 CFR 51 and 93 define the requirements for determining conformity for federal actions to state or federal implementation plans. A conformity analysis is required for each criteria pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by a federal action would equal or exceed any of the rates specified in the applicable implementation plan. As mentioned previously, Anderson County's nonattainment designation has been deferred until April 15, 2008. The length of the proposed pipeline in Anderson County would consist of less than one mile and construction emissions within the county would be minimal. Given this limited scope we do not believe that general conformity would apply if the county is designated as nonattainment before the project commences. Therefore, the general conformity requirements do not apply to the proposed Project.

Air Quality Monitoring and Existing Air Quality

Air quality monitors are located throughout the state and region for a variety of purposes. The monitoring site nearest the project area that measures O_3, SO_2, Pb, $PM_{2.5}$, and PM_{10} is in Savannah, Georgia. The nearest monitoring locations for CO are in Atlanta, Decatur and Clarkston, Georgia. The nearest monitoring locations for NO_2 are in Atlanta, Decatur, Tucker and Conyers, Georgia. The available monitoring data from 2002 through 2006 are summarized in table 4.11.1-1 along with the standards established under the NAAQS. The values reported are the maximum monitored concentration for the 5-year period reviewed.

As indicated previously and demonstrated by the local monitoring data, areas within the State of

Georgia that could be influenced by the proposed project are classified as attainment for all criteria pollutants. The measured O_3 8-hour concentration above the current standard was

TABLE 4.11.1-1

National Ambient Air Quality Standards

Pollutant	Primary Standard	Averaging Times	Secondary Standard	5-Year Maximum	Monitoring Station Number/ Location
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour a/	None	3.7 ppm	130891002 / Clarkston, GA
	35 ppm (40 mg/m^3)	1-hour a/	None	10.8 ppm	130890002 / Decatur, GA
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	0.00 µg/m^3	130510021 / Savannah, GA
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	0.019 ppm	131210048 / Atlanta, GA
Particulate Matter (PM_{10})	Revoked b/	Annual b/ (Arith. Mean)		N/A	N/A
	150 µg/m^3	24-hour c/	Same as Primary	76 µg/m^3	130510014 / Savannah, GA
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual d/ (Arith. Mean)	Same as Primary	15 µg/m^3	130510017 / Savannah, GA
	35 µg/m^3	24-hour e/	Same as Primary	31µg/m^3	130510091 / Savannah, GA
Ozone	0.08 ppm	8-hour f/	Same as Primary	0.086 ppm	130510021 / Savannah, GA
	0.12 ppm	1-hour g/ (Applies only in limited areas)	Same as Primary	0.095 ppm	130510021 / Savannah, GA
Sulfur Oxides	0.03 ppm (80 µg/m^3)	Annual (Arith. Mean)	-------	0.005 ppm	130511002 / Savannah, GA
	0.14 ppm (365 µg/m^3)	24-hour a/	-------	0.048 ppm	130511002 / Savannah, GA
	-------	3-hour a/	0.5 ppm (1300 µg/m^3)	0.099 ppm	130511002 / Savannah, GA

a/ Not to be exceeded more than once per year.
b/) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).
c/ Not to be exceeded more than once per year on average over 3 years.
d/ To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
e/ To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
f/ To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
g/ (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1, as determined by appendix H.
(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone non-attainment Early Action Compact (EAC) Areas.

reported in 2002 prior to standard taking effect. From 2002 through 2006 there were no reported 8-hour O_3 exceedances. The nearest monitors for CO are located in Atlanta, Decatur and Clarkston Georgia. Data from 2002 to 2006 was reviewed for all CO monitoring stations and the highest 5-year value was reported. The nearest monitors for NO_2 are located in Atlanta, Decatur, Tucker and Conyers, Georgia. Data from 2002 to 2006 was reviewed for all NO_2 monitoring stations and the highest 5-year value was reported.

4.11.1.3 Existing Facility Emissions

Terminal Expansion

Table 4.11.1-2 lists the air emission sources currently permitted to operate at the Elba Terminal. Table 4.11.1-3 summarizes approximate potential-to-emit (PTE) for each source group. The emissions indirectly associated with operation of the existing terminal are summarized in table 4.11.1-4.

TABLE 4.11.1-2

Summary of Air Emissions Equipment

Equipment	Manufacturer	Model	Rated Capacity (ISO)	Site Rating
LNG Vaporizer	T-Thermal	Sub-X 90-135	88.1 MMBtu/hr	88.1 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 90-135	88.1 MMBtu/hr	88.1 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 90-135	88.1 MMBtu/hr	88.1 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 90-135	88.1 MMBtu/hr	88.1 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 90-135	88.1 MMBtu/hr	88.1 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
Reciprocating Engine Generator	Cooper-Bessemer	LSV-12-SG-4	3,920 hp	3,920 hp
Reciprocating Engine Generator	Cooper-Bessemer	LSV-12-SG-4	3,920 hp	3,920 hp
Gas Turbine Generator	Solar	Centaur T4000	3,800 hp	3,800 hp
Gas Turbine Generator	Solar	Centaur T4000	3,800 hp	3,800 hp
Fuel Gas Heater	NATCO	A51998	1.25 MMBtu/hr	1.25 MMBtu/hr
Fuel Gas Heater	NATCO	A51998	1.25 MMBtu/hr	1.25 MMBtu/hr
Heated Vent Stack Heater	Johnston	N/A	11.74 MMBtu/hr	11.74 MMBtu/hr
Air Compressor	N/A	N/A	15 hp	15 hp
Firewater Pump Engine	Cummins	N/A	215 hp	215 hp
Firewater Pump Engine	Cummins	N/A	700 hp	700 hp
LNG Vessel Unloading	N/A	N/A	N/A	N/A

TABLE 4.11.1-3

Summary of Potential Emissions From the Existing Terminal Equipment a/

Equipment Group	NO_x Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM b/ Emissions (tpy)	VOC Emissions (tpy)
Existing Equipment					
Elba I LNG Vaporizers	220	316	1	4	19
Elba II LNG Vaporizers	128	262	1	3	16
Emergency Generator Engines c/	13	11	< 0.5	< 0.5	30
Gas Turbine Generators	141	12	1	2	1
Fuel Gas Heaters	1	1	< 0.5	< 0.5	< 0.5
Heated Vent Stack Heater No. 1	5	4	< 0.5	< 0.5	< 0.5

TABLE 4.11.1-3

Summary of Potential Emissions From the Existing Terminal Equipment a/

Equipment Group	NO_X Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM b/ Emissions (tpy)	VOC Emissions (tpy)
Firewater Pump Drives	6	1	1	< 0.5	< 0.5
Air Compressor	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vessel Unloading d/	--	--	--	--	1
Oil Storage Tanks	--	--	--	--	3
Existing Equipment Total	**513**	**608**	**4**	**9**	**72**

a/ Summary values reflect rounding to the nearest whole number expressed in tons per year.

b/ All PM emissions from exclusive natural gas combustion are less than 2.5 micrometers, therefore PM emissions represent potential emissions of both PM_{10} and $PM_{2.5}$.

c/ Potential emissions from the emergency generator engines are based on 500 hundred hours per year of operation, as documented in the January 2006 minor modification to designate the existing RICE for emergency use only.

d/ Existing vessel unloading emissions represent fugitive VOC emissions from landside stationary source operations.

TABLE 4.11.1-4

Summary of Indirect Emissions Due to Current Vessel Operations a/

Operation	NO_X Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM_{10} Emissions (tpy)	VOC Emissions (tpy)
LNG Vessel Offloading (2004-2006)	33	2	136	12	0.5
LNG Vessel Hotelling (2004-2006)	6	0.4	27	2	0.1
LNG Vessel Transit (2004-2006)	10	4	15	2	2
Tug Assist Vessel Standby (2004-2006)	17	0.8	0.7	0.8	0.6
Tug Assist Vessel Berthing/Unberthing (2004-2006)	28	2	0.9	2	1
Coast Guard Escort Vessels (2004-2006)	4	115	0.09	0.03	3
Total Secondary Vessel Emissions based on current operations b/	**56**	**3**	**163**	**15**	**1**
Total Indirect Vessel Emissions based on current operations	**98**	**124**	**180**	**18**	**8**
LNG Vessel Offloading (Current Capacity)	131	7	240	21	3
LNG Vessel Hotelling (Current Capacity)	18	1	27	2	0.4
LNG Vessel Transit (Current Capacity)	22	9	33	4	4
Tug Assist Vessel Standby (Current Capacity)	45	2	2	2	1
Tug Assist Vessel Berthing/Unberthing (Current Capacity)	53	4	2	4	3
Coast Guard Escort Vessels (Current Capacity)	10	280	0.2	0.07	8
Total Secondary Vessel Emissions based on current capacity b/	**194**	**10**	**270**	**26**	**5**
Total Indirect Vessel Emissions based on current capacity	**279**	**302**	**305**	**33**	**20**

a/ Current operation emissions are based on receiving approximately 50 vessels per year. Current capacity emissions are based on receiving 126 vessels per year, which is the number of estimated port calls that Southern LNG would expect at full utilization of the Elba II Project.

b/ Secondary emissions for PSD impact analyses include emissions generated during LNG Vessel Offloading, LNG Vessel Hotelling, and Tug Assist Vessel Standby during Vessel Offloading and Hotelling.

Elba Express Compressor Station

Currently, no sources of air emissions exist at the proposed location of the Elba Express Pipeline and Compressor Station.

4.11.1.4 Regulatory Requirements for Air Quality

The proposed project is potentially subject to a variety of federal and state regulations pertaining to the construction and/or operation of air emission sources. The GDNR has primary jurisdiction over air emissions produced by the sources to be located at either the expanded terminal, the new compressor station or along the pipeline. The GDNR enforces its own regulations as well as EPA's federal requirements. The following sections summarize the applicability of various GDNR and federal regulations.

Terminal Expansion

Federal Air Quality Requirements

New Source Review/Prevention of Significant Deterioration

Expansion of the Elba Terminal would take place in Chatham County an attainment area for all criteria pollutants. Due to the attainment status of the area federal non-attainment New Source Review requirements do not apply.

PSD regulations (40 CFR Part 52.21) address construction in air quality attainment areas and define a major source as any source with a PTE listed pollutants in amounts equal to or greater than 250 tons per year (tpy) or 100 tpy for 28 specific source categories. If the construction consists of a modification to an existing major source, then lower emission thresholds triggering the need for PSD review apply (*i.e.*, 40 tpy of NO_X, 100 tpy of CO).

The existing Terminal is a major source under PSD as its PTE of NO_X and CO each exceed 250 tpy. As a result, a PSD review and PSD netting analysis were required for the proposed Terminal Expansion facilities. Southern LNG conducted a PSD netting analysis as part of the air construction permit application process. The PSD netting analysis demonstrated that both NO_X and CO net emission increases exceed the PSD significance thresholds, and a PSD construction permit was required. Southern LNG prepared and submitted a PSD permit application to GDNR EPD in April 2006. On May 15, 2007, GDNR EPD issued its Final Determination and approved the proposed modifications at the Elba terminal as part of Southern LNG's Part 70 Operating Amendment.

Projects subject to PSD review must complete a Best Available Control Technology (BACT) analysis to determine the feasible and cost-effective control technology to be applied in order to limit the impacts from the proposed new emission sources. As presented in the proposed Elba III Terminal Expansion PSD Permit Application, the six new LNG vaporizers would utilize submerged combustion vaporizer technology, good combustion practices, and proper operation and maintenance to limit emissions of NO_X and CO, for which PSD review was required.

Table 4.11.1-5 summarizes the BACT determination and corresponding emission rate for each PSD significant pollutant as part of the Elba III Terminal Expansion, and includes BACT determinations for prior projects to illustrate the improvements in emission control technology for SCV applications.

TABLE 4.11.1-5

BACT Determinations for Elba Island LNG Terminal

Project	Year Permitted a/	NO_X BACT (lb/MMBtu)	CO BACT (lb/MMBtu)
Recommissioning/Elba I Expansion	2001	0.114	0.164
Elba II Expansion	2003	0.08	0.164
Elba III Expansion	2007	0.037	0.030

a/ Denotes year in which PSD permit was issued.

New Source Performance Standards

Southern LNG would comply with applicable New Source Performance Standards (NSPS) through exclusive natural gas firing and proper operation and maintenance of combustion devices. Two NSPS subparts were identified as being applicable to sources at the proposed Terminal Expansion site.

If a source is found to be subject to a source-specific NSPS, the general requirements of Subpart A apply, unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring, reference test methods, and general control device requirements that support all other subparts as applicable.

Subpart Db applies to each steam generating unit of 100 million British thermal units per hour (MMBtu/hr) or greater heat input capacity that was constructed or modified after June 19, 1984. Each existing and proposed 121.4 MMBtu/hr vaporizer is subject to this subpart. Accordingly, Subpart Db applies to the new vaporizers associated with the Terminal Expansion Project.

For units firing exclusively natural gas, Subpart Db requires a NO_X emission standard of 0.20 lb/MMBtu and the use of a Continuous Emissions Monitoring System (CEMS) or a Predictive Emissions Monitoring System (PEMS) to monitor NO_X emissions. Subpart Db also requires hourly fuel records and quarterly records of excess NO_X emissions and daily records of NO_X emission rates and other operational parameters. Subpart Db is noted in the current facility Title V permit (Condition 3.3.3) as a rule currently applicable to the existing vaporizers constructed as part of the previous Elba II Project.

National Emissions Standards for Hazardous Air Pollutants

The Elba Island LNG Terminal is not predicted to be a major source of hazardous air pollutants (HAP) because potential emissions of combined HAPs would be less than 25 tpy and emissions of any individual HAP would be less than 10 tpy. The potentially applicable National Emissions

Standards for Hazardous Air Pollutants (NESHAPs) that do not apply because of the facility's minor source status include the following:

- Subpart HH, National Emissions Standards for Hazardous Air Pollutants: Oil and Natural Gas Production;
- Subpart HHH, National Emissions Standards for Hazardous Air Pollutants: Natural Gas Transmission and Storage;
- Subpart YYYY, National Emissions Standards for Hazardous Air Pollutants: Combustion Turbines;
- Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants: Reciprocating Internal Combustion Engines; and
- Subpart DDDDD: National Emissions Standards for Hazardous Air Pollutants: Industrial, Commercial, and Institutional Boilers and Process Heaters.

Title V Operating Permit

The Terminal Expansion Project is a major source with respect to the Title V (Part 70) Major Source Operating Program as administered by GDNR EPD pursuant to Section 391-3-1-.03(10), "Title V Operating Permits," of Georgia's Rules for Air Quality Control (GRAQC). The facility is a major source because potential emissions of NO_X, among other pollutants, exceed the applicable major source threshold of 100 tpy. The facility currently operates under Title V Permit No. 4922-051-0003-V-02-2. Southern LNG has submitted an application to modify the Title V permit as part of the PSD Permit Application. On May 15, 2007, GDNR EPD issued its Final Determination and approved the proposed modifications at the Elba terminal as part of Southern LNG's Part 70 Operating Amendment.

Applicable State Air Quality Requirements

GDNR EPD administers state construction permit programs and State Implementation Plan (SIP)-approved permitting programs for the federal PSD and Title V permit programs. GDNR EPD requires that Southern LNG secure appropriate construction permit authorization prior to the installation of equipment associated with the Terminal Expansion Project. Southern LNG prepared and submitted a PSD air permit application to EPD in April 2006. Southern would not initiate construction prior to the issuance of the required permit.

A number of applicable state emission standards, which differ from federal requirements, were addressed in the air permit application. The state regulations with which Southern LNG's operations must comply include:

- GRAQC §391-3-1-.02(2)(b) - Visible Emissions
- GRAQC §391-3-1-.02(2)(d) - Fuel-Burning Equipment
- GRAQC §391-3-1-.02(2)(g) - Sulfur Dioxide

Elba Express Compressor Station

Federal Air Quality Requirements

New Source Review/Prevention of Significant Deterioration

Due to the attainment status of the project area, federal non-attainment NSR requirements do not apply.

The PTE of the proposed compressor station would not exceed 250 tpy for any criteria pollutant. The Elba Express Compressor Station would be classified as a new "minor" source and not subject to PSD review; therefore, BACT and PSD modeling would not be required. Additionally, GEPD does not require state BACT or modeling for minor sources.

For minor sources, the GEPD allows for the issuance of either a combined construction and operating permit or alternatively, separate construction and operating permits. At a minimum, a state construction permit would be required from the GEPD prior to the start of construction of the Elba Express Compressor Station. EEC would submit the appropriate permit application to the GEPD in advance of construction activities.

New Source Performance Standards

The proposed turbine would have a heat input rate greater than 10 MMBtu/hr, therefore it is subject to Federal NSPS for Stationary Combustion Turbines (40 CFR 60 Subpart KKKK). Due to the turbine's heat input rate, greater than 10 MMBtu/hr but less than 850 MMBtu/hr, the applicable NO_x emission standard is 25 ppmv (parts per million by volume) at 15 percent oxygen (O_2). The utilization of dry-low NO_x technologies will be employed to meet the NSPS for NO_x.

Furthermore, the proposed turbine would be required to meet a SO_2 emission limit of 0.90 lb/MW-hr. Alternatively, a fuel limit of 0.06 lb/MMBtu could be met. The utilization of natural gas as fuel ensures compliance with any of the referenced SO_2 standards.

As the proposed turbine would be subject to NSPS subpart KKKK, the provisions of the NSPS Subpart GG would not apply, although as noted for the Terminal Expansion, the unit would be subject to the general requirements contained in NSPS Subpart A.

National Emissions Standards for Hazardous Air Pollutants

Potential emissions of HAPs from the new compressor station would be less than the major source threshold of 10 tpy for any single HAP and 25 tpy for total HAPs. Therefore, the provisions of NESHAP do not apply.

Title V Operating Permit

The total potential emissions of all criteria pollutants would be less than the Title V major source threshold of 100 tpy and as noted above the station would not be a major source of HAPs. As

such, the proposed Elba Express Compressor Station would not be subject to the Title V permitting requirements.

Applicable State Air Quality Requirements

GDNR EPD requires that EEC secure appropriate construction permit authorization prior to the installation of equipment associated with the proposed compressor station. EEC would obtain an air construction permit prior to any construction or installation of the proposed equipment.

The same state regulations applicable to the expanded terminal would apply to the compressor station.

- GRAQC §391-3-1-.02(2)(b) - Visible Emissions
- GRAQC §391-3-1-.02(2)(d) - Fuel-Burning Equipment
- GRAQC §391-3-1-.02(2)(g) - Sulfur Dioxide

4.11.1.5 Air Emissions Impacts

Construction Air Pollutant Emissions

Terminal Expansion

Air quality impacts associated with construction projects generally can be classified as impacts associated with fugitive dust generation and impacts associated with construction activities that may result in a minor temporary increase in emissions. Project construction would last approximately five years to complete both phases of the Terminal Expansion Project.

The construction related emissions would be comprised of two components, fugitive dust generated by vehicle travel and vehicle exhaust emissions. The vehicle-related fugitive emissions would be comprised of emissions associated with construction equipment, commuter vehicles, and delivery vehicles traveling in and around the construction area. The impact of fugitive dust emissions associated with vehicle travel around the construction area would remain localized to the specific area disturbed by construction.

The vehicle exhaust emissions would be generated by construction equipment, commuter vehicles, and delivery vehicles that travel in and around the construction area and generally include gasoline- or diesel-fueled engines in land clearing/grading equipment, cranes, bulldozers, various types of trucks, and cars.

Table 4.11.1-6 provides the proposed estimates of criteria pollutant emissions due to construction related activities. For comparison purposes, table 4.11.1-7 shows the yearly emissions inventory for Chatham County, Georgia, for 2001, the most recent data (EPA 2001). The data lists aggregate annual emissions of criteria air pollutants from source categories defined by EPA. This includes emissions from both point sources (facilities) and area sources (small businesses, residences, wildfires, vehicles, etc.). The yearly constructed-related emissions estimated for the terminal expansion would be temporary and would account for only a minimal portion of the

county's yearly emissions inventory. Therefore, we believe that the associated construction emissions would not result in a significant impact on air quality.

TABLE 4.11.1-6

Summary of Construction Related Emissions From Terminal Expansion Project

Operation	NO_X Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM_{10} Emissions (tpy)	VOC Emissions (tpy)
2007					
Construction Equipment a/	0.58	0.21	0.08	0.04	0.05
Commuter Traffic b/	6.62E-02	9.52E-01	6.87E-04	2.29E-03	8.73E-02
Delivery Vehicles b/	5.67E-03	8.06E-03	1.42E-05	7.26E-04	4.65E-03
Fugitive Dust c/	-	-	-	571.2	-
2008					
Construction Equipment a/	107.99	36.48	15.55	6.88	5.33
Commuter Traffic b/	6.08E-02	9.02E-01	6.25E-04	2.30E-03	8.02E-02
Delivery Vehicles b/	5.51E-03	8.00E-03	1.41E-05	7.07E-04	4.61E-03
Fugitive Dust c/	-	-	-	571.2	-
2009					
Construction Equipment a/	130.28	43.61	19.46	8.49	8.57
Commuter Traffic b/	5.58E-02	8.58E-01	6.23E-04	2.28E-03	7.30E-02
Delivery Vehicles b/	5.33E-03	7.90E-03	1.43E-05	6.91E-04	4.54E-03
Fugitive Dust c/	-	-	-	571.2	-
2010					
Construction Equipment a/	67.25	17.72	9.37	4.43	4.91
Commuter Traffic b/	5.09E-02	8.18E-01	6.23E-04	2.28E-03	6.62E-02
Delivery Vehicles b/	5.20E-03	7.89E-03	1.42E-05	6.76E-04	4.53E-03
Fugitive Dust c/	-	-	-	571.2	-
2011					
Construction Equipment a/	-	-	-	-	-
Commuter Traffic b/	4.02E-02	6.75E-01	5.38E-04	1.97E-03	5.20E-02
Delivery Vehicles b/	4.37E-03	6.75E-03	1.25E-05	5.41E-04	3.86E-03
Fugitive Dust c/	-	-	-	571.2	-
Total Construction Related Emissions associated with Elba III	306	102	44	2,876	19

a/ Construction equipment emissions based on EPA NONROAD model.

b/ Commuter and delivery vehicle traffic emissions based on EPA MOBILE 6.2 model.

c/ Fugitive dust emissions based on EPA AP-42 Chapters 13.2.1 for paved roads, 13.2.2 for unpaved roads, and 13.2.3 for heavy construction operations.

Elba Express Pipeline and Compressor Station

Emissions from construction of the pipeline and compressor station would be temporary and last only during the construction period, anticipated to be approximately 9 to 12 months for Phase I (the pipeline) and 6 to 9 months for Phase II (the compressor station). Although pipeline construction is projected to require 9 to 12 months, the emissions associated with the burning of

vegetation typically occur over a few days. Open burning may occur during construction; however, EEC would comply with any local ordinances on open burning.

TABLE 4.11.1-7

Chatham County Emissions Inventory (2001)

	NO_X Emissions (tons)	CO Emissions (tons)	SO_2 Emissions (tons)	PM_{10} Emissions (tons)	$PM_{2.5}$ Emissions (tons)	VOC Emissions (tons)
Area Source Emissions	15,419	91,284	1,414	5,860	1,712	16,823
Point Source Emissions	15,801	36,083	17,586	9,404	7,129	3,273
Total Emissions	31,220	127,367	19,000	15,264	19,000	20,096

The construction-related emissions are comprised of the similar components associated with construction of the Terminal Expansion. The types of construction equipment, commuter, and delivery vehicles for pipeline construction consist of dozers, tractors, boom trucks, pickup trucks, compressors, sidebooms, and other mobile equipment. Table 4.11.1-8 provides a summary of estimated vehicle exhaust emissions associated with construction of the pipeline.

TABLE 4.11.1-8

Summary of Construction Emissions for the Elba Express Pipeline

Pollutants	Construction Emissions (tpy)
NOx	84.23
CO	18.15
NM/NE VOC	6.83
PM/PM_{10}	5.98
SO_2	5.57

Notes:

1. Emission factors for NO_x, CO, PM, PM_{10}, SO_2 and VOC taken from AP-42, Section 3.3, table 3.3-1, dated October 1996 for diesel fuel.
2. Estimated HP ratings
3. Assumed load factors, equipment weeks, and days per week

Air Pollutant Emissions From Operation

Terminal Expansion

The new emission sources resulting from the Terminal Expansion Project would include installation of six new LNG vaporizers, each with a heat input of 121.4 MMBtu/hr and one new vent stack heater. Table 4.1.1-9 summarizes the proposed air emission sources at the terminal.

Table 4.11.1-10 summarizes approximate potential emissions from each source group, Terminal Expansion facilities, and facility-wide potential emissions.

TABLE 4.11.1-9 **Summary of Air Emissions Equipment**				
Equipment	**Manufacturer**	**Model**	**Rated Capacity (ISO)**	**Site Rating**
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
LNG Vaporizer	T-Thermal	Sub-X 120-180	121.4 MMBtu/hr	121.4 MMBtu/hr
Heated Vent Stack Heater	Johnston	N/A	11.74 MMBtu/hr	11.74 MMBtu/hr

TABLE 4.11.1-10 **Summary of Potential Emissions From The Proposed Terminal Expansion a/**					
Equipment Group	**NO_X Emissions (tpy)**	**CO Emissions (tpy)**	**SO_2 Emissions (tpy)**	**PM b/ Emissions (tpy)**	**VOC Emissions (tpy)**
Terminal Expansion					
Elba III LNG Vaporizers	118	96	2	6	19
Heated Vent Stack Heater No. 2 c/	5	4	< 0.5	< 0.5	< 0.5
Elba III Potential Emissions Increase d/	123	100	2	6	20
Facility-wide Total (After Expansion III) e/	636	708	6	16	92

a/ Summary values reflect rounding to the nearest whole number expressed in tons per year.

b/ All PM emissions from exclusive natural gas combustion are less than 2.5 micrometers, therefore PM emissions represent potential emissions of both PM_{10} and $PM_{2.5}$.

c/ Potential emissions from the emergency generator engines are based on 500 hundred hours per year of operation, as documented in the January 2006 minor modification to designate the existing RICE for emergency use only.

d/ Existing vessel unloading emissions represent fugitive VOC emissions from landside stationary source operations.

e/ Facility-wide total Hazardous Air Pollutants emissions for all sources is 5.26 tons/year.

As shown above, the Terminal Expansion facilities would cause increased emissions due to the operation of the new LNG vaporizers and would be subject to federal and state air quality regulations. PSD air quality impact analyses were conducted using EPA-approved regulatory air quality models to quantify the impacts associated with the Terminal Expansion facilities and continued operation of the existing terminal facilities. Southern LNG conducted a full air quality analysis as part of the PSD permit application process to determine impacts of the proposed Terminal Expansion Project on the ambient air. The air quality dispersion modeling analysis presented in the PSD permit application can be summarized as follows:

- Ambient impacts on NO_2 due to PSD increment-consuming emissions from the existing terminal facilities and significant regional sources were computed to be below PSD Increment thresholds.

- Ambient impacts on NO_2 due to all emissions from the terminal facilities and significant regional sources demonstrated compliance with the NAAQS.
- No significant ambient impacts of CO were predicted and compliance with applicable NAAQS is presumed.
- Additional impacts to the soils, vegetation, and visibility of the surrounding area are not anticipated to be significant.
- The Terminal Expansion Project and continued operation of the PSD Increment-affecting sources at the terminal would neither cause nor contribute to exceedances of applicable PSD Increment or Air Quality Related Values thresholds at federally protected Class I areas within 300 km of the facility. When the frequency, magnitude, and duration of visibility impairment events were considered, as well as visibility impairment due to natural occurring phenomena (*e.g.*, sea salt and precipitation), the continued operation of the Increment-consuming sources at the terminal would not contribute to excessive levels of regional haze at the Wolf Island, Cape Romain, or Okefenokee Class I areas.
- Computed ambient impacts of toxic air pollutants would be below allowable ambient concentrations as defined by GDNR EPD's guidelines.

Indirect Emissions from LNG Carrier

The Terminal Expansion Project would cause increases of indirect emissions of air pollutants from LNG carrier calling at the terminal and from various support vessels. GDNR EPD has previously determined that under state law and the Georgia State Implementation Plan for air quality, marine vessels are not part of the stationary source, even when docked at a facility that is a stationary source (GDNR EPD 2003). GRAQC 391-3-1-.03(9)(c) defines a stationary source as "all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel," which is consistent with the PSD definition of a stationary source at 40 CFR 52.21(b)(6).

EPA air quality regulations for PSD permitting define secondary emissions as follows (40 CFR 52.21(b)(18)):

Secondary emissions means emissions which would occur as a result of the construction or operation of a major stationary source or major modification, but do not come from the major stationary source or major modification itself. Secondary emissions include emissions from any offsite support facility which would not be constructed or increase its emissions except as a result of the construction or operation of the major stationary source or major modification. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel.

The GDNR EPD issued a letter to Southern LNG on June 5, 2006, requesting that LNG vessel emissions and modeling be included as part of the air permit application for the Terminal Expansion Project. After further discussions with GDNR EPD, it was determined that emissions generated during certain vessel operations may be considered secondary emissions. Although the regulatory definition of secondary emissions excludes emissions from the tailpipe of mobile sources, such as LNG cargo vessels, the emissions from the vessels while at berth are included as

secondary emissions. The mobile source exclusion is the basis for excluding "to and fro" emissions of LNG vessel vessels and support vessels from the secondary emissions analyses. Activities conducted while the vessels are at berth include hotelling operations and LNG offloading. Accordingly, Southern LNG submitted a response to GDNR EPD's June 5 letter in the form of an updated air quality modeling analysis which included secondary vessel emissions. This report provides a summary of secondary emissions, which represent a subset of all indirect emissions from vessels. Southern LNG has quantified indirect vessel emissions based on all reasonable vessel activity associated with the terminal, including transit or "to and fro" emissions. Secondary emissions only include emissions generated while the LNG vessel is at berth, except for mobile Coast Guard vessels which may be patrolling the area while the vessel is at berth.

The nature, size, frequency, and fuel-burning characteristics of LNG vessel vessels that call at the terminal are not under Southern LNG's control or regulated for uniformity, but rather are dictated by Southern LNG's customers that utilize LNG vessels from foreign sources. The LNG vessel emissions presented in this analysis are based on vendor-specific LNG vessel emission data as provided by Southern LNG customers. Emissions from the tug assist vessels are estimated based on the Tier II IMO/EPA Requirements (effective 2007). Coast Guard escort vessel emissions were based on factors for four-stroke outboard, precontrolled engines, as presented in EPA's "Exhaust Emission Factors for Nonroad Engine Modeling – Spark Ignition." Air emissions from these vessels are quantified using energy-based emission factors along with fuel types. Indirect emissions presented in this analysis include emissions from the LNG vessel while berthed at dockside for LNG offloading operations, the LNG vessel while in transit, tug assist vessels, and Coast Guard escort vessels.

Prior to making the channel transit of the Savannah River and into the terminal, each arriving LNG vessel must gain permission from the Coast Guard to proceed. A summary description of the vessel and accompanying tugs' activities once the vessel is authorized to proceed is provided below:

- Following departure from the load port, the LNG vessel would have planned to arrive at the Pilot Boarding Position, designated as 2 miles east of the Sea Buoy. At this point, which is approximately 16 to 18 nautical miles from the terminal, one Savannah River Pilot, one Docking Pilot, and one tug assist vessel would join the vessel. To facilitate boarding by the River and Docking Pilot, the LNG vessels' speed is reduced to approximately 10 knots. Once the pilots have safely boarded, the transit continues at approximately 12 knots. The inbound transit from Pilot Station to the Elba Island berths is estimated to take approximately one hour and forty-five minutes. During inbound transit operations, LNG cargo vessels may burn marine diesel heavy fuel oil (HFO) and/or boil-off LNG fuel gas.
- Prior to the LNG vessel passing the Savannah River jetties, (a point approximately 6 to 8 nautical miles from the terminal), an additional tug assist vessel meets the LNG vessel for escort purposes.
- At a point approximately 1 to 2 nautical miles from the terminal (approaching the slip entrance), one or two additional tug assst vessels join the LNG vessel for purposes of docking assistance. At this point, a total of three or four tug assist vessels are engaged

with docking duties. Docking maneuvers take approximately 30 minutes. (The emission calculations for the tug assist vessel berthing/unberthing category conservatively assumed four tugs for the current operations at the terminal, and for the Terminal Expansion Project, as shown in tables 4.11.1-4, 4.11.1-11, and 4.11.1-12. However, it should be noted that four tugs normally would be used only for the larger LNG vessels. Smaller vessels are safely docked with three tugs.)

- Once the LNG vessel is moored, one or two tug assist vessels are released, whilst two tug assist vessels remain on station at the facility in a stand-by mode for emergency response. A Docking Pilot remains onboard the LNG vessel throughout her port stay.
- Once the vessel is moored, the means of propulsion is shut down, while auxiliary engines are used to provide power for both operational use and general "hotelling" purposes. During the discharge operation, auxiliary means are used to power the cargo pumps to offload the cargo. Hotelling and offloading operations typically last a period of 20 to 30 hours.
- Following completion of the offloading operation and granting of the required approvals by both the local authorities and the Coast Guard, the Docking Pilot is joined onboard by a Savannah River Pilot for departure. The two stand-by tugs are joined by one or two additional tugs to assist the LNG vessel in her undocking maneuver and subsequent channel departure transit. A total of three or four tugs are now engaged with undocking duties. Undocking maneuvers take approximately 15 to 30 minutes. (The emission calculations for the tug assist vessel berthing/unberthing category conservatively assumed four tugs for the current operations at the terminal and for the Terminal Expansion Project, as shown in tables 4.11.1-4, 4.11.1-11, and 4.11.1-12. Again four tugs normally would be used only for the larger LNG vessels. Smaller vessels are safely docked with three tugs.)
- At a point approximately 0.5 to 1 nautical mile from the facility, one or two of the tug assist vessels are released, whilst two remain with the LNG vessel for the duration of the outbound escort. Once the outbound transit is underway, the vessel would proceed at approximately 12 knots. The outbound transit is estimated to take approximately one hour and thirty minutes. During outbound transit operations, LNG vessels may burn marine diesel HFO and/or boil-off LNG fuel gas.
- At a point approximately 6 to 8 nautical miles from the terminal (at the Savannah River jetties), one of the escort tug assist vessels is released, and one tug remains with the vessel.
- At a point approximately 16 nautical miles away from the terminal, the Savannah River Pilot and Docking Pilot depart the vessel, disembarking to the pilot boat and tug assist vessel, which is then released from service.

Occasionally, Coast Guard vessels may escort the LNG vessels to Elba Island and patrol the area while LNG is offloaded to the terminal. For the purpose of this analysis, it was estimated that two escort vessels would accompany each vessel port call, and one vessel would patrol the island during hotelling and offloading operations. The transit emissions from the LNG vessels are an approximation, based on an LNG vessel traveling at 12 knots for 2 hours while in the reduced speed zone, which equates to a distance of 24 nautical miles each way. The transit emissions were estimated out to this distance, because this point is where vessels receive approval from the

Coast Guard to proceed, and the tugs begin assisting the vessels to enter the Savannah River channel and the Elba Island Terminal.

Annual indirect emissions were estimated based on emission factors provided by Southern LNG's customers, the type of fuel burned, and the estimated time required to complete the offloading operation.

Southern LNG quantified indirect emissions due to current operations at the terminal. Actual emissions are based on vessel log data collected at Elba Island from August 3, 2004 to August 4, 2006. The facility received 99 LNG vessels over this 2-year period. Prior to implementation of the Terminal Expansion Project, Southern LNG estimates the maximum annual number of vessels that will call on Elba Island to be approximately 126 vessels per year. This estimate includes vessels associated with both the Elba Island Recommissioning Project and the Elba II Project. However, the Elba II Project was just recently completed in February 2006. Therefore, actual operations over the past 2 years do not represent the current capacity of the facility, and Southern LNG expects the current average of 50 port calls per year to increase as Elba II reaches its full capacity. Table 4.11.1-4 provides the annual average estimate of criteria pollutant emissions due to actual operations at Elba Island over the past 2 years, as well as an estimate of indirect emissions after Elba II reaches full capacity (approximately 126 vessels per year).

Southern LNG also estimated annual indirect emissions following the Terminal Expansion Project, based on the expected increase in port calls associated with the project. Table 4.11.1-11 provides the estimated increase in criteria pollutant emissions associated with the current expansion project.

TABLE 4.11.1-11

Summary of Indirect Emission From the Terminal Expansion Project a/

Operation	NO_X Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM_{10} Emissions (tpy)	VOC Emissions (tpy)
LNG Vessel Offloading	101	5	175	16	2
LNG Vessel Hotelling	14	0.8	20	2	0.3
LNG Vessel Transit	16	7	25	3	3
Tug Assist Vessel Standby	34	2	1	2	1
Tug Assist Vessel Berthing/Unberthing	40	3	1	3	2
Coast Guard Escort Vessels	7	211	0.2	0.05	6
Total Secondary Vessel Emissions associated with the Elba III Project b/	**149**	**8**	**197**	**19**	**4**
Total Indirect Vessel Emissions associated with Elba III Project	**213**	**228**	**223**	**25**	**15**

a/ Estimated emissions are based on 95 port calls per year, which includes LNG vessel traffic associated with the Terminal Expansion Project. Emission factors were vendor specific data provided by Southern LNG's customers.

b/ Secondary emissions for PSD impact analyses include emissions generated during LNG Vessel Offloading, LNG Vessel Hotelling, and Tug Assist Vessel Standby during Vessel Offloading and Hotelling.

Table 4.11.1-12 provides a cumulative summary of emissions from the future Elba Island LNG Terminal.

TABLE 4.11.1-12

Cumulative Summary of Emissions from the Future Elba Island LNG Terminal a/

Emission Source	NO_x Emissions (tpy)	CO Emissions (tpy)	SO_2 Emissions (tpy)	PM Emissions (tpy)	VOC Emissions (tpy)
Existing Equipment	513	608	4	9	72
Elba III Potential Emissions Increase	123	100	2	6	20
Future Terminal (After Expansion III) b/	**636**	**708**	**6**	**16**	**92**
LNG Vessel Offloading	232	12	416	37	5
LNG Vessel Hotelling	32	2	47	4	0.7
LNG Vessel Transit	38	15	58	6	7
Tug Assist Vessel Standby	79	4	3	4	3
Tug Assist Vessel Berthing/Unberthing	93	7	3	7	5
Coast Guard Escort Vessels	17	490	0.4	0.1	14
Secondary Vessel Cumulative Emissions c/	**343**	**18**	**466**	**45**	**8**
Indirect Vessel Cumulative Emissions	**492**	**530**	**528**	**58**	**34**
Future Elba LNG Terminal Total (including mobile sources)	**1128**	**1238**	**534**	**74**	**126**

a/ Estimated emissions are based on 221 port calls per year, which includes cumulative LNG vessel traffic following the Terminal Expansion Project.

b/ Facility-wide total Hazardous Air Pollutants emissions for all sources is 5.26 tons/year.

c/ Secondary emissions for PSD impact analyses include emissions generated during LNG Vessel Offloading, LNG Vessel Hotelling, and Tug Assist Vessel Standby during Vessel Offloading and Hotelling.

In addition, FERC requested that Southern LNG conduct a refined air dispersion analysis for the proposed project to provide a more thorough evaluation of the potential impacts on air quality in the vicinity of the Terminal Expansion. The air dispersion modeling analysis was used to predict the off-site concentrations in the vicinity of the project for NO_2, CO, and SO_2 emissions associated with operation of the project for comparison to the appropriate federal air quality standards. A summary of the methodology and results of the analysis is provided below.

A cumulative impacts evaluation was conducted including the emissions attributable to all stationary sources at the Elba Island LNG Terminal (existing and proposed), marine vessel emissions originating within the moored security zone, and regional sources. The resulting impacts were assessed against the NAAQS. Emissions originating inside and outside of the moored security zone are summarized in table 4.11.1-13.

Table 4.11.1-13

Summary of Mobile Emissions Within and Outside of Moored Security Zone

Inside the Moored Security Zone	Outside the Moored Security Zone
LNG Vessel Offloading	Tug Assist Vessel Standby at Port
LNG Vessel Hotelling	LNG Vessel Transit
LNG Vessel Berthing/Unberthing	Tug Assist Vessel Escort/Transit
Tug Assist Vessel Pushing/Pulling/Maneuvering	Security Escort/Transit/Patrol

The modeling was conducted using the ISC-PRIME model with a 5-year meteorological data set (1982-1986) which was approved by the EPA for Southern LNG's PSD permit application. The model included background concentrations of NO_2, CO, and SO_2 emissions which were derived from GDNR EPD ambient monitoring data as an average of peak measurements in the Savannah area. Industrial sources in the surrounding region were also included where regional source inventories of NO_x and SO_2 emissions were compiled from data provided by GDNR EPD and the South Carolina Department of Health and Environmental Control. A regional source emission inventory was not available for CO. The emissions were modeled using receptors at 100-meter spacing within 10 km of the Terminal. This methodology represents a very conservative approach.

The worst-case scenario was modeled which represented the presence of two LNG vessels at the Terminal and the presence of two tug assist vessels for each LNG vessel only during berthing and unberthing. Although the expansion would be designed for two vessels to offload simultaneously, the likelihood of this is not expected to be great. Southern LNG estimated the duration of LNG operations during which the LNG vessel would have the highest level of emissions due to combustion of heavy fuel oil for steam turbine operation. The results of the cumulative NAAQS analysis are presented in table 4.11.1-14.

TABLE 4.11.1-14

Summary of Modeled Air Quality Impacts Attributable to Elba Island LNG Terminal

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu g/m^3$) [a/]	Background Value ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	26.4 [b/]	13	39.7	100
CO	1-hour	795.3 [c/]	3,406	4,201.29	40,000
	8-hour	384.2 [c/]	2,266	2,650.17	10,000
SO_2	3-hour	1,076.8 [c/]	143	1,219.80	1,300
	24-hour	386.9 [c/]	52	438.9	365
	Annual	20.4 [b/]	10	30.4	80

[a/] Maximum modeled impact from 5-year meteorological data
[b/] Impacts are assessed using highest impact at each receptor
[c/] Impacts are assessed using the highest, 2nd-high impact at each receptor

The modeling results show that the cumulative impacts of NO_2, CO, and SO_2 for the 3-hour and annual periods are all below the corresponding NAAQS. The cumulative impacts attributable to the Terminal exceed the NAAQS for the SO_2 24-hour averaging period. Further analysis showed that the exceedances of the 24-hour NAAQS were estimated for 2 of the 5 meteorological data years analyzed and the emissions from marine activities contributed substantially to the magnitude of the estimated exceedances. The highest 24-hour SO_2 impacts for the analysis were shown to occur in a narrow band immediately adjacent to the boundary of Elba Island and the safety zone at the docking area. However, given this very conservative approach, we believe that the Terminal Expansion alone would contribute to only a fraction of the impacts shown in the modeling analysis. Although the Terminal Expansion would contribute to the degradation of the regional air quality, it would not result in significant impacts to the regional air quality.

In addition, the mix of LNG vessel configurations expected to dock at Elba Island would be changing in the coming years to include more diesel engine-driven vessels that would have lower SO_2 emissions. The Marine Environment Protection Committee of the International Maritime Organization has identified SO_x Emission Control Areas (SECAs) for certain territorial waters around the world. The east coast of the U.S. is one of the SECAs and it is considering adopting this proposed 1.5 percent or lower sulfur limit around 2010 or 2011 which is about the same time that the Terminal Expansion would go into service. This would ultimately result in lower SO_2 emission from the LNG vessels.

Waterway for LNG Marine Traffic

During normal operation of the project, air emissions from the LNG marine traffic and escort vessel traffic would occur between the LNG terminal to the territorial seas. Because the air emissions due to the LNG vessel traffic and escort vessels were estimated to a distance of 24 nautical miles (27.6 miles) from the terminal, the air quality impacts within the Zones of Concern (described in section 4.12.4.3) are included in the above analysis. During normal operating conditions, the impacts on air quality would occur along the entire waterway from the territorial seas to the terminal. Following the assumption that the number of vessels that visited the Port of Savannah in 2005 is similar to the current rate of Port use, the Elba III Terminal Expansion would increase the number of visiting vessels to the Port by about three percent. Although we cannot quantitatively determine the increase in air impacts due to the additional LNG vessels and support vessels we can assume that the increase in air pollutants along the waterway attributable to the Elba III Terminal Expansion could be about three percent. The medium population density areas in Zones 2 and 3 are currently subject to the air emissions generated by LNG marine traffic and other large vessels using the waterway to destinations such as the Port of Savannah, Georgia. Thus while we cannot quantify the impacts, we do expect a temporary increase in air quality impacts to the populations in Zones 2 and 3 along the waterway, which at times (based upon wind speed, direction, number of support vessels, and fuel mixtures) may be above ambient air quality levels for short periods. However, the emissions affecting any one localized area would be temporary as the LNG vessels and support vessels make the transit and would occur at distances allowing for considerable dispersion. The long-term impacts associated with the normal operation of the additional LNG vessels along the waterway should not have a significant impact on air quality.

If a marine LNG spill occurred, any unignited LNG would vaporize; because LNG is mostly composed of methane, no criteria air pollutants would be associated with the vaporized LNG. However, methane is considered a greenhouse gas and may contribute to global warming. The dispersion of the methane vapors would cause a temporary decrease in the ambient air quality. Wildlife and humans occupying the water's surface near the release in Zone 1 could intercept the vapor cloud prior to dispersion and suffer asphyxiation. The duration of exposure to any substantial pollutant concentrations would be short and would not pose a significant health risk to sensitive receptors given the distance to shore from a potential LNG spill. Therefore, there would be no significant impacts to air quality in the unlikely event of a marine LNG spill.

However, if ignition to the vapor cloud would occur, combustion emissions would be released to the atmosphere. Natural gas combustion typically is not complete in spill scenarios. The products of incomplete combustion of natural gas include criteria pollutants, hazardous air pollutants, unburned hydrocarbons, and soot (carbon particulates). The maximum increases in ambient air pollutant concentrations due to the natural gas vapor cloud fire would occur downwind of the LNG spill. These ambient air pollutant concentrations would likely exceed short-term NAAQS and State Ambient Air Quality Standards over the duration of the fire as well as soot deposition and diminished visibility due to soot transport. The more populated area of the transit route closer to the terminal receptors would be exposed to higher pollutant concentrations for the short duration of the fire. The types and amounts of emissions from the ignition of an LNG pool would depend on many factors, but the emissions to any one localized area would be temporary and depend on weather and other conditions along the waterway. Emissions at a particular location that would arise from ignited vegetation and any nearby man-made structures would likely have greater levels of unburned hydrocarbons and hazardous air pollutants. Any high acute exposures to smoke from LNG and induced fires may lead to a range of health problems such as a worsening of asthma conditions, irritation of the eyes, nose and throat, and difficulty breathing. In sensitive populations (children, elderly, or chronically ill) symptoms of exposure may be of greater magnitude. This could be a significant impact, with injuries ranging from mild to fatal, being most severe in Zone 1 and decreasing outward through Zones 2 and 3. However, because of the implementation of safety and security measures during marine transit (See section 4.12, Reliability and Safety), the likelihood of a marine LNG spill would be extremely remote and therefore is highly unlikely to impact air quality.

Elba Express Compressor Station

EEC performed an analysis to assess the potential air emissions from the proposed Elba Express Compressor Station. This section provides summary of that analysis for the sources to be constructed at the proposed compressor station.

The emissions provided below are estimates at this time and are not permit limits for this unit. The permit limits would be established during the air permitting of the compression station. Table 4.11.1-15 lists the equipment that EEC has identified for installation and operation at the proposed location.

TABLE 4.11.1-15

Proposed Equipment for Elba Express Compressor Station

Equipment	No. of Identical Units	Net Output Power/Unit	Maximum Heat Input/Unit (MMBtu/hr)	Potential Hours of Operation per Year
Solar Taurus 70-CS Turbine a/	1	10,310 hp b/	86.94	8760
Emergency Generator a/	1	250 kW	3.95	500
Fuel Gas Heater a/	1	NA	1.5	8760

a/ The manufacturer, make and model of the units are not finalized; therefore, they are subject to change. However, the net output ratings would be equivalent to those proposed.

b/ Engine rating at ISO conditions.

NOTE: The emissions provided above are estimates at this time and they are not permit limits for this unit. The permit limits would be established during the air permitting of the compression station.

Table 4.11.1-16 provides a summary of the PTE from the compressor station operation. The new compressor station would be a minor source which is not subject to PSD regulations under NSR and would not require BACT. No additional controls are planned beyond the SoLoNO_x controls, installed by the manufacturer, that are standard for the proposed units and limit NO_x, CO, and volatile organic compound (VOC) emissions.

TABLE 4.11.1-16

Summary of Potential Emissions For Elba Express Compressor Station

Pollutants	Elba Express Compressor Station
Potential to Emit from Proposed Project (tpy)	
NO_x	39.83
CO	45.63
NM/NE VOC	12.51
PM/PM_{10}	2.57
SO_2	1.30
Formaldehyde	0.60
HAPs	0.69

No air quality impacts would be expected from the operation of pipeline, metering, or other auxiliary facilities associated with the Elba Express Pipeline.

4.11.1.6 Mitigation

Terminal Expansion

During construction, elevated levels of ambient pollutants are likely to occur in the immediate vicinity of the terminal site. However, this reduction of local ambient air quality due to fugitive dust and emissions generated by construction equipment would be temporary. Once the

construction phase is completed, the fugitive dust and emissions would subside, thus the length of time any one area would be exposed to dust and emission from construction activities would be limited. The specific measures Southern LNG would employ to minimize construction-related vehicle exhaust emissions could include the utilization of more efficient (newer model) heavy construction equipment, maintaining all construction equipment in proper working condition, and minimizing the amount of idling time of construction equipment. Any measures employed by Southern LNG would meet all GDNR EPD requirements for construction-related vehicle exhaust emissions. Vehicular exhaust and crankcase emissions from gasoline and diesel engines would comply with applicable EPA mobile source emission regulations (40 CFR 85) by using equipment manufactured to meet these specifications.

The specific control measures to minimize fugitive dust due to vehicle travel would meet all GDNR EPD requirements for fugitive dust mitigation, which may include watering the disturbed construction area, washing construction equipment, and minimizing the area being disturbed to the extent possible during each phase of construction. By implementing these measures, as applicable, we anticipate that the fugitive dust emissions associated with vehicle travel in and around the construction area should not result in a significant impact on regional air quality.

Potential impacts on air quality due to the operation of the new LNG vaporizers would be minimized by adherence to applicable federal and state regulations and the installation of BACT to minimize emission from significant sources. As presented in Southern LNG's Terminal Expansion Project PSD Permit Application, the six new LNG vaporizers would utilize submerged combustion vaporizer technology, good combustion practices, and proper operation and maintenance to limit emissions of NO_X and CO, for which PSD review was required.

Elba Express Pipeline and Compressor Station

Because pipeline construction moves along through an area relatively quickly, air emissions are typically intermittent and short-term. EEC would employ the same mitigations measures for construction of the pipeline and compressor station as described for the terminal.

Air quality impacts due to the operation of the proposed Elba Express Pipeline facilities are anticipated to be minor. EEC would comply with all state and local air permitting requirements prior to construction and operation of the compressor station. We do not believe the minor air quality impacts associated with the pipeline facilities would have a significant cumulative effect on air quality when aggregated with other emissions sources in the area.

4.11.2 Noise

Noise impacts generally fall into two categories: temporary impacts resulting from operation of construction equipment, and long-term or permanent impacts resulting from operation of the Terminal Expansion facilities, Elba Express Pipeline facilities, and Elba Express Compressor Station. Construction-related noise from heavy equipment would be of a similar nature regardless of project. Both the Terminal Expansion and compressor station projects would involve the addition or installation of equipment that would fall under the same noise level requirements. Noise would affect the local environment during both the construction and

operation of the Terminal Expansion and Elba Express Pipeline facilities, including the Elba Express Compressor Station. The ambient sound level of a region is defined by the total noise generated within the specific environment, and is usually comprised of sound emanating from natural and artificial sources. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and throughout the week.

Two measures used by federal agencies to relate the time-varying quality of environmental noise to its known effect on people are the 24-hour equivalent sound level ($L_{eq(24)}$) and the day-night sound level (L_{dn}). The $L_{eq(24)}$ is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} takes into account the duration and time the noise is encountered. The L_{dn} is the $L_{eq(24)}$ with 10 decibels on the A-weighted scale (dBA) added to nighttime sound levels between the hours of 10 p.m. and 7 a.m., to account for people's greater sensitivity to sound during nighttime hours.

In 1974, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. This publication evaluates the effects of environmental noise with respect to health and safety. The document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. The FERC has adopted this criterion for new compression and associated facilities, and it is used here to evaluate the potential noise impact from operation of the proposed Terminal Expansion facilities and Elba Express Compressor Station. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA for facilities that operate at a constant level of noise.

Both the Terminal Expansion and the Elba Express Compressor Station sites are located in the state of Georgia. The state of Georgia does not have a noise standard applicable to either project.

The Terminal Expansion site is located in Chatham County, Georgia. The county has a noise standard applicable to the proposed expansion. The Chatham County noise ordinance (24-304 Noise Disturbance Prohibited) limits sound from the Elba Island LNG Terminal facility to no greater than 60 dBA during the day (7 a.m. to 10 p.m.) and 55 dBA at night (10 p.m. to 7 a.m.) at any residential property line. Facility sound levels at any industrial or commercial property line are limited to 75 dBA and 65 dBA, respectively. The ordinance also prohibits construction during the hours of 10 p.m. and 7 a.m. if it creates a noise disturbance across a residential real property boundary. At any other hours, construction noise levels at noise sensitive areas (NSA) are limited to 75 dBA.

The proposed Elba Express Compressor Station would be located in Jenkins County, Georgia. There are no local or county standards applicable to the compressor station.

The FERC standard, limiting operational noise from either project to an L_{dn} of no greater than 55 dBA, is the most restrictive standard for both the Terminal Expansion and the compressor station projects for nearby NSAs in Georgia.

Southern LNG and Elba Express evaluated potential noise impacts by conducting both a background noise monitoring program at the nearest NSAs and a noise impact evaluation for both the proposed LNG expansion and compressor station facilities. The noise impact evaluations included calculating expected increases in noise associated with construction and by calculating expected noise levels due to operation of each project. The expected noise levels were then compared to our standard for permissible noise levels at NSAs.

4.11.2.1 Existing Noise Environment

Terminal Expansion

The existing terminal is operational and as such, an ambient noise monitoring program was required at nearby NSAs with the facility operating at or near full load conditions. Two existing NSAs were identified in the vicinity of the facility. These NSAs are depicted on the site area map (figure 4.11-1) and include the following:

- NSA 1 – Houses on Causton Harbor Road and Bartow Point Road, 12,300 feet southwest of the facility; and
- NSA 2 – Houses along Riverview Road, 12,000 feet southwest of the facility.

Southern LNG's noise consultant, Hoover and Keith, Inc. (H&K), conducted ambient noise monitoring at the two NSA locations on the afternoon of March 20, 2006. The monitoring program was intended to be conducted with the terminal operating at or near full capacity. However, pipeline conditions at the time did not require full load operation. The measured ambient sound levels at the NSAs are provided in table 4.11.2-1.

TABLE 4.11.2-1

Measured Ambient Noise Levels Near the Existing Terminal Facility (dBA)

Location	Distance/Direction	L_{Day} a/	L_{Night} b/	L_{dn}
NSA 1	12,300 feet / SW	52.5	---	58.9
NSA 2	12,000 feet / SW	44.7	---	51.1

a/ The Elba Island LNG facility was not audible at either NSA location.
b/ L_{night} was not measured. Assumed to be equal to L_{Day}.

Only daytime measurements were conducted, and the nighttime noise level was conservatively assumed to be the same as the daytime noise level for purposes of calculating the existing L_{dn} noise level. Existing noise sources included other industrial facilities, aircraft, and natural sounds (wind induced sounds, birds). The LNG facility was not audible at either of the NSA locations during noise monitoring.

Southern LNG therefore selected five additional locations (noted as positions 3 through 7) inside the LNG facility, at closer-in locations, for obtaining noise measurements. The LNG facility was audible at four of the five closer-in locations. The measured sound levels at all closer-in positions are presented in table 4.11.2-2.

TABLE 4.11.2-2

Measured Ambient Noise Levels at Closer-In Positions Near the Existing Terminal Facility (dBA)

Position	Distance/Direction a/	Measured Sound Level (L_{eq})
3	800 Feet / NW	63.6
4	1100 Feet / WSW	57.5
5	2100 Feet / SW	51.5
6	1600 Feet / SSE	44.5
7	600 Feet / SE	61.0

a/ Distance is from the approximate acoustic center of the facility.

Of the closer-in locations where the facility was audible, observations made by H&K indicated that at position 4, the terminal was the dominant source of noise, was in a clear line of site to the major noise producing sources at the facility, and would be an ideal position for obtaining noise level data that could be used to predict offsite sound levels. The noise level measured at position 4 was extrapolated for distances to each of the NSA locations, accounting for distance and atmospheric affects. In addition, the measured level was also increased to account for the part load operating condition of the terminal. The adjustment consisted of determining the total potential horsepower of all major facility sources (23,800 hp), and the horsepower in operation during the noise measurements (8,500 hp). This resulted in an increase of 4.5 dBA over the measured levels from position 4. Provided in table 4.11.2-3 are the calculated full load terminal noise levels at each NSA location and at the nearest industrial property line, as calculated from the position 4 data.

Non-Internet Public

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED ELBA III PROJECT
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Figure 4.11-1
NSA Location Map for Proposed Terminal Expansion Project

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

TABLE 4.11.2-3

Calculated Noise Level Due to Full Load LNG Operation (dBA)
From the Existing Terminal Facility

Position	Distance/Direction	Calculated L_{Day}	L_{Night} a/	Calculated L_{dn}
NSA 1	12,300 feet / SW	31.1	---	37.5
NSA 2	12,000 feet / SW	31.4	---	37.8
Nearest Industrial Property Line	7,000 Feet / WSW	39.2	---	---

a/ L_{Night} was not measured. Assumed to be equal to L_{Day}.

The calculated noise levels due to the existing Terminal are shown to be well below the FERC standard for residential properties, and well below the Chatham County noise standard for industrial property lines.

Elba Express Compressor Station

Existing NSAs were identified in the vicinity of the proposed compressor station. These NSAs are depicted on the site area map (figure 4.11-2) and include the following:

- NSA 1 – A church approximately 1,400 feet west of the center of the proposed site; and
- NSA 2 – A house approximately 3,500 feet east-southeast of the center of the proposed site.

EEC's consultants, H&K, conducted ambient noise measurements at these two NSA locations on July 24, 2006. Measurements were conducted during daytime hours only. The nighttime ambient level was estimated from observations, and an ambient L_{dn} was calculated. Existing noise sources included vehicular traffic noise and natural sounds (birds). These measured ambient levels are presented in table 4.11.2-4.

TABLE 4.11.2-4

Existing Ambient Noise Levels Near The Proposed Compressor Station Site (dBA)

Location	Distance/Direction	L_{Day}	L_{Night} a/	L_{dn}
NSA 1	1,400 Feet / West	42.6	40.0	46.9
NSA 2	3,500 Feet / ESE	45.4	40.0	47.7

a/ L_{Night} was estimated, not measured.

Non-Internet Public

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Figure 4.11-2
NSA Location Map for Elba Express Compressor Station

4.11.2.2 Construction Noise

Terminal Expansion

Construction activity, and associated noise levels, would vary depending on the phase of construction in progress at any one time. Southern LNG assumed that the highest level of construction noise would occur during earth work and foundation construction. Construction noise levels were calculated for three distinct phases: 1) construction of the Terminal Expansion facilities; 2) pile driving, and; 3) dredging of the marine berthing slip. The construction noise analysis considered the noise produced by any significant sound sources associated with each construction phase. Construction noise levels were calculated for the nearest NSA location (NSA 2), by phase, and are provided in table 4.11.2-5.

Based on the analyses conducted and the results presented above, we do not anticipate any significant noise impacts associated with construction of the proposed Terminal Expansion facilities.

TABLE 4.11.2-5

Maximum Calculated Construction Noise Levels at NSA 2 by Terminal Expansion Construction Phase (dBA)

Calculated LNG Facility Construction	Calculated LNG Facility Construction (L_{dn})	Calculated Marine Terminal Pile Driving	Calculated Marine Terminal Pile Driving (L_{dn})	Calculated Marine Terminal Dredging	Calculated Marine Terminal Dredging (L_{dn})
34.0	40.4	35.0	41.4	27.0	33.4

Elba Express Pipeline and Compressor Station

Construction activity, and associated noise levels, would vary depending on the phase of construction in progress at any one time. Construction of the pipeline would occur over relatively short 50 to 400 foot stretches. Work in the proximity of any single general location on the pipeline route would likely last no more than a few days to one week, as construction activities move along the corridor. Therefore, no single receptor would be exposed to significant noise levels for an extended period.

EEC assumed that the highest level of construction noise of the compressor station would occur during earth work (site clearing and grading). Maximum expected construction noise levels at the nearest NSA (NSA 1) were calculated to be 52.0 dBA. Since no nighttime construction is proposed, the construction noise L_{dn} would also be 52.0 dBA.

In addition to construction of the compressor station, EEC identified the need to conduct HDDs at two locations along the pipeline route (Savannah River and Broad River crossings). In the draft EIS, we recommended that EEC develop a HDD noise analysis, mitigation, and compliance plan demonstrating that noise due to drilling operations would be below an L_{dn} of 55 dBA or, if that threshold were exceeded, to stop drilling and mitigate noise at the affected NSA to reduce noise levels below this threshold, or offer temporary housing until noise levels at the NSA are 55

dBA L_{dn} or lower. In its comments to the draft EIS, EEC prepared and submitted an analysis of expected noise levels due to HDD activities at the nearest NSAs to each crossing. The analysis revealed that without mitigation, our 55 dBA L_{dn} limit for HDD noise would be exceeded at only one NSA near the Savannah River entry point and one NSA near the Broad River entry point. HDD noise levels would be below the limit at all remaining NSA locations at both crossings. The analysis also evaluated and recommended noise mitigation measures that would reduce noise at the NSA near the Savannah River crossing to below the 55 dBA L_{dn} limit. The noise increase due to drilling at the NSA near the Broad River crossing would be below a 3 dBA increase, the threshold of noticeable difference.

EEC would be required to maintain drilling noise levels to below 55 dBA L_{dn}, and as a general requirement, resolve any landowner complaints concerning noise in its weekly status reports. Based on the measures that would be implemented by EEC, we believe that noise impacts associated with the HDD operations would be satisfactorily mitigated.

4.11.2.3 Operational Noise

Terminal Expansion

Southern LNG performed a noise analysis to calculate noise levels that would be generated by operation of the proposed Terminal Expansion facilities. These levels were evaluated against the existing baseline L_{dn} noise levels and our impact criterion to determine potential impacts at the representative NSAs.

The calculated noise levels for the Terminal Expansion under full load conditions, as well as the existing ambient sound level and future sound level for the nearest NSAs, are presented in table 4.11.2-6. The noise analyses also included specific noise mitigation measures to reduce impacts.

TABLE 4.11.2-6

Terminal Expansion
Calculated Operation Noise Levels Summary (dBA)

Location	Calculated Existing LNG L_{dn} a/	Calculated Project L_{dn} b/	Existing Measured Ambient L_{dn} c/	Cumulative Future Noise Level d/ (L_{dn})	Increase Over Existing
NSA 1	37.5	38.8	58.9	58.9	0.0
NSA 2	37.8	38.8	51.1	51.3	0.2

a/ Noise level of Terminal under full load conditions.
b/ Terminal plus proposed expansion under full load.
c/ Existing measured ambient. Elba Island LNG not audible at these locations. Only daytime levels measured, and nighttime assumed to equal daytime levels.
d/ Existing ambient levels plus Elba Island after expansion.

Increases in noise levels of 3 dBA or less are considered to be imperceptible. The analysis revealed that imperceptible increases in noise (near zero dBA) would occur with Terminal Expansion facility operations.

Waterway for LNG Marine Traffic

Noise generated by LNG marine traffic along the waterway from the territorial sea to the proposed LNG Terminal Expansion would be similar to noise from other large vessels currently using the waterway. Scientific data exists to suggest that underwater vessel noise does impact aquatic species. However, extensive scientific research has not been conducted to know the exact noise impacts of underwater vessel noise on these species. Given the volume of existing vessel traffic into the Port of Savannah, it is expected that any noise attributable to the additional LNG vessels would not be noticed by species tolerant of existing shipping. Underwater noise in the Zones of Concern (described in section 4.12.4.3) would cause a local and temporary avoidance behavior in aquatic species but would not result in significant impacts.

The proposed project area already is subject to routine noise disturbances associated with construction, commercial and recreational vessels, maintenance dredging, other engine operations, industrial and municipal activities, and other sources. Noise associated with the normal operation of the additional LNG vessels along the waterway would cause an insignificant incremental increase in noise impacts. Following the assumption that the number of vessels that visited the Port of Savannah in 2005 is similar to the current rate of Port use, the Elba III Terminal Expansion would increase the number of visiting vessels to the Port by about three percent. By extrapolation, therefore, it is assumed that the maximum increase in noise events along the waterway attributable to the Elba III Terminal Expansion would be about three percent. Overall, the amount of noise resulting from the proposed increase in LNG vessel traffic would be comparable to that associated with the large amount of shipping (including LNG vessels) that already use the Port of Savannah.

In the event of a marine LNG spill, any LNG released would vaporize. Subsequent ignition of the vapor cloud may also occur. Detonation of an unconfined natural gas cloud is extremely difficult to achieve and is considered by scientists and researchers to be very unlikely to occur during an LNG spill. Therefore, noise associated with such an event would not be significant. Given the known behavior of an LNG spill when ignited, and because no detonation would result, such an ignition event would not be expected to generate sound pressure waves that would affect nearby species or other resources in the Zones of Concern, either above or below the surface of the water.

Compliance with Applicable Noise Standards

Calculated operational noise levels for the Terminal Expansion were shown to be well below the FERC criterion of 55 dBA L_{dn} for all nearby NSA locations. Calculated facility noise levels at the nearest industrial property line (39.2 dBA) were shown to be in compliance with the Chatham County noise ordinance. Based on the analyses conducted, and the data presented above, we conclude that no significant noise impacts would occur with the proposed expansion operations.

Proposed Mitigation

Southern LNG indicated that the following site-specific noise mitigation measures were included in the noise analyses: (a) the submerged combustion LNG vaporizer inlet fans would be totally

enclosed in an insulated acoustical enclosure and (b) The combustion air inlet would enter the acoustical enclosure through a suitable parallel baffle silencer.

The modeling analyses for the Terminal Expansion facility incorporated noise reduction measures to achieve the levels presented herein. Based on the estimates presented in the acoustical analyses, noise levels due to operation of the Terminal Expansion facility would be below an L_{dn} of 55 dBA at the NSAs. Further, for NSA locations where the existing ambient L_{dn} levels exceed 55 dBA, no increases in operational noise levels are expected, and we conclude that there would be no significant adverse noise impacts due to operation of the Terminal Expansion facility. However, to ensure that the Terminal Expansion Project operates in compliance with our guidelines, **we recommend that Southern LNG file a noise survey with the Secretary for the Terminal Expansion no later than 60 days after placing the expansion facilities into service. If the noise attributable to the operation of the terminal exceeds an L_{dn} of 55 dBA at any nearby NSAs, Southern LNG should file a report on what changes are needed and should install additional noise controls to meet that level within 1 year of the in-service date. Southern LNG should confirm compliance with this requirement by filing a second noise survey no later than 60 days after it installs the additional noise controls.**

Elba Express Compressor Station

The calculated Elba Express Compressor Station noise levels under full load conditions, as well as the existing ambient sound level, and future sound level for each NSA, are presented in table 4.11.2-7. The noise analysis included specific mitigation measures to reduce impacts.

TABLE 4.11.2-7

Elba Express Compressor Station Existing and Future Noise Impacts at NSAs (dBA)

Location	Existing Measured Ambient L_{dn}	Calculated Project L_{dn}	Cumulative Future L_{dn} Noise Level a/	Increase Over Existing
NSA 1	46.9	52.0	53.2	6.3
NSA 2	47.7	40.8	48.5	0.8

a/ Ambient plus proposed compressor station at full load.

The analysis indicated that increases in noise at the nearest NSA (church) would be on the order of 6 dBA. Increases in noise at the nearest residence would be less than 1 dBA, an essentially imperceptible increase, and noise levels at this location would be well below our criterion.

Compliance with Applicable Noise Standards

Calculated operational noise levels for the Elba Express Compressor Station were shown to be below the FERC criterion of 55 dBA L_{dn} for both nearby NSA locations. Based on the analyses conducted, and the data presented above, we conclude that no significant noise impacts would occur with compressor station operations.

Proposed Mitigation

The modeling analyses for the Elba Express Compressor Station incorporated site-specific noise mitigation measures to achieve the levels presented herein. Based on the estimates presented in the acoustical analyses, noise levels due to operation of the station would be below an L_{dn} of 55 dBA at the NSAs. We conclude that there would be no significant adverse noise impacts due to operation of the Elba Express Compressor Station. However, to ensure that the Elba Express Compressor Station operates in compliance with our guidelines, **we recommend that EEC file a noise survey with the Secretary for the Elba Express Compressor Station no later than 60 days after placing the station into service. If the noise attributable to the operation of the station under full load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, EEC should file a report on what changes are needed and should install additional noise controls to meet that level within 1 year of the in-service date. EEC should confirm compliance with this requirement by filing a second noise survey no later than 60 days after it installs the additional noise controls.**

4.12 RELIABILITY AND SAFETY

Three federal agencies share in the oversight of the safety and security of LNG import terminals: the FERC, the Coast Guard, and the DOT. The FERC authorizes the siting and construction of LNG import terminals and is the lead federal agency under NEPA to analyze the environmental, safety, security, and cryogenic design of proposed facilities. The Coast Guard has authority over safety of the LNG marine traffic and the marine transfer area. The Coast Guard also has authority over security of the LNG vessels and the entire LNG facility. In conjunction with this, the Coast Guard determines the suitability of waterways for LNG marine traffic by issuing an LOR. The DOT has exclusive authority to promulgate and enforce safety regulations and standards over the onshore LNG facilities beginning at the last valve immediately before the LNG storage tank.

In February 2004, the three participating agencies entered into an Interagency Agreement to assure that they work in a coordinated manner to address the full range of issues regarding safety and security at LNG import terminals, including the terminal facilities and vessel operations, and to maximize the exchange of information related to the safety and security aspects of the LNG facilities and related marine operations. The FERC closely coordinates its pre-authorization review of the proposal with the Coast Guard and the DOT to ensure a seamless safety and security review.

The operation of the proposed Elba III Terminal Expansion poses a potential hazard that could affect the public safety without strict design and operational measures to control potential accidents. The primary concerns are those events that could lead to an LNG spill of sufficient magnitude to create an offsite hazard, including events occurring during the course of but not limited to LNG vessel transits. However, it is also important to recognize the stringent requirements for the design, construction, operation and maintenance of the facility as well as the extensive safety systems to detect and control potential hazards.

With the exception of the October 20, 1944 fire at the LNG facility in Cleveland, Ohio, the operating history of U.S. LNG facilities has been free of LNG safety-related incidents resulting in adverse effects to the public or the environment. The 1944 Cleveland incident was attributed to the use of materials inadequately suited for cryogenic temperatures and the lack of spill impoundments at the site.[27] More recently, an operational accident occurred in 1979 at the Cove Point LNG facility in Lusby, Maryland, when a pump seal failed, resulting in gas vapors entering an electrical conduit and settling in a confined space. When a worker switched off a circuit breaker, the gas ignited, resulting in heavy damage to the building and a worker fatality. Lessons learned from this accident resulted in changing the national fire codes, with the participation of the FERC, to ensure that the situation would not occur again. The proposed facilities would be designed, constructed, and operated in compliance with these codes.

On January 19, 2004, a blast occurred at Sonatrach's Skikda, Algeria LNG liquefaction facility that killed 27 and injured 56 workers. No members of the public were injured. Preliminary findings of the accident investigation suggest that a cold hydrocarbon leak occurred at Liquefaction Train 40 and was introduced to the high-pressure steam boiler by the combustion air fan. An explosion developed inside the boiler firebox which subsequently triggered a larger explosion of the hydrocarbon vapors in the immediate vicinity. The resulting fire damaged the adjacent liquefaction process and liquefied petroleum gas separation equipment of Train 40, and spread to Trains 20 and 30. Although Trains 10, 20, and 30 had been modernized in 1998-1999, Train 40 had been operating with its original equipment since start-up in 1981.

Although there are major differences between the equipment involved in the accident at Skikda and that proposed by Southern LNG (*i.e.*, high-pressure steam boilers that power refrigerant compressors would not be used here nor are they used at any LNG facility under FERC jurisdiction), the sequence of cascading events identifies potential failure modes that warrant further evaluation. As a result, we have provided a recommendation in section 4.12.2, *Cryogenic Design and Technical Review*, to address this issue.

A discussion of the principal properties and hazards associated with LNG is presented in section 4.12.1. A summary of our preliminary design and technical review of the cryogenic aspects of the LNG terminal is presented in section 4.12.2. An analysis of the thermal radiation and flammable vapor cloud hazards resulting from a credible land-based LNG spill is presented in section 4.12.3, while the safety aspects of LNG transportation by vessel is discussed and summarized in section 4.12.4. The emergency response and evacuation plan is discussed in section 4.12.5. Conclusions on marine traffic safety are provided in section 4.12.6. Security awareness related to terrorism is discussed in section 4.12.7. And finally, pipeline safety standards, pipeline accident data, and pipeline impacts on public safety are presented in sections 4.12.8 through 4.12.10.

[27] For a description of the incident and the findings of the investigation, see "U.S. Bureau of Mines, Report on the Investigation of the Fire at the Liquefaction, Storage, and Regasification Plant of the East Ohio Gas Co., Cleveland, Ohio, October 20, 1944, February 1946."

4.12.1 LNG Hazards

LNG's principal hazards result from its cryogenic temperature (-260° F), flammability, and vapor dispersion characteristics. As a liquid, LNG will neither burn nor explode. Although it can cause freeze burns and, depending on the length of exposure, more serious injury or death, its extremely cold state does not present a significant hazard to the public, which rarely, if ever, comes in contact with it as a liquid. As a cryogenic liquid, LNG will quickly cool materials it contacts, causing extreme thermal stress in materials not specifically designed for ultra-cold conditions. Such thermal stresses could subsequently subject the material to brittleness, fracture, or other loss of tensile strength. These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296° F) or several other cryogenic gases that have been routinely produced and transported in the United States.

LNG vaporizes rapidly when exposed to ambient heat sources such as water or soil. When released from its containment vessel and/or transfer system, LNG will generally produce 620 to 630 standard cubic feet of natural gas for each cubic foot of liquid. A large quantity of LNG spilled without ignition would form a vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. If a large quantity of LNG is spilled in the presence of an ignition source, the resulting pool fire would produce high levels of radiant heat in the area surrounding the LNG pool.

A rapid phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction, an RPT is the result of heat transferred to the liquid inducing a change to the vapor state. The rapid expansion from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the events were strong enough to damage test equipment in the immediate vicinity of the LNG release point. The sizes of the overpressure events have been generally small and are estimated to be equivalent to several pounds of trinitrotoluene (TNT). Although such a small overpressure is not expected to cause significant damage to an LNG vessel, the RPT may increase the rate of LNG pool spreading and the LNG vaporization rate for a spill on water.

Methane vapors, the primary component of natural gas, are colorless, odorless and tasteless, and are classified as a simple asphyxiant. Methane vapors may cause extreme health hazards, including death, if inhaled in significant quantities within a limited time. Although very cold methane vapors may cause freeze burns, any cloud resulting from an LNG spill would be continuously mixing with the warmer air surrounding the spill site. Dispersion modeling indicates the majority of the cloud would generally be within 25° F of the surrounding atmospheric temperature, with colder temperatures closest to the spill source. In addition, this modeling estimates that most of the cloud would be below concentrations resulting in oxygen deprivation effects, including asphyxiation, with the highest methane concentrations closest to the spill source. Therefore, asphyxiation and freezing normally represent a negligible risk to the public from LNG facilities.

Although LNG will not burn, methane vapors in a 5 to 15 percent mixture by volume with air are flammable. Once a flammable vapor-air mixture from an LNG spill has been ignited, the flame front will propagate back to the spill site if the vapor concentration along this path is sufficiently high to support the combustion process. Combustible materials within the flammable portion of the cloud may be within the flame and could be ignited. However, any events leading to a containment failure would most likely be accompanied by a number of ignition sources. The result would be an LNG pool fire, and subsequent radiant heat hazards, rather than the formation of a large unconfined vapor cloud.

Although, LNG is not explosive as it is normally transported and stored, natural gas vapors (primarily methane) can explode if contained within a confined space, such as a building or structure, and ignited. Occasionally, various parties have expressed the energy content of an LNG storage tank or LNG vessel in equivalent tons of TNT, as an implied measure of explosive potential. However, such a simplistic analogy fails to consider that explosive forces are not just a function of the total energy content but also of the rate of energy release. For a detonation to occur, the rate of energy release must be nearly instantaneous, such as with a TNT charge initiated by a blasting cap. Unlike TNT or other explosives which inherently contain an oxidizer, an unconfined vapor cloud must be mixed with oxygen within the flammability range of the fuel for combustion to occur. For a large unconfined vapor cloud, the flammability range tends to exist at the mixing zone at the edges of the cloud. When ignited, flame speeds about 20 to 25 meters per second (66 to 82 feet per second) and local over pressures up to 0.2 psig have been estimated for unconfined methane-rich vapor clouds, well below the flame speeds and over pressures associated with detonation.

The potential for unconfined LNG vapor cloud detonations was investigated by the U.S. Coast Guard in the late 1970s at the Naval Weapons Center at China Lake, California. These experiments, as well as other subsequent tests, are mentioned in Appendix C of the Sandia National Laboratories report entitled, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water, December 2004* (Sandia Report). Using methane, the primary component of natural gas, several experiments were conducted to determine if unconfined vapor clouds would detonate. The tests indicated unconfined methane-air mixtures could be ignited, but no test produced unconfined detonation. There is no evidence suggesting that methane-air mixtures will detonate in unconfined open areas.

Further tests were conducted in the late 1970s to examine the level of sensitivity of an unconfined cloud to the presence of heavier hydrocarbons such as ethane and propane. As stated in Section 5 of Appendix C of the Sandia Report, detonation sensitivity is affected by the level of refinement of natural gas stored as LNG. The series of tests on ambient-temperature fuel mixtures of methane-ethane and methane-propane indicated that the addition of heavier hydrocarbons influenced the tendency of an unconfined vapor cloud to detonate. Less processed product with greater amounts of heavier hydrocarbons is more sensitive to detonation. During these experiments, all successful detonations were initiated with an explosive charge in well-mixed vapor clouds at correct stoichiometric proportions. These are not representative of conditions which would be expected during a large scale LNG spill. The precise timing, necessary mixing, and required amount of initiating explosives render the possibility for detonation of a large unconfined vapor cloud as unrealistic. Detonation of the unconfined

natural gas cloud is extremely difficult to achieve and is generally considered by scientists and researchers to be very unlikely to occur during an LNG spill.

Consequently, the primary hazards to the public from an LNG spill either on land or water would be from dispersion of the flammable vapors or from radiant heat generated by a pool fire.

4.12.2 Cryogenic Design and Technical Review

As part of its application and in response to FERC staff's data requests, Southern LNG provided a front-end engineering design for the proposed project. The front-end engineering design and technical review emphasizes the engineering design and safety concepts as well as the projected operational reliability of the proposed facilities. The principle areas of coverage include: materials in cryogenic environments; insulation systems; cryogenic safety; thermodynamics; heat transfer; instrumentation; cryogenic processes; and other relevant safety systems.

Study and evaluation of information for the proposed design and installation of the Elba III Terminal Expansion facilities has been performed by the FERC staff. The front-end engineering design and specifications submitted for the proposed facilities to date are considered to be preliminary but would be the basis for any detailed design to follow. A significant amount of the design involving final selection of equipment manufacturers, process conditions, and resolution of some safety related issues would be completed in the next phase of the project development if authorization is granted by the Commission. This information would need to be filed with FERC staff for review and approval.

As a result of the technical review of the information provided by Southern LNG in the submittal documents, a number of concerns were identified by staff relating to the reliability, operability, and safety of the proposed design. Southern LNG provided responses to staff's questions at the technical conference held on January 24, 2007. However, several areas of concern are noted that require additional consideration and/or action on behalf of the company. Follow up on those items requiring additional action should be documented in reports to be filed with the FERC. As a result, **we recommend that the following measures apply to Southern LNG's Terminal Expansion. Information pertaining to these specific recommendations should be filed for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service, as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, should be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR 388.112. *See Critical Energy Infrastructure Information*, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006), FERC Stats. & Regs. ¶ 31,228 (2006). Information pertaining to items such as: offsite emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. This information should be submitted a minimum of 30 days before approval to proceed is required.**

- **Complete plan drawings and a list of the hazard detection equipment should be filed <u>prior to initial site preparation</u>. The list should include the instrument tag number,**

type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings should clearly show the location of all detection equipment.

- **Southern LNG should provide a technical review of its proposed facility design that:**

    a. Identifies all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids and flammable gases); and

    b. Demonstrates that these areas are adequately covered by hazard detection devices and indicate how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.

  Southern LNG should file this review prior to initial site preparation.

- **Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and other hazard control equipment should be filed prior to initial site preparation. The list should include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings should clearly show the planned location of all fixed and wheeled extinguishers.**

- **Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system should be filed prior to initial site preparation.**

- **A copy of the hazard design review and list of recommendations that are to be incorporated in the final facility design should be filed prior to initial site preparation.**

- **The final design of the fixed and wheeled dry-chemical, fire extinguishing hazard control equipment should identify manufacturer and model.**

- **The final design should include an updated fire protection evaluation carried out in accordance with the requirements of NFPA 59A 2001, chapter 9.1.2.**

- **The final design should include a shutoff valve at the suction and discharge of each high pressure LNG pump.**

- **The final design of the vaporizers should include double block isolation on the suction and double block isolation and check valve on the discharge of each vaporizer. One of the valves on the suction and one valve on the discharge should be automatically actuated.**

- **The final design of the minimum flow recycle line from the secondary pumps to downstream of the isolation valve to the LNG storage tanks should specify pipe with the same pressure and temperature rating as the discharge piping for the secondary pumps.**

- **The final design should include details of the shut down logic, including cause and effect matrices for alarms and shutdowns.**

- **The final design should include emergency shutdown of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable.**

- **The final design should specify that the hazardous area classification of the LNG pump area and vaporizer LNG inlet and outlet piping areas are classified as Class 1 Group D, Division 1.**

- **The final design should include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system. Each air gap should vent to a safe location and be equipped with a leak detection device that should continuously monitor for the presence of a flammable fluid, should alarm the hazardous condition, and should shutdown the appropriate systems.**

- **The final design should include a hazard and operability review of the completed design. A copy of the review and a list of the recommendations should be filed.**

- **The final design of the sendout piping from the vaporizers to the shut-off valve upstream of the meter station should specify the same pressure rating as the vaporizer discharge piping.**

- **All valves including drain, vent, main, and car sealed, or locked valves should be tagged in the field during construction and prior to commissioning.**

- **The design details and procedures to record and to prevent the tank fill rate from exceeding the maximum fill rate specified by the tank designer should be filed prior to commissioning.**

- **A tabulated list of the proposed hand-held fire extinguishers should be filed prior to commissioning. The information should include a list with the equipment number, type, size, number, and location. Plan drawings should include the type, size, and number of all hand-held fire extinguishers.**

- **Operation and Maintenance procedures and manuals, as well as safety procedure manuals, should be filed prior to commissioning.**

- **The FERC staff should be notified of any proposed revisions to the security plan and physical security of the facility prior to commencement of service.**

- **Progress on construction of the Expansion Project should be reported in filed monthly reports. Details should include a summary of activities, projected schedule for completion, problems encountered and remedial actions taken. Problems of significant magnitude should be reported to the FERC within 24 hours.**

In addition, **we recommend that the following measures should apply throughout the life of the facility:**

- **The facility should be subject to regular FERC staff technical reviews and site inspections on at least an annual basis or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, Southern LNG should respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted semi-annual report, should be submitted.**

- **Semi-annual operational reports should be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including vessel arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas, etc.), plant modifications including future plans and progress thereof. Abnormalities should include, but not be limited to: unloading/shipping problems, potential hazardous conditions from offsite vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility also should be reported. Reports should be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section entitled "Significant plant modifications proposed for the next 12 months (dates)" also should be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.**

- **In the event the temperature of any region of any secondary containment, becomes less than the minimum specified operating temperature for the material, the Commission should be notified within 24 hours and procedures for corrective action should be specified.**

- **Significant non-scheduled events, including safety-related incidents (i.e., LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security related incidents (i.e., attempts to**

enter site, suspicious activities) shall be reported to FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made immediately, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to Commission staff within 24 hours. This notification practice should be incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include:

a. **fire;**
b. **explosion;**
c. **estimated property damage of $50,000 or more;**
d. **death or personal injury necessitating in-patient hospitalization;**
e. **free flow of LNG that results in pooling;**
f. **unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;**
g. **any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;**
h. **any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;**
i. **a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;**
j. **inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;**
k. **any condition that could lead to a hazard and cause a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility;**
l. **safety-related incidents to LNG vessels occurring at or en route to and from the LNG facility; or**
m. **an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.**

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, Commission staff would determine the need for an on-site inspection by Commission staff, and the timing of an initial incident report (normally within 10 days) and follow-up reports.

The Southern LNG terminal has been designed to withstand the effects of hurricane force winds, storm surges, and flooding. All critical structures and facilities for the Elba III Terminal Expansion Project would be designed to withstand 150 mph sustained winds per 49 CFR 193.2067. Non-critical facilities or structures would be designed in accordance with the wind design criteria in American Society of Civil Engineers standard, ASCE 7-98 "Minimum Design Loads for Buildings and Other Structures."

The terminal site elevations were established based on storm surge and flooding effects data available for Elba Island in Chatham County, Georgia. Southern LNG researched data from the Federal Emergency Management Agency and the Chatham Emergency Management Agency. The predicted storm surge elevation at high tide due to a Category 3 hurricane would be nearly equivalent to the 100-year flood elevation of 22 feet Mean Low Water (MLW). To provide protection from these events, the top of the dike elevation for the new LNG storage tanks would be at least 26 feet above MLW, and critical process equipment, such as the boiloff gas condensers, would be elevated above 22 feet MLW.

4.12.3 Siting Requirements – Thermal and Dispersion Exclusion Zones

Regulatory Requirements

The LNG facilities proposed in this project must comply with the siting requirements of 49 CFR 193, Subpart B. On March 30, 2000, the DOT revised 49 CFR 193 to incorporate the 1996 edition of NFPA 59A into the LNG regulations. On April 9, 2004, the DOT further revised 49 CFR 193 to incorporate the 2001 edition of NFPA 59A. The following sections specifically address siting requirements:

- **Part 193.2001, Scope of part**, excludes any matter other than siting provisions pertaining to marine cargo transfer systems between the marine vessel and the last manifold or valve immediately before a storage tank.
- **Part 193.2051, Scope**, states that each LNG facility designed, replaced, relocated or significantly altered after March 31, 2000, must be provided with siting requirements in accordance with subpart B and NFPA 59A, 2001 edition. In the event of a conflict with NFPA 59A, then Part 193 prevails.
- **Part 193.2057, Thermal radiation protection**, requires that each LNG container and LNG transfer system have thermal exclusion zones based on three radiation flux levels in accordance with Section 2.2.3.2 of NFPA 59A, 2001 edition.
- **Part 193.2059, Flammable vapor-gas dispersion protection**, requires that each LNG container and LNG transfer system have a dispersion exclusion zone in accordance with sections 2.2.3.3 and 2.2.3.4 of NFPA 59A, 2001 edition.
- **Part 193.2155(b), Structural requirements,** requires that an LNG storage tank must be at least 1 mile from the ends of an airport runway and ¼ mile from the nearest point on a runway.

For the following LNG facilities that are proposed in this project, we have identified the applicable siting requirements from Part 193 and NFPA 59A, 2001 edition:

- Two 1,257,000-barrel LNG storage tanks - Parts 193.2057 and 2059 require the establishment of thermal and flammable vapor exclusion zones for LNG tanks. NFPA 59A, 2001 edition, Section 2.2.3.2 specifies four thermal exclusion zones based on the design spill and the impounding area. Sections 2.2.3.3 and 2.2.3.4 specify a flammable vapor exclusion zone for the design spill which is determined in Section 2.2.3.5. Part 193.2155(b) specifies that the LNG storage tanks must be at least 1 mile from the ends of an airport runway and ¼ mile from the nearest point on a runway. The proposed site would comply with 49 CFR 193.2155(b).
- Modifications to the cargo transfer system consisting of one additional 16-inch-diameter unloading arm and an increase in the size of the unloading line from 30-inch to 36-inch-diameter - Parts 193.2001, 2057, and 2059 require thermal and flammable vapor exclusion zones for the transfer system. NFPA 59A, 2001 edition, does not address LNG transfer systems.
- Four 3,100 gpm first-stage pumps and six 1,600 gpm secondary pumps - Parts 193.2057 and 2059 require thermal radiation and flammable vapor exclusion zones. NFPA 59A, 2001 edition, Section 2.2.3.2 specifies the thermal exclusion zone and Sections 2.2.3.3 and 2.2.3.4 specify the flammable vapor exclusion zone based on the design spill in a process area.
- Six 180 MMscfd submerged combustion vaporizers - Same requirements as for LNG pumps.

The incorporation of the NFPA 59A requirements into Part 193 has resulted in some confusion and possible misinterpretation in applying the siting requirements. Parts 193.2057 and 2059 require exclusion zones for LNG transfer systems, which are defined to include transfer piping. However, NFPA 59A only requires exclusion zones for "transfer areas" which are defined as the part of the plant where liquids are introduced or removed from the facility such as truck loading or vessel unloading areas. The definition of transfer area in NFPA 59A specifically excludes permanent plant piping such as cargo transfer lines. Additionally, NFPA 59A Section 2.2.3.1 specifically excludes transfer area at the water edge of marine terminals. When the DOT originally incorporated NFPA 59A into its regulations, it removed the requirement for impounding systems around transfer piping (old Part 193.2149). In the preamble to the final rule, the DOT determined that the most likely sources of leaks within an LNG plant are LNG storage tanks, cargo transfer areas, and vaporizers and process equipment, which are all addressed in NFPA 59A Section 2.2.1.2. The result is that while Part 193 retains exclusion zones for LNG transfer systems, neither Part 193 nor NFPA 59A requires the impoundment from which to base the calculations. We do not believe that this was the intent, nor do we believe that omitting containment for transfer piping is a sound engineering practice. The FERC staff will continue to require containment for all LNG transfer piping within a plant site.

The incorporation of NFPA 59A also changed the way in which design spills and impoundment capacities may be determined. Under Section 2.2.2.2, the capacity of impounding areas for vaporization, process, or LNG transfer areas must equal the greatest volume during a 10-minute

period from any single accidental leakage source or during a shorter time period based upon demonstrable surveillance and shutdown provisions acceptable to the authority having jurisdiction. Similar criteria appear in Section 2.2.3.5 for determining the design spill used in thermal and flammable vapor exclusion zone calculations. Prior to the incorporation of NFPA 59A the design spill in Part 193 assumed the rupture of a single transfer pipe with the greatest overall flow capacity, for not less than 10 minutes (old Part 193.2059(d)). As a result, the spill rate for vaporization, process, or LNG transfer areas may be assumed to be a "leakage source" rather than a full pipe rupture; however, the spill duration must be 10 minutes unless the authority having jurisdiction (*i.e.,* DOT's OPS), determines that a shorter time is acceptable. Again, given the confusion in applying the two requirements, the FERC staff will continue to utilize the 10-minute spill criteria at the maximum flow possible for containment sizing. This will ensure that impoundments are sized for a catastrophic failure, while recognizing that less conservative spill scenarios may be appropriate to calculate exclusion zones. In giving recognition to the integrity of all-welded transfer piping, the determination of the single accidental leakage source should be based on an evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc., and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. This approach is the result of discussion with DOT's OPS concerning the basis for design spills and application to exclusion zone determinations for proposals before the Commission.

Impoundment Systems and Design Spills

Part 193.2181 specifies that the impoundment system serving a single LNG storage tank must have a volumetric capacity of 110 percent of the LNG tank's maximum liquid capacity. Southern LNG proposes to install an earthen dike around each storage tank, which would have a surface area of 550,050 ft^2 and an average height of 15.5 ft. Both tank D-5 and D-6 would have a maximum design liquid capacity of approximately 52,834,410 gallons each. After accounting for the estimated space occupied by features inside each dike, the available dike volume would be 60,787,610 gallons. This would provide impoundment for approximately 115 percent of each inner tank's maximum design liquid volume. The proposed earthen dikes for both Tank D-5 and D-6 would comply with part 193.2181.

Potential LNG spills occurring from each storage tank withdrawal header would be directed through an earthen trough to a sump located within the dike surrounding each tank. In accordance with Section 2.2.3.5 of NFPA 59A, 2001 edition, the design spill for an LNG storage tank with penetrations below the liquid level with internal shut off valves is defined as the flow through an assumed opening at, and equal in area to, that penetration below the liquid level that could result in the largest flow from an initially full container for a 1 hour period. The 24-inch-diameter bottom fill line on both Tank D-5 and D-6 would represent the opening with the largest potential flow. Using the formula specified in Section 2.2.3.5 of NFPA 59A, 2001 edition, the maximum flow rate from this opening would be 58,572 gallons per minute, which would result in a total 1-hour spill volume of approximately 3,514,348 gallons. Each tank area sump would have overall dimensions of approximately 400-foot square with two sloped walls and a 3-foot depth and would provide a containment capacity of approximately 3,519,270 gallons. The tank area sumps for both Tank D-5 and D-6 would each be adequate to contain the total 1-hour spill volume specified in Section 2.2.3.5 of NFPA, 2001 edition. Rainwater collected in the sumps

would be pumped out by permanently installed sump pumps that would be automatically activated by a level switch and would also be interlocked with a temperature switch to prevent operation in the event of an LNG spill.
Any potential spills from the sendout line piping between the new LNG storage tanks and the new vaporizer/pump area would be captured either by Retention Area 2, an existing sump located just north of the existing tank dikes that is proposed to be expanded, or by Retention Area 3, a new sump that would be located approximately 110 feet west of Retention Area 2. The maximum flow rate in this sendout line piping would be 7,530 gallons per minute, corresponding to a 10-minute spill volume of 75,300 gallons. Retention Area 3 would be 70 feet square with sloping walls to provide containment for about 84,385 gallons. Retention Area 2 would be deepened and extended to have overall dimensions of 87 feet by 60 feet by 3 feet deep. This revised sump would create an impoundment capacity of approximately 93,873 gallons. Both Retention Area 2 and Retention Area 3 would be capable of containing a full rupture of the sendout line piping for 10-minutes.

The new secondary LNG pumps and the new vaporizers would be located within curbed areas which would be sloped to drain into existing spillways leading to Retention Area 2. The maximum flow rate in this sendout line piping would be 8,209 gallons per minute, corresponding to a 10-minute spill volume of 82,095 gallons. The expanded Retention Area 2 would be capable of containing this spill.

Rainwater collected in both Retention Area 2 and Retention Area 3 would be pumped out by permanently installed sump pumps that would be automatically activated by a level switch and would also be interlocked with a temperature switch to prevent operation in the event of an LNG spill.

Southern LNG selected the failure of a 4-inch-diameter pump recycle line connection on the discharge piping of a secondary LNG pump as the accidental leakage source for the process area, which is a curbed area containing process equipment such as the pumps and vaporizers. However, an evaluation of all small diameter attachments to piping in the process area determined that a failure of the 6-inch diameter recirculation line connection on the secondary pump discharge header would be a more appropriate single accidental leakage source. Due to the high pressure in the header, the highest design flow rate from this source would result in a 10-minute design spill of 82,095 gallons. Both Retention Area 2 and Retention Area 3 would be capable of containing a spill of this size. However, this spill would not be able to reach Retention Area 3, and no other flanges or fittings exist as a source of a design spill for Retention Area 3.

The new LNG unloading line would be located within earthen impoundments. A full rupture of the unloading line flowing for 10 minutes would equal a total spill of approximately 500,272 gallons. Depending on the location of the potential leak, this spill would be contained by either the existing North Loading Dock Sump, the existing D-2 LNG tank dike, the existing Retention Area 1, or one of the tank area sumps for the proposed LNG tanks. All of these impoundments would have the capacity to contain this 500,272 gallon spill.

Southern LNG selected a full break of the unloading line as the accidental leakage source for this line. An evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc., and any flanges that may be used at valves or other equipment, determined that a failure of the 6-inch-diameter attachment to the unloading line would be an appropriate single accidental leakage source. Depending on the location of the potential leak, this design spill of 136,050 gallons would be contained by either the existing North Loading Dock Sump, the existing D-2 LNG tank dike, the existing Retention Area 1, or one of the tank area sumps for the proposed LNG tanks. Each of the existing impoundments was previously analyzed and approved to contain a larger design spill. Therefore, only the tank area sumps need to be considered in the current exclusion zone analysis.

Table 4.12.3-1 presents the impounding area and spill size volume for the various spill scenarios. Where applicable, Southern LNG oversized each impoundment to accommodate the drainage from affected piping and the potential increase in pump flow due to pressure loss in the system. The largest design spill collected by a given sump would be used to calculate exclusion zones for that sump.

TABLE 4.12.3-1

Impoundment Areas

Source	Spill Size (gallons)	Impoundment System	Impoundment Size (gallons)
Impoundment sizing spills:			
LNG storage tank	52,834,410	Tank Dike	60,787,610
LNG tank bottom penetration	3,514,348	Tank Dike Sump	3,519,270
Primary pump discharge	75,302	Tank Dike Sump	3,519,270
	75,302	Retention Area 3	84,385
	75,302	Retention Area 2	93,873
Secondary pump discharge header	82,095	Retention Area 2	93,873
Vessel unloading line	500,272	Existing North Loading Dock Sump	1,224,000
	500,272	Existing Retention Area 1	1,122,078
	500,272	Existing Dike for Tank D-2	16,801,247
	500,272	Tank Dike Sump	3,519,270
Design spills:			
LNG tank bottom penetration	3,514,348	Tank Dike Sump	3,519,270
Secondary pump discharge header – 6” connection	82,095	Retention Area 2	93,873
Vessel unloading line - 6" connection	136,050	Tank Dike Sump	3,519,270

Thermal Exclusion Zone

If a large quantity of LNG is spilled in the presence of an ignition source, the resulting pool fire would produce high levels of radiant heat in the area surrounding the impoundment. Exclusion distances for various flux levels were calculated according to 49 CFR 193.2057 and Section 2.2.3.2 of NFPA 59A, 2001 edition, using the "LNGFIRE III" computer program model developed by the Gas Research Institute. NFPA 59A, 2001 edition, establishes certain

atmospheric conditions (0 mph wind speed, 70°F, and 50 percent relative humidity) which are to be used in calculating the distances. However, Part 193.2057 supercedes these requirements and stipulates that the wind speed, ambient temperature, and relative humidity which produce the maximum exclusion distances must be used, except for conditions that occur less than 5 percent of the time based on recorded data for the area. For its analysis, Southern LNG selected the following ambient conditions to produce the maximum distances: wind speed of 15 mph; ambient temperature of 45°F; and 50 percent relative humidity. These conditions yield longer distances than the 0 mph wind speed, 70°F ambient temperature, and 50 percent relative humidity specified in NFPA 59A, 2001 edition. FERC staff agrees with Southern LNG's selection of atmospheric conditions.

Using these ambient criteria, FERC staff calculated thermal radiation distances for incident flux levels ranging from 1,600 to 10,000 Btu/ft^2-hr for a pool fire in each LNG storage tank dike. The tank D-5 dike would not be perfectly rectangular as would the proposed shape of the tank D-6 dike. Since LNGFIRE III is capable of modeling only rectangles or circles, staff modeled the irregularly-shaped tank D-5 dike as a rectangle, keeping the greatest width of the dike constant and adjusting the dike length to maintain the actual surface area. This method produced the longest thermal radiation distances beyond the western property line. The full surface area at the top of the dike was used in the calculations while the flame base was set to the average height of the dike wall, 15.5 feet. Target height was set at ground level (0 feet).

Thermal radiation distances were also determined for 1,600 Btu/ft^2-hr incident flux levels centered on each tank dike sump and the expanded Retention Area 2. These were found to be in compliance with thermal radiation protection regulations in 193.2057. In addition, all other existing impoundments used for containment in the Elba III Terminal Expansion project have been previously analyzed for thermal radiation, have not changed in surface area, and have been found to be acceptable.

Although no flanges or fittings exist as a source of a design spill for Retention Area 3, its capacity and surface area would be similar to that of the adjacent Retention Area 2, indicating that the thermal radiation exclusion zones calculated for Retention Area 2 would also represent the potential hazards associated with Retention Area 3. Since Retention Area 3 would be located between Retention Area 2 and the larger tank D-6 sump, which are both closer to off-site property, any potential exclusion zone from Retention Area 3 would not be expected to extend beyond the exclusion zones for those impoundments.

Table 4.12.3-2 presents the calculated maximum distances for incident flux levels ranging from 1,600 to 10,000 Btu/ft^2-hr as calculated by FERC staff.

The exclusion zones in table 4.12.3-2 are measured from the center of each impoundment. The centers of the tank dikes and tank dike sumps would be located approximately 800 and 600 feet, respectively, from the South Channel. Therefore, portions of the thermal exclusion zones for each of those incident flux levels listed in table 4.12.3-2 would extend over the South Channel. The 1,600 Btu/ft^2-hr exclusion zone for the tank dikes would also extend approximately 150 feet over the Savannah River on the north side of the site. For these reasons, a recommendation has been added in section 4.12.5, *Emergency Response and Evacuation Plan*, to ensure that

recreational boaters would be warned in the unlikely event that a potential exists for fire in any of these impoundments.

TABLE 4.12.3-2

Thermal Exclusion Zones

Source	Exclusion Area NFPA 59A Section 2.2.3.2(a)	Incident Flux (Btu/ft^2 hr) a/	Exclusion Zone (feet) b/
Retention Area 2	Property line that can be built upon.	1,600	362
LNG tank dike sump	Property line that can be built upon.	1,600	1,406
LNG storage tank D-5 dike	Outdoor assembly area occupied by 50 or more people.	1,600	2,314*
LNG storage tank D-5 dike	Offsite structures used for occupancies or residences.	3,000	1,825
LNG storage tank D-5 dike	Property line that can be built upon.	10,000	1,155
LNG storage tank D-6 dike	Outdoor assembly area occupied by 50 or more people.	1,600	2,270
LNG storage tank D-6 dike	Offsite structures used for occupancies or residences.	3,000	1,778
LNG storage tank D-6 dike	Property line that can be built upon.	10,000	1,112

a/ The 1,600 Btu/ft^2-hr flux level is associated with an exposed person experiencing burns within about 30 seconds. At 3,000 Btu/ft^2-hr, an exposed person would experience burns within 10 seconds, however a wooden structure would not be expected to burn and affords protection to sheltered persons. At 10,000 Btu/ft^2-hr, clothing and wood can ignite spontaneously.

b/ Exclusion zone distances are measured from the center of the impoundment. For rectangular sumps, the longest exclusion zone distance is listed.

* The short side of the rectangular tank D-5 dike would be facing the nearest offsite property. The exclusion zone distance for this side of the tank D-5 dike would be 2,271 feet.

As noted in Table 4.12.3-2, the 1,600 Btu/ft^2-hr exclusion zone from a tank dike may not extend over an existing outdoor assembly area occupied by 50 or more people. In addition, 49 CFR 193.2007 specifies that the operator or a government agency must legally control all activities within an exclusion zone in accordance with 193.2057 and 193.2059 for as long as the facility is in operation.

In the case of the tank D-5 and D-6 dikes, the 1,600 Btu/ft^2-hr zone would extend across the South Channel and over approximately 450 feet of coastal wetlands owned by the state of Georgia. Control of activities on this property rests with the US Army Corps of Engineers under Section 404 of the Clean Water Act, 33 USC 1344, and the State of Georgia under the Coastal Marshlands Protection Act, Georgia Code Ann. 12-5-280 et seq. Southern LNG states that under the terms of section 12-5-288(a) of the Georgia Code, a permit for any development in this area could only be granted in highly unusual circumstances, and section 12-5-288(b) of the Georgia Code indicates that the filling of marshlands for residential, commercial, and industrial uses is considered to be contrary to the public interest. Southern LNG also owns and controls the only access road to this remote area.

On July 10 and July 11, 2007, Southern LNG filed information provided to the Georgia Department of Natural Resources which identified the coastal marshlands contained within the

exclusion zones and indicated that Southern LNG would oppose any permit application for development activities in those areas in order to comply with its exclusion zone requirements.

We believe the thermal radiation exclusion zones for the Elba III Expansion project would comply with the regulations in 49 CFR 193.2007 and 193.2057.

Vapor Dispersion Zone

A large quantity of LNG spilled without ignition would form a flammable vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A, 2001 edition, and Part 193.2059 require that provisions be made to minimize the possibility of flammable vapors from reaching a property line that can be built upon and that would result in a distinct hazard. Part 193.2059 requires that dispersion distances be calculated for a 2.5 percent average gas concentration (½ the lower flammability limit [LFL] of LNG vapor) under meteorological conditions which result in the longest downwind distances at least 90 percent of the time. Alternatively, maximum downwind distances may be estimated for stability Class F, a wind speed of 4.5 mph, 50 percent relative humidity, and the average regional temperature. The section allows the use of the DEGADIS Dense Gas Dispersion Model, or the FEM3A model, to compute dispersion distances. Design spills into impounding areas serving LNG containers, transfer systems and piping are to be determined in accordance with Section 2.2.3.5 of NFPA 59A, 2001 edition.

Southern LNG's application contained a vapor dispersion analysis for the D-5 and D-6 tank dike sumps and Retention Area 2. An average regional temperature of 66.2° F, 50 percent relative humidity, and 4.5 miles per hour wind speed were used as input conditions. We agree with Southern LNG's selection of atmospheric conditions.

The largest design spill that would be directed to Retention Area 2 would come from a 6-inch-diameter connection to the new secondary pump discharge header. The design spill rate from a 6-inch-diameter attachment to this header would be 8,209 gallons per minute. Using this spill rate and the specifications provided for the impoundment, staff calculated a distance of approximately 984 feet to the 2.5 percent average gas concentration isopleth for the expanded Retention Area 2. Based on this distance, the flammable vapor exclusion zone associated with this sump would not cross any property line that could be built upon and would therefore comply with the regulations in part 193.2059.

Although no flanges or fittings exist as a source of a design spill for Retention Area 3, its capacity and surface area would be similar to that of the adjacent Retention Area 2, indicating that the vapor dispersion exclusion zones calculated for Retention Area 2 would also represent the potential hazards associated with Retention Area 3. Since Retention Area 3 would be located between Retention Area 2 and the larger tank D6 sump, which are both closer to off-site property, any potential exclusion zone from Retention Area 3 would not be expected to extend beyond the exclusion zones for those impoundments.

As shown in Table 4.12.3-1, the largest design spill that would be directed to each of the proposed tank dike sumps would come from the LNG storage tank bottom fill piping. Using the formula specified in Section 2.2.3.5 of NFPA 59A, the maximum flow rate from this opening would be approximately 58,572 gallons per minute. Using this spill rate and the specifications provided by Southern LNG for the D-5 and D-6 tank dike sumps, staff calculated a distance of approximately 2,218 feet from the center of each dike to the 2.5 percent average gas concentration isopleth.

Flammable vapor dispersion modeling is intended to be performed for spill scenarios in which the vapor generated from a spill overflows the impoundment during the time that the spill is occurring. In this case, vapor is calculated to overflow the dike 34 minutes after the start of the 60 minute spill, which is consistent with accepted practice.

Because the exclusion zone would extend over the South Channel, a recommendation has been added in section 4.12.5, *Emergency Response and Evacuation Plan*, to ensure that recreational boaters would be warned in the unlikely event that LNG vapor may disperse over the waterway.

In accordance with federal regulations, the flammable vapor exclusion zone from either tank impoundment may not extend over a property that can be built upon. In addition, 49 CFR 193.2007 specifies that the operator or a government agency must legally control all activities within an exclusion zone in accordance with 193.2057 and 193.2059 for as long as the facility is in operation.

In the case of the tank D-5 and D-6 dikes, the flammable vapor exclusion zone would extend across the South Channel and over approximately 400 feet of coastal wetlands owned by the state of Georgia. Control of activities on this property rests with the US Army Corps of Engineers and the State of Georgia. Under the terms of the Georgia Code, permits for any development in this area could only be granted in highly unusual circumstances, and as discussed in the previous section, *Thermal Exclusion Zones*, Southern LNG has communicated to the Georgia Department of Natural Resources that it would oppose any permit applications for development activities in this area in order to comply with its exclusion zone requirements. We believe the vapor dispersion exclusion zones for the Elba III Expansion project would comply with the regulations in 49 CFR 193.2007 and 193.2059.

4.12.4 LNG Vessel Safety

Since 1959, LNG has been transported by vessel without a major release of cargo or a major accident involving an LNG vessel. Over the last 45 years, LNG vessels have made over 44,000 voyages worldwide. Starting in 1971, LNG began arriving at the Distrigas facility in Everett, Massachusetts. To date, more than 680 cargoes, with volumes ranging from 60,000 to 125,000 m^3, have been delivered into the Port of Boston without incident. During 2005, a total of 241 cargoes of LNG were imported into the United States. For 35 years, LNG shipping operations have been safely conducted in the United States.

LNG imports to Elba Island have steadily increased since operations recommenced. Between the end of 2001 through the end of 2006, the Terminal has received 177 cargoes delivering over 446 Bcf of natural gas.

4.12.4.1 History

During the 44,000 voyages that have been completed since the inception of LNG maritime transportation, there has not been a serious accident at sea or in a port which resulted in a spill due to rupturing of the cargo tanks. However, insurance records, industry sources, and public websites identify a number of incidents involving LNG vessels, including minor collisions with other vessels of all sizes, groundings, minor LNG releases during cargo unloading operations, and mechanical/equipment failures typical of large vessels. Some of the more significant LNG vessel incidents are described below:

- **Pollenger** had an LNG spill onto the steel cover of cargo tank number one during unloading at Everett, Massachusetts in April 1979. The spill caused cracking of the steel plate.
- **El Paso Paul Kayser** grounded on a rock in June 1979 in the Straits of Gibraltar during a loaded voyage from Algeria to the United States. Extensive bottom damage to the ballast tanks resulted; however, the cargo tanks were not damaged, and no cargo was released. The complete cargo of LNG was subsequently transferred to another LNG vessel and delivered to its United States destination.
- **LNG Taurus** grounded in December 1980 near the entrance to Taboata Harbor, Japan. The grounding resulted in extensive bottom damage, but the cargo tanks were not affected. The vessel was refloated and the cargo unloaded.
- **Isabella** had LNG spill onto its deck due to a cargo tank overflow in June 1985, causing severe cracking of the steelwork. The spill had been attributed to a cargo valve failure during discharging of cargo.
- **Tellier** was blown by severe winds from its docking berth at Skikda, Algeria in February 1989 causing damage to the loading arms and the vessel and shore piping. The cargo loading had been secured just before the wind struck, but the loading arms had not been drained. Consequently, the LNG remaining in the loading arms spilled onto the deck causing fracture of some plating.
- **Mostefa Ben Boulaid** had LNG spill onto its deck during loading operations in Algeria in 2002. The spill, which is believed to have been caused by overflow rather than a mechanical failure, caused significant brittle fracturing of the steelwork. The vessel was required to discharge its cargo, after which it proceeded to dock for repair.
- **Khannur** had a cargo tank overfill into the vessel's vapor handling system on September 10, 2001, during unloading at Everett, Massachusetts. Approximately 100 gallons of LNG were vented and sprayed onto the protective decking over the cargo tank dome, resulting in several cracks. After re-inspection by the Coast Guard, the Khannur was allowed to discharge its LNG cargo.
- **Norman Lady** was struck by the USS Oklahoma City nuclear submarine while the submarine was rising to periscope depth near the Strait of Gibraltar in November 2002. The 87,000-m^3 LNG vessel, which had just unloaded its cargo at Barcelona, Spain,

sustained only minor damage to the outer layer of its double hull but no damage to its cargo tanks.

- **Tenaga Lima** grounded on rocks while proceeding to open sea east of Mopko, South Korea due to strong current in November 2004. The shell plating was torn open and fractured over an approximate area of 20 feet by 80 feet, and internal breaches allowed water to enter the insulation space between the primary and secondary membranes. The vessel was refloated, repaired, and returned to service.
- **Golar Freeze** moved away from its docking berth during unloading on March 14, 2006, in Savannah, Georgia. The powered emergency release couplings on the unloading arms activated as designed, and transfer operations were shut down.

As noted above, an incident occurred at the Terminal in March 2006 during the unloading of the LNG vessel, the Golar Freeze. The Golar Freeze was pulled 15 feet from the South Dock by surge from a vessel passing well in excess of the minimum safe speed limit imposed by the Coast Guard. The automated "proximity indicator" switches actuated as designed and initiated the berth's ESD system and closed the powered emergency release coupler valves, which prevented release of the LNG. Although four of the mooring lines parted, the remaining twelve lines held the vessel until the two standby tractor tugs returned it to the dock. Following an investigation into the matter, the Coast Guard filed an administrative action against the Federal Pilot on board the passing vessel.

Since the Golar Freeze incident occurred at the Terminal, the Coast Guard and Southern LNG have examined ways to prevent the potential for a similar incident to occur again, particularly with the proposed use of larger LNG vessels. On January 19, 2007, the Coast Guard published an Interim Rule in the Federal Register to modify the Regulated Navigation Area (RNA) for the Savannah River (33 CFR Part 165.756). The Coast Guard modified the language in the RNA to eliminate any confusion that passing vessels must make every effort to minimize their surge as they pass the LNG facility slip where an LNG tankkship is moored. The Coast Guard would continue to require two standby tugs while an LNG vessel is moored to assist either the passing vessel or the moored LNG vessel. This Interim Rule went into effect on February 20, 2007 and the Coast Guard received comments until March 20, 2007.

4.12.4.2 LNG Vessel Construction

LNG vessels with cargo capacities of 145,000 m^3 are typical of the current LNG vessels the Elba Island Terminal receives. At the completion of the Project it is proposed that Q-Max vessels with a LNG cargo capacity of 266,000 m^3 will be offloaded at the terminal. The relative dimensions of two LNG vessels that could be used to transport LNG to the Terminal are shown in table 4.12.4-1. Typical membrane and spherical LNG vessels are shown in figure 4 12-1.

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Page 4-207
Figure 4.12-1
Typical Designs for an LNG Vessel

TABLE 4.12.4-1

Typical LNG Vessel Characteristics

	Existing Vessels	Future Vessels
Specifications	**145,000 m^3**	**266,000 m^3**
Length (m)	277.2	303.0
Breadth (m)	43.4	50.0
Loaded Draft (m)	12.3	12.5
Hull Depth (m)	26	27
Loaded Displacement (Tonnes)	116,941	151,599

In 1980, at the initial peak of LNG import activity in the United States, the Coast Guard published the report *Liquefied Natural Gas and Liquefied Petroleum Gas – Views and Practices – Policy and Safety*. The report summarized the Coast Guard's extensive research into the safety hazards of LNG and its view that "...the nature of both LNG and LPG presents an acceptable risk for transportation in maritime commerce." This is due to the fact that LNG vessels are well constructed, robust vessels designed to withstand low-energy-type incidents that are prevalent in harbors and during docking operations. Moreover, safety measures, both equipment and training, are planned and designed into these LNG vessels to prevent or control all types of potential incidents. The Sandia National laboratory reached a similar conclusion in 2005 in its report.

The world's LNG vessel fleet currently exceeds 173 vessels. Currently, all of the vessels in the LNG fleet operate under a foreign flag with foreign crews. The LNG vessels used to import LNG to the United States would be constructed and operated in accordance with the International Maritime Organization's (IMO) *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, the International Convention for the Safety of Life at Sea (SOLAS), and 46 CFR Part 154, which contain the United States safety standards for vessels carrying bulk liquefied natural gas. Foreign flag LNG vessels are required to possess a valid IMO Certificate of Fitness and a Coast Guard Certificate of Compliance.

As required by the IMO conventions and design standards, hold spaces and insulation areas on an LNG vessel are equipped with gas detection and low temperature alarms. These devices monitor for leaks of LNG into the insulation between primary and secondary LNG cargo tank barriers. In addition, hazard detection systems are also provided to monitor the hull structure adjacent to the cargo tank, compressor rooms, motor rooms, cargo control rooms, enclosed spaces in the cargo area, specific ventilation hoods and gas ducts, and air locks.

LNG vessels are equipped with a firewater system with the ability to supply at least two jets of water to any part of the deck in the cargo area and parts of the cargo containment and tank covers above-deck. A water spray system is also available for cooling, fire prevention, and crew protection in specific areas. In addition, certain areas of LNG vessels are fitted with dry chemical powder-type extinguishing systems and carbon dioxide (CO_2) smothering systems for fighting fires.

In 1993, amendments to the IMO's *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* require all vessels to have monitoring equipment with an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a cargo tank. In addition, the cargo tanks are heavily instrumented, with gas detection equipment in the hold and inter-barrier spaces, temperature sensors, and pressure gauges. Fire protection must include the following systems:

- a water spray (deluge) system that covers the accommodation house control room and all main cargo valves;
- a traditional firewater system that provides water to fire monitors on deck and to fire stations found throughout the vessel;
- a dry chemical fire extinguishing system for hydrocarbon fires; and
- a CO_2 system for protecting machinery including the ballast pump room, emergency generators, and compressors.

As a result of the terrorist attacks that occurred on September 11, 2001, the IMO agreed to new amendments to the 1974 SOLAS addressing port facility and vessel security. The *International Ship and Port Facility Security (ISPS) Code* was adopted in 2003 by the IMO. This code requires both vessels and ports to conduct vulnerability assessments and to develop security plans. The purpose of the code is to prevent and suppress terrorism against vessels; improve security aboard vessels and ashore; and reduce the risk of passengers, crew, and port personnel on board vessels and in port areas, for vessels and cargoes. All LNG vessels as well as other cargo vessels 300 gross tons and larger, and ports servicing those regulated vessels, must adhere to these IMO and SOLAS standards. Some of the IMO requirements are as follows:

For Vessels:

- Vessels must develop security plans and have a Vessel Security Officer (VSO);
- Vessels must be provided with a vessel security alert system. These alarms transmit ship-to-shore security alerts to a competent authority designated by the Administration, which may include the company, identifying the vessel, its location, and indication that the security of the vessel is under threat or has been compromised;
- Vessels must have a comprehensive security plan for international port facilities, focusing on areas having direct contact with vessels; and
- Vessels may have certain equipment onboard to help maintain or enhance the physical security of the vessel.

For port facilities:

- Port facility security plan;
- Facility Security Officer (FSO); and
- Certain security equipment may be required to maintain or enhance the physical security of the facility.

For both vessels and ports:

- Monitoring and controlling access;
- Monitoring activities of people and cargo;
- Ensuring security communications and that they are readily available; and
- Completion of a Declaration of Security that is signed by the FSO and VSO.

4.12.4.3 Hazards

The history of LNG shipping has been free of major incidents, and none have resulted in significant quantities of cargo being released (see section 4.12.4.1). No incidents have occurred at existing LNG terminals during the 50 years of operation that resulted in any significant quantities of cargoes being released. However, the possibility of an LNG spill from a vessel over the duration of the proposed project must be considered. Historically, the events most likely to cause a substantial release of LNG were a vessel casualty such as:

- A grounding sufficiently severe to puncture an LNG cargo tank;
- A vessel colliding with an LNG vessel in transit;
- An LNG vessel alliding[28] with the terminal or a structure in the waterway; or
- A vessel alliding with an LNG vessel while moored at the terminal.

However, the attacks on September 11, 2001, have made the public keenly aware of an additional risk that must be considered in the evaluation of marine safety and security:

- A deliberate attack on an LNG vessel by a terrorist group.

To result in a spill of LNG, any of the above events would need to occur with sufficient impact to breach an LNG vessel's double hull and cargo tanks. All LNG vessels used to deliver LNG to the proposed Project would have double-hull construction, with the inner and outer hulls separated by about 10 feet. Furthermore, the cargo tanks are normally separated from the inner hull by a layer of insulation approximately 1-foot thick.

As a result, many grounding incidents severe enough to cause a cargo spill on a single-bottom oil vessels would be unable to penetrate both inner and outer hulls of an LNG vessel. An earlier Federal Power Commission (FPC) (predecessor to the FERC) study estimated that the double-bottom of an LNG vessel would be sufficient to prevent cargo tank penetration in about 85 percent of the cases that penetrated a single-bottom oil vessel. Previous incidents with LNG vessels have primarily involved grounding, and none of these have resulted in the breach of the double hull and subsequent release of LNG cargo.

The likelihood of an LNG vessel sustaining cargo tank damage in a collision would depend on several factors – the displacement and construction of both the struck and striking vessels, the velocity of the striking vessel and its angle of impact with the struck vessel, and the location of the point of impact. The previous FPC study estimated that the additional protection afforded by the double hull would be effective in low-energy collisions; overall, it would prevent cargo tank penetration in about 25 percent of the cases that penetrated a single-hull oil vessel.

[28] "Alliding" is the action of dashing against or striking upon a stationary object (for example, the running of one ship upon another ship that is docked) – distinguished from "collision," which is used to refer to two moving ships striking one another.

In 1995, to assist the Coast Guard in San Juan, Puerto Rico, EcoEléctrica L.P. prepared an analysis of the damage that could result from an oil vessel striking an LNG vessel at berth (FERC, 1996). The analysis assumed a 125,000 m^3 LNG vessel and an 82,000-dead-weight-ton vessel carrying number 6 fuel oil without tug assistance. The analysis determined the minimum striking speed to penetrate the cargo tanks of an LNG vessel for a range of potential collision angles. The resulting minimum striking speeds are presented in table 4.12.4-2 for the two principal cargo systems.

TABLE 4.12.4-2

Minimum Striking Speed to Penetrate LNG Cargo Tanks

Angle of Impact	Minimum Striking Speed (knots)	
	Spherical Tanks	Membrane Tanks
Greater than 60 degrees	4.5	3.0
45 degrees	6.3	4.0
30 degrees	9.0	6.0
15 degrees	18.0	12.0

For membrane tanks, the critical beam-on striking speed is 3.0 knots; for spherical tanks, the critical beam-on speed is 4.5 knots. For both containment types, lower angles of impact result in much greater minimum striking speeds to penetrate LNG cargo tanks. In the July/August 2002 issue of the "LNG Journal," the SIGTTO General Manager provides a table that indicates the critical speed necessary for a 20,000-ton vessel to puncture the outer hull of an LNG vessel is 7.3 knots. For a 93,000-ton vessel, the impact speed is 3.2 knots. In neither case does such an impact result in damage to the LNG cargo containment system, nor does it result in release of LNG.

The DOE has released a study by Sandia National Laboratories entitled, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water* (Sandia Report) December 2004. The Sandia Report included an LNG cargo tank breach analysis using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for both credible accidental and intentional LNG spill events. The analysis of accidental events found that groundings, collisions with small vessels and low-speed (less than 7 knots) collisions with large vessels striking at 90 degrees could cause minor vessel damage but would not result in a cargo spill. This is due to the protection provided by the double-hull structure, the insulation layer, and the primary cargo tank of an LNG vessel. High-speed (12 knots) collisions with large vessels striking at 90 degrees were found to potentially cause cargo tank breach areas of 0.5 to 1.5 m^2.

In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In a grounding of sufficient magnitude to rupture an LNG cargo tank, the damage would occur underwater, and the potential for ignition would be less than for collisions or allisions. In this case, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If not ignited, the flammable vapor cloud would drift downwind until the effects of dispersion would dilute the vapors below the LFL for methane. The maximum range of potentially flammable vapors, or the distance to the LFL, is a function of the volume of LNG spilled, the rate of the spill, and the

prevailing meteorological conditions. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site.

The final EIS for the Calcasieu LNG Project (FERC, 1976) analyzed the maximum range of a flammable vapor cloud and hazardous radiation levels from an instantaneous one-tank spill. As was consistent with risk analyses at that time and for nearly 25 years thereafter, the instantaneous spillage of one cargo tank was considered to be the "worst-case" scenario. Physical constraints on maximum vessel speeds and maximum depths of penetration required to rupture one LNG cargo tank render the possibility of an instantaneous release of more than one cargo tank to be implausible. This is not to imply that the loss of multiple cargo tanks could never occur, but that the extent of the hazard would not exceed that of the instantaneous spillage of one tank.

For an instantaneous one-tank spill with ignition, the final EIS for the Calcasieu LNG Project estimated that a hazardous thermal radiation level of 5,300 Btu/ft^2-hr would extend 3,595 feet from the center of the spill. For an instantaneous one-tank spill without ignition, the final EIS for the Yukon Pacific LNG Project (FERC, 1995) estimated that potentially flammable vapors could travel up to 3.3 miles, with a 10-mph wind and typical atmospheric stability.

In October 2001, the use of a one-tank instantaneous release as the worst-case scenario was reexamined by Quest Consultants, Inc (Quest) as part of an effort by the DOE to determine the hazards associated with reopening the Distrigas LNG import terminal following the terrorist attacks of September 11, 2001. It was determined that time-release spills through 1-meter and 5-meter diameter holes would more accurately simulate credible worst-case damage scenarios. The maximum flammable vapor cloud and radiation hazards were calculated for the two spill scenarios. For a spill on water with ignition, the maximum distance to a radiant flux level of 1,500 Btu/ft^2-hr was estimated to be 1,770 feet. For a spill on water without ignition, a flammable vapor cloud of 2.5 miles was estimated. In November 2003, in response to comments concerning its October 2001 study, Quest clarified that its study applied only to LNG spills resulting from a collision with a large vessel in Boston's Outer Harbor, where waves would restrict the spreading of LNG on water.

Since the Quest study, there has been an emergence of studies by various parties to define the worst-case scenario that would result from a deliberate terrorist attack on an LNG vessel and the subsequent release of cargo. Distances have been estimated to range from 1,770 to 4,200 feet for a thermal radiation level of 1,500 Btu/ft^2-hr. Part of the reason for the apparent discrepancies is the lack of large-scale historical incidents, and the need to extrapolate small-scale field test data to a worst-case event. This inevitably leads to differing conservative assumptions among the various parties. For example, some models calculate a time-release cargo discharge through 1-meter or 5-meter diameter holes, while others assume that the cargo tank empties instantaneously.

As a result, the FERC commissioned a study by ABSG Consulting Inc. (ABSG) to search and review the literature on experimental LNG spills and on consequence methodologies that are applicable to modeling incidents of LNG spills on water. Further, the goal of the study was to identify appropriate methods for estimating flammable vapor and thermal radiation hazard distances for potential LNG vessel cargo releases during transit and while at berth. The resulting

study, *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*, was released for public comment on May 14, 2004. On June 18, 2004, staff's responses to comments on the consequence assessment methods were issued. In addition, the model was updated to include a lower limit on the characteristic wind speed. As discussed in greater detail in staff's responses, various components of the consequence assessment methodologies were revised based on comments received. The revised methodology provides procedures for calculating: (1) the rate of release of LNG from a cargo tank penetration for various-sized holes; (2) the spreading of an unconfined LNG pool on water for both continuous spills and rapid (nearly instantaneous) releases; (3) the rate of vapor generation from an unconfined spill on water; (4) thermal radiation distances for LNG pool fires on water; and (5) flammable vapor dispersion distances.

A detailed evaluation of the consequences of a terrorist attack on a modern membrane LNG vessel was prepared by Lloyds Register North America for the Weaver's Cove LNG Project. The study evaluated the consequences of attacks on an LNG vessel by missiles and explosives. Finite element analysis was used to evaluate the effect of various-sized charges on both the outer and inner hulls. A 1-meter diameter hole of the inner hull at the waterline was found to be the worst-case scenario for hazard consequence assessments. This finding is consistent with the attack on the double-hull oil vessel *Limberg* which caused greater than a 5-meter diameter hole on the outer hull, but only minor damage to the inner hull. A failure modes and effects analysis was used to understand internal LNG release characteristics, and a residual strength analysis was used to investigate damage scenarios for a loaded LNG vessel.

As discussed above, the Sandia Report included an LNG cargo tank breach analysis, using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for credible accidental and intentional LNG spill events. For intentional scenarios, the size of the cargo tank hole depends on the location of the vessel and source of threat. Intentional breach areas were estimated to range from 2 to 12 m^2. In most cases, an intentional breaching scenario would not result in a nominal hole of more than 5 to 7 m^2, which is a more appropriate range to use in calculating potential hazards from spills. These hole sizes are equivalent to circular hole diameters of 2.5 and 3 meters.

The Sandia Report also included guidance on risk management for intentional spills, based on the findings that the most significant impacts to public safety and property exist within approximately 500 meters (1,640 feet) of a spill due to thermal hazards from a fire, with lower public health and safety impacts beyond 1,600 meters (approximately 1 mile). Large unignited LNG vapor releases were found to be unlikely, but could extend from nominally 2,500 meters (8,200 feet) to a conservative maximum distance of 3,500 meters (11,500 feet) for an intentional spill. As part of the waterway suitability review process, the Coast Guard uses these criteria developed by Sandia to define the outer limits of the hazard zones for assessing potential risks associated with the proposal. Cascading damage due to brittle fracture from exposure to cryogenic liquid or fire-induced damage to foam insulation was evaluated and, while possible under certain conditions, is not likely to involve more than two or three cargo tanks. Cascading events are not expected to increase the overall fire hazard by more than 20 to 30 percent (1,920 to 2,080 meters [6,300 to 6,825 feet]) but would increase the expected fire duration. RPTs are

possible for large spills, but the effects would be localized near the spill source and should not cause extensive structural damage.

The methodology described in the ABSG study and revised in staff's responses to comments was also used by FERC staff to calculate the thermal radiation and flammable vapor dispersion distances for several holes ranging in diameter from 1 meter to 3.9 meters. Based on the penetration of the largest cargo tank of a 140,000-m^3 LNG vessel, a potential spill of 23,000 m^3 is estimated for the volume of LNG above the waterline. The estimated pool spread results and thermal radiation hazard distances are identified in table 4.12.4-3. Thermal radiation calculations are based on an ambient temperature of 45°F, a relative humidity of 50 percent, and a 15-mph wind speed.

TABLE 4.12.4-3

LNG Spills on Water from a 140,000 m^3 LNG Vessel (using the ABSG model)

LNG Release and Spread					
Hole area	0.8 m^2	1.5 m^2	5.0 m^2	7.0 m^2	12.0 m^2
Hole Diameter	1.0 m	1.4 m	2.5 m	3.0 m	3.9 m
Spill Time	92.3 min	49.2 min	14.8 min	10.5 min	6.1 min
Pool Fire Calculations					
Maximum Pool Radius	343 ft	471 ft	822 ft	936 ft	1,104 ft
Fire Duration	92.4 min	49.3 min	15.0 min	10.8 min	6.5 min
Distance to:					
1,600 Btu/ft^2-hr	2,154 ft	2,729 ft	4,149 ft	4,576 ft	5,181 ft
3,000 Btu/ft^2-hr	1,664 ft	2,100 ft	3,175 ft	3,499 ft	3,957 ft
10,000 Btu/ft^2-hr	975 ft	1,236 ft	1,854 ft	2,039 ft	2,303 ft

Flammable vapor dispersion calculations were based on an ambient temperature of 66.2 ºF, 50 percent relative humidity, a 4.5-mph wind speed and atmospheric stability Class F. Based on a 1-meter diameter cargo tank breach in a 140,000 m^3 LNG vessel, an unignited release would result in an estimated pool radius of 421 feet. The unignited vapor cloud would extend to 11,340 feet to the LFL and 15,688 feet to one-half the LFL. It is important to identify certain key assumptions of conditions that must exist in order to achieve these vapor cloud distances. First it would be necessary for an event to create a 1-meter diameter hole by penetrating the outer hull, the inner hull, and cargo containment without ignition. Far more credible is that the event creating a 1-meter diameter hole would also result in a number of ignition sources which would lead to an LNG pool fire and subsequent thermal radiation hazards. It is also unlikely that a flammable vapor cloud could achieve these distances over land surfaces without encountering an ignition source, and subsequently burning back to the source.

For the Project, Southern LNG proposes to receive LNG vessels with capacities up to 266,000 m^3. Because the Sandia Report is based on smaller LNG vessels with a capacity of 125,000 m^3, and may not sufficiently address potential risks associated with the future generation LNG vessels, the Coast Guard COTP Savannah required that Southern LNG conduct a site-specific analysis of these future generation LNG vessels. With Coast Guard involvement, Southern LNG contracted Det Norske Veritas to perform a vulnerability evaluation and consequence analysis (DNV Report) for the larger LNG vessel. The DNV Report used multiple pool fire and vapor

cloud scenarios with variable hole sizes (intentional and accidental), number of tanks breached, LNG discharge rates, atmospheric conditions, and the distances to Lower Flammable Limits. On September 6, 2006, Southern LNG submitted the DNV Report entitled *Elba Island: Approach to LNG Consequence Modeling* to the Coast Guard Headquarters Office of Vessel and Facility Operating Standards for evaluation and official acceptance. On September 25, 2006, Coast Guard Headquarters responded via letter that the DNV Report is "acceptable for addressing the modeling gaps that exist between the quantities of LNG carried on vessels included in the Sandia Report of December 2004 and those of future LNG vessels currently being designed and considered for use in conjunction with the expansion project at Elba Island."

The results of the DNV Report are summarized below. Based on the penetration of the largest cargo tank of a 266,000 m^3 LNG vessel, a potential spill of 39,500 m^3 is estimated for the volume of LNG above the waterline. For a scenario producing a 5 m^2 hole in a single cargo tank at 0.5 meter above the waterline, the largest distance to thermal hazards of 5 kW/m^2 (approximately 1,600 Btu/ft^2-hr) was calculated to be 1,200 meters (3,937 feet). The largest distance to thermal hazards of 37.5 kW/m^2 (approximately 12,000 Btu/ft^2-hr) was calculated to be 500 meters (1,640 feet). The largest flammable vapor dispersion distance due to an intentional breach (5 m^2 hole) was calculated to be 3,300 meters (10,827 feet). The DNV Report, like the Sandia Report, considered a large vapor dispersion scenario highly unlikely due to the high probability of the presence of an immediate ignition source for the intentional breach scenarios. Additional vapor cloud and pool fire scenarios were modeled as requested by the Coast Guard Vessel & Facility Operating Standards Division, based on recommendations from DOE's Sandia National Laboratories.

As identified in Southern LNG's Waterway Suitability Report (see section 4.12.4.5), the Zones of Concern for the larger 266,000 m^3 LNG vessels were established using the guidance provided in the Sandia Report and the results of the DNV Report. The Zones of Conern were determined to be:

- Zone 1 – impacts on structures and organisms are expected to be significant within 798 meters (2,620 feet). The outer perimeter of Zone 1 is the distance to thermal hazards of 37.5 kW/m^2 from a pool fire.
- Zone 2 – impacts would be significant but reduced, and damage from radiant heat levels are expected to transition from severe to minimal between 798 and 2,019 meters (2,620 and 6,625 feet). The outer perimeter of Zone 2 is the distance to thermal hazards of 5 kW/m^2 from a pool fire.
- Zone 3 – impacts on people and property from a pool fire or an unignited LNG spill that does not ignite are expected to be minimal between 2,019 meters (6,625 feet) and a conservative maximum distance of 3,500 meters (11,500 feet). The outer perimeter of Zone 3 should be considered the vapor cloud dispersion distance to the LFL from a worst case unignited release. Impacts to people and property could be significant if the vapor cloud reaches an ignition source and burns back to the source.

The severity of impacts within Zones 1 through 3 would depend on the location of the incident relative to a specific area, the scope of the incident, and whether the released LNG ignited or dispersed. This could be a significant impact, being most severe in Zone 1 and decreasing

outward through Zones 2 and 3. However, because of the implementation of safety and security measures during marine transit, the likelihood of a marine LNG spill is extremely remote.

LNG vessels would traverse primarily offshore waters with the exception of approximately 7.1 miles of the Savannah River navigation channel. The LNG vessel would transit the channel at a speed of 9 to 11 knots, resulting in areas within the Zones of Concern being exposed to a potential transient thermal hazard for up to 15 minutes (see figures 4.12-2 and 4.12-3). In addition, a temporary hazard would exist around the slip during part of the 12 to 14-hour period while the LNG vessel is at the dock and unloading cargo.

An accidental spill from an LNG vessel is unlikely due to the channel characteristics and the operational controls that would be imposed by the Coast Guard. Along the transit route the Savannah River bottom is composed of mud and sand with no known natural hazards. The possibility of collisions and allisions would be minimized since the LNG vessel would be under pilot control and have a tug escort about 5 miles from the entrance to the Savannah River. The potential for other vessels to collide with an LNG vessel would be further reduced due to the Coast Guard's moving safety zone around LNG vessels. In addition, the potential for an LNG vessel to allide with other moored vessels or structures is very low, since the only berth areas along the transit route are an abandoned lash facility, the bar pilots dock, and Coast Guard Station Tybee. All other Port facilities are upstream of the LNG terminal.

As stated previously, the analysis of accidental events in the Sandia Report found that groundings, collisions with small vessels and low-speed (less than 7 knots) collisions with large vessels striking at 90 degrees could cause minor vessel damage but would not result in a cargo spill. High-speed (12 knots) collisions with large vessels striking at 90 degrees were found to potentially cause cargo tank breach areas of 0.5 to 1.5 m^2. Based on the smaller hole sizes from an accidental marine LNG spill, the transient hazard area from and ignited or unignited accidental spill would be within the Zones of Concern described above.

As stated in the Coast Guard's Waterway Suitability Report to FERC (see section 4.12.4.5), 2000 census data was used to identify population areas potentially affected by the Zones of Concern along each transit route segment. Other than Tybee Island, both sides of the river from its mouth to Elba Island are generally undeveloped and consist of marsh, dredged material disposal sites, and other uninhabited waterfront areas. Tybee Island has a medium population density (1,000 to 9,000 persons per square mile) for both permanent residences and its recreational use during the summer months. Numerous residences, commercial business, and outside use areas on the northern half of Tybee Island would be located within both Zones 2 and 3. There are no schools or hospitals located within Zones 2 or 3 on Tybee Island.

Taalahi and Wilmington Islands also have medium population densities; however, the population centers for both of these tracts are located outside the Zones of Concern. A small number of residences in these areas are located within Zone 3.

The transit for any vessel entering the Savannah River requires passage by Tybee National Wildlife Refuge and Fort Pulaski National Monument. A portion of Cockspur Island (adjacent

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Figure 4.12-2
Environmental Resources Along LNG Transit Route – Onshore Portion

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Figure 4.12-3
Environmental Resources Along LNG Transit Route – Offshore Portion

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to the shipping channel) would be within Zone 1, where the remainder would be with Zone 2. Fort Pulaski (open to the public), the Savannah River Pilot's boat dock facility, and Coast Guard Station Tybee are located on Cockspur Island.

The potential impact on the infrastructure and industrial development in Zone 1 was also evaluated. A thermal radiation level of 10,000 Btu/ft^2-hr is associated with potential damage to equipment and infrastructure. A fire associated with a potential spill resulting from a nominal cargo tank hole of an intentional event could expose the LNG storage tanks at the Terminal to a thermal radiation level of 10,000 Btu/ft^2-hr for up to 20 minutes. Depending on the duration of the incident, damage to the LNG storage tanks at the Terminal could compound the event. However the thermal exclusion zones for the LNG storage tank impoundments (see section 4.12.3) would be well within Zone 2 from the initial ignited marine spill.

These intentional breach scenarios provide guidance to the Coast Guard in developing the operating restrictions for LNG vessel movements in the waterway, as well as in establishing potential impact areas for emergency response and evacuation planning. By focusing on the "worst-case" scenario for LNG transportation, there is a tendency to dismiss the potential hazards for other fuels and products commonly transported on our waterways. Some of the previously identified studies that calculate long hazard distances for LNG cargo fires also estimate similarly long distances for gasoline, propane, and jet fuel cargo fires. Also, it should not be assumed that the hazard distances identified are the assured outcome of an LNG vessel accident or attack, given the conservatisms in the models and the level of damage required to yield such large scale releases. Further, these "worst-case" intentional breach scenarios should not be misconstrued as defining an exclusionary zone. Rather the average most probable "worst-case" scenarios provide guidance in developing the operating restrictions for LNG vessel movements in the Savannah River navigation channel, as well as in establishing potential impact areas for emergency response and evacuation planning. The Coast Guard currently authorizes and would continue to authorize the inbound and outbound transit of each LNG vessel calling on the Terminal.

The operational restrictions to be imposed by the Coast Guard and local pilots, as well as the requirements of the RNA and the Coast Guard's *Savannah Area LNG Vessel Management and Emergency Plan*, on LNG vessel movements through the Savannah River navigation channel, would minimize the possibility of a hazardous event occurring along the vessel transit. Based on the extensive operational experience of LNG shipping and the structural design of an LNG vessel, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty – collision, grounding, or allision – is highly unlikely. In addition, given the navigation controls and safety and security procedures in place to specifically prevent such accidents and intentional spill scenarios, the likelihood of these scenarios occuring is extremely remote and therefore, are not likely to result in significant impacts.

4.12.4.4 LNG Vessel Transit to the Elba Island Terminal

Imported LNG could be obtained from exporting terminals throughout the world and delivered by LNG vessels to the proposed Project. Exporting countries include Algeria, Australia, Brunei, Indonesia, Malaysia, Nigeria, Oman, Qatar, Trinidad, and United Arab Emirates. In 2003, LNG

imports to the United States included: 72 percent from Trinidad, 12 percent from Nigeria, 10 percent from Algeria, 3 percent from Qatar, 2 percent from Oman, and 1 percent from Malaysia. Southern LNG expects to source LNG supplies from the Middle East for the proposed expansion.

The Port of Savannah includes all waters and adjacent waterfront from the entrance of the Savannah River upstream to the US Route 17 (Houlihan) Highway Bridge located at river mile 21.3 including the cities of Savannah, Garden City, and Port Wentworth. The Savannah River is navigable for deep-draft vessels to the upper end of Savannah Harbor, 19 miles above the outer ends of the entrance jetties, and for barges to the city of Augusta, 172 miles above the entrance. The waterway for LNG marine traffic and access to the Terminal berthing slip on the Savannah River are free of natural hazards, including reefs, rocks, and sandbars.

The Port of Savannah is currently the nation's fourth largest container port and second largest on the east coast. The largest terminal operator in the Savannah Harbor is the Georgia Ports Authority, which operates the Ocean Terminal for breakbulk cargo and the Garden City Terminal for containerized cargo. Other major products and industries of the port include petroleum products, roll on-roll off (RO-RO) shipments, kaolin clay, wood products, and various chemicals. The port is also 1 of 13 strategic ports in the United States and is regularly used to assist in the mobilization of the Army's 3rd Infantry Division. The Savannah Riverfront is a downtown historic area with considerable tourist and entertainment activity.

As discussed in section 4.9.7, the largest development located within the Terminal Expansion Zones of Concern is located in the western end of Zone 3 and consists of two existing industrial facilities with over 300 employees combined. No other major critical infrastructure, including nuclear power plants, refineries, major bridges and tunnels, or major industrial areas of importance are located within the Zones of Concern (see figure 4.9-1).

From the territorial sea, LNG vessels would transit the Port of Savannah, as they currently do, through the Savannah River to the Terminal. LNG vessels transit from the Savannah River Sea Buoy (Tybee Lighted Buoy T) to the Elba Island LNG terminal is 18 miles, with Elba Island being the first facility deep-draft vessels encounter during inbound transit. The entrance to the Savannah River (Gated Buoys 1 and 2) is 600 feet wide and dredged and maintained to a depth of -44 feet MLW. These waterway dimensions remain in place until Tybee Knoll Range (Buoys 17 and 18), where the width of the channel decreases to 500 feet and the depth is dredged and maintained to -42 feet MLW. These dimensions remain in place from Tybee Knoll Range to the Elba Island LNG terminal.

The COE is responsible for the operation and maintenance of the Federal Savannah Harbor Navigation Project. In 1994, the Savannah District completed the Savannah Harbor deepening project, deepening the main navigation channel from –38 to –40 feet MLW. In 1999, the U.S. Congress, in the 1999 Water Resources Development Act, conditionally authorized further deepening the channel to a maximum depth of 48 feet, contingent upon the completion of a Tier II EIS, a final mitigation plan, and an incremental analysis of the channel depths from 42 to 48 feet. This deepening would aid in the transit of deep-draft container vessels, which must presently transit the river only at high tide or enter the harbor less than fully laden. The COE is

the lead agency for this effort, and the Georgia Ports Authority is a cooperating agency. Presently, work is ongoing on the scientific studies and modeling efforts necessary to produce the Tier II EIS and General Reevaluation Report.

Southern LNG has constructed a new turning basin across from the Terminal, pursuant to the Coast Guard and FERC requirements. The turning basin would continue providing greater depth and clearance past the Terminal and facilitate maneuvers into and out of the slip.

The distance from the mouth of the harbor to the Terminal is about 7 miles. The Atlantic Intracoastal Waterway crosses the Savannah River approximately 1.5 miles below the Terminal and 9 miles below the primary Port area. There are no bridges during the transit to Elba Island. There is no anchorage in the Savannah River except in an emergency. Most vessels anchor to the north or northwest of the sea buoy, where depths range from 19 to 45 feet. Waterfront facilities along the portion of the Savannah River from the Atlantic Ocean to the Terminal include:

- Bar Pilots Dock located 0.5 mile upriver from the mouth of the Savannah River on the south side of the channel;
- Georgia Ports Authority Lash Facility (abandoned) located 0.5 miles upriver from the mouth of the Savannah River on the north side of the channel; and
- Coast Guard Station Tybee Island Dock located 1 mile upriver from the mouth of the Savannah River on the south side of the channel.

Numerous factors affect the ability of any commercial vessel (including LNG vessels) to get underway. These factors include tide restrictions; the availability of river pilots, docking pilots and tugs; weather; visibility; shore crews; and berth space. The Savannah River is influenced by oceanic tides, which have an effect on the depth of the river channel and also the speed and direction of the river current. Deep-hulled cargo vessels cannot navigate the Savannah River satisfactorily at low tide. LNG vessels need a minimal current to safely and efficiently dock off river in the Elba Island berthing slip. Fog from time to time prevents all commercial traffic from moving up or down the Savannah River, and winds (exceeding about 25 knots for LNG vessels and 35 knots for other commercial traffic) may also impede or temporarily stop the movement of commercial vessels. Large vessels require the aid of tugs to perform certain maneuvers in the harbor area, such as docking at Elba Island or in commercial cargo unloading berths. The above factors are considered and the management of vessel movements within the port is coordinated between the shipping interests, the pilots, and the Coast Guard.

A maneuverability simulation study was commissioned by Shell Trading (U.S.) Company (Shell) and conducted at Marine Safety Institute in Rhode Island, November 9-11, 2005. This study was performed using a 264,000 m^3 LNG vessel with an overall length of 1,132 feet. These values are consistent with those presently being considered for construction. The Shell study was conducted using a full mission simulator, and 22 simulations were conducted over a 3.5-day period. Significant conclusions of the evaluation team were:

- It is feasible to navigate the simulated 264,000 m^3 membrane LNG vessel to and from the Terminal mooring basin;

- The Terminal mooring basin would accommodate the simulated 264,000 m^3 membrane LNG vessel at either berth with a similar sized LNG vessel at the opposite berth;
- The turning basin, adjacent to the Terminal mooring basin, is adequate for turning the simulated 264,000 m^3 membrane LNG vessel for entry into, or departure from, the mooring basin; and
- The turning basin is adequate for either bow-in or bow-out approaches to either berth.

There are also a number of safeguards in place for current LNG marine traffic on the Savannah River that will remain in place following the proposed expansion. As port-wide experience with LNG deliveries has increased, these safeguards have been evaluated through discussions with port stakeholders and updated to maintain safety and security risk mitigation while minimizing impact to port mobility. When Southern LNG was recommissioned in 2001, COTP Savannah instituted a RNA (33 CFR Part 165.756) outlining the requirements for all vessels transiting the Savannah River when an LNG vessel is within the geographic limits of the RNA (the Savannah River between Fort Jackson and the Savannah River Channel Entrance Sea Buoy). Changes to the RNA are discussed further in section 4.12.4.5. In addition to the requirements of the RNA, the entire process for LNG vessel arrivals is outlined in the Coast Guard's *Savannah Area LNG Vessel Management and Emergency Plan*. This plan is designed to ensure the safety of all operations associated with LNG vessel transit and unloading. The plan outlines the series of events that must occur when an LNG vessel calls on the Terminal and specify LNG waterfront facility requirements, cargo transfer operations, Coast Guard inspection and monitoring requirements, and emergency operations. These procedures would be applied to the additional LNG vessels that would be unloaded as part of the proposed Project.

In summary, the sequence of events followed by LNG vessels per the *Savannah Area LNG Vessel Management and Emergency Plan* includes the following:

- The vessel's master, agent or authorized representative notifies the COTP 96 hours prior to entry into the Port.
- As the LNG vessel arrives off the entrance to the Savannah River, any pre-arrival checks would be completed prior to beginning the vessel's transit to the Terminal. At the discretion of the COTP, the LNG vessel may be boarded and inspected by Coast Guard MSU personnel.
- At a point approximately 15 miles from the sea buoy, which is approximately 5 miles southeast of Tybee Island, the pilot and tug join the vessel.
- After the vessel has completed all required pre-arrival inspections and has complied with the Port of Savannah Minimum Under-Keel Clearance Guidelines, the vessel transit would begin.
- Southern LNG expects that its customer would continue to arrange for tug escorts for the LNG vessels during transit, unloading, and for berth maneuvers.
- If indicated by weather conditions, additional tugs may be required to moor the LNG vessel during the docking maneuver, and the tugs would remain with the vessel until it is properly moored.

The Terminal slip/dock arrangement allows the LNG vessels to unload LNG from either the port or starboard side mooring and moves the LNG vessels away from and nearly perpendicular to the

edge of the main vessel channel while they are unloading LNG. This slip orientation affords a greater level of safety and security for LNG vessels and for shipping in general within the Port of Savannah.

After docking, if foreign flagships are being utilized, certain government formalities (*i.e.*, Customs and Immigration) would be completed before any vessel operations can begin. When the LNG vessel is cleared, a series of pre-transfer conferences and inspections would be held, including the following:

- Any required Coast Guard inspection of vessel, if not completed before transit.
- Pre-transfer conference between the vessel and Southern LNG and completion of the vessel/shore safety checklist, completion of the Declaration of Security, verification of the vessel/shore ESD connection, and verification of the vessel/shore communication system.
- Custody transfer of the LNG cargo.
- Connecting the vessel to the shore piping.

LNG cargo then would be pumped to the LNG storage tanks. The cargo discharge operation would take approximately 12 to 14 hours depending on the size of the vessel. During the cargo transfer, the vessel's staff would stay in constant contact with the Terminal's staff. When the cargo pumping operations are completed, the vessel/shore systems would be disconnected and final custody transfer procedures and cargo/vessel-related formalities would be completed.

Upon arrival of the tugs and pilot, the vessel would undock and begin its transit to the sea buoy. Multiple tugs would be required to undock the vessels. The entire estimated average time to complete the process normally would range between 24 and 32 hours, depending on the cargo and offloading capacity of the vessel. This time includes transit from the sea buoy, unloading, and return to the sea buoy.

The Savannah area is susceptible to hurricanes and tropical storms. During pre-hurricane conditions when the area is threatened by these storms, the COTP may restrict or limit the transfer of LNG and the movement of LNG vessels. In accordance with the COTPs Heavy Weather Plan, no transfer of LNG products or transits of LNG vessels would be allowed at least 24-36 hours before gale force winds (34 mph) are expected offshore of Savannah. This control is applied to facilitate the closing of the Port to inbound marine traffic and to provide conditions which allow vessels to transit clear of offshore storms should it become necessary to evacuate the Port.

4.12.4.5 Requirements for LNG Operations in the Savannah River

The Coast Guard exercises regulatory authority over LNG facilities that affect the safety and security of port areas and navigable waterways under Executive Order 10173; the Magnuson Act (50 USC Section 191); the Ports and Waterways Safety Act of 1972, as amended (33 USC Section 1221, et seq.); and the Maritime Transportation Security Act of 2002 (46 USC Section 701). The Coast Guard is responsible for matters related to navigation safety, vessel engineering and safety standards, and all matters pertaining to the safety of facilities or equipment located in

or adjacent to navigable waters up to the last valve immediately before the receiving tanks. The Coast Guard also has authority for LNG facility security plan review, approval and compliance verification as provided in Title 33 CFR Part 105, and siting as it pertains to the management of vessel traffic in and around the LNG facility.

The Coast Guard regulations in 33 CFR 127 apply to the marine transfer area of waterfront facilities between the LNG vessel and the last manifold or valve located immediately before a storage tank. Title 33 CFR 127 regulates the design, construction, equipment, operations, inspections, maintenance, testing, personnel training, firefighting, and security of LNG waterfront facilities. The safety systems, including communications, ESD, gas detection, and fire protection, must comply with the regulations in 33 CFR 127. Under 33 CFR 127.019, Southern LNG would be required to submit two copies of its Operations and Emergency Manuals to the COTP for examination.

Title 33 CFR 127 separates cargo transfer operations into three distinct phases: Preliminary Transfer Inspection (Section 127.315); Declaration of Inspection (Section 127.317); and LNG Transfer (Section 127.319). These different sections require specific actions to be completed prior to and during the transfer. Additionally, there are specific actions required in the case of a release of LNG (Section 127.321).

As required by its regulations (Section 127.009), the Coast Guard is responsible for issuing a LOR as to the suitability of the waterway for LNG marine traffic with respect to the following items:

- information submitted under Section 127.007:
    - the physical location of the facility;
    - a description of the facility;
    - the LNG vessels' characteristics and the frequency of LNG shipments to or from the facility; and
    - charts showing waterway channels and identifying commercial, industrial, environmentally sensitive, and residential areas in and adjacent to the waterway used by the LNG vessels en route to the facility, within 25 kilometers (15.5 miles) of the facility.
- density and character of marine traffic;
- locks, bridges, or other manmade obstructions in the waterway; and
- the following factors adjacent to the facility:
    - depth of water;
    - tidal range;
    - protection from high seas;
    - natural hazards, including reefs, rocks, and sandbars;
    - underwater pipes and cables; and
    - distance of berthed vessels from the channel and the width of the channel.

On June 14, 2005, the Coast Guard published a Navigation and Vessel Inspection Circular – *Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic* (NVIC 05-05). The purpose of NVIC 05-05 is to provide Coast Guard COTPs/Federal

MARSEC Coordinators (FMSC), members of the LNG industry, and port stakeholders with guidance on assessing the suitability of a waterway for LNG marine traffic that takes into account conventional navigation safety/waterway management issues contemplated by the existing LOI/LOR process, but in addition, would also take completely into account MARSEC implications. In accordance with this guidance, each LNG project applicant is to submit a WSA to the cognizant COTP. The WSA process addresses the transportation of LNG from an LNG vessel's entrance into U.S. territorial waters, through its transit to and from the LNG receiving facility, including operations at the LNG vessel/facility interface. In addition, the WSA should address the navigational safety issues and port security issues introduced by the proposed LNG operations. The NVIC 05-05 also provides specific guidance on the timing and scope of the WSA.

The process of preparing the LOR begins when an applicant submits a LOI to the COTP. In accordance with 33 CFR 127.007, Southern LNG submitted a LOI to the Coast Guard on January 12, 2006 (see appendix L). As is the case for current LNG marine traffic, the arrival, transit, cargo transfer, and departure of LNG vessels would be required to adhere to the procedures of the *Savannah Area LNG Vessel Management and Emergency Plan* developed by the Coast Guard COTP Savannah. In addition, Southern LNG uses existing Operations and Emergency Manuals developed in consultation with the Coast Guard. These procedures would be revised for the proposed expansion and would ensure the safety and security of all operations associated with LNG vessel transit and unloading. The *Savannah Area LNG Vessel Management and Emergency Plan* contains specific requirements for the LNG vessel, pre-arrival notification, transit through shipping channels, the waterfront facility, cargo transfer operations, Coast Guard inspection and monitoring activities, and emergency operations. The Coast Guard COTP Savannah would monitor each LNG vessel in accordance with the *Savannah Area LNG Vessel Management and Emergency Plan*. This plan would be updated as needed for the proposed operations.

Regulated Navigation Area (RNA)

When Southern LNG was recommissioned in 2001, COTP Savannah instituted a RNA (33 CFR Part 165.756) outlining the requirements for all vessels transiting the Savannah River when an LNG vessel is within the geographic limits of the RNA (the Savannah River between Fort Jackson and the Savannah River Channel Entrance Sea Buoy). When originally enacted, COTP Savannah did not allow any vessels over 1,600 gross tons within the boundaries of the RNA when an LNG vessel was transiting. As the Coast Guard, Southern LNG, the Savannah River Pilots, and the local tug operators gained experience in the safety and security aspects of LNG vessel arrivals, the RNA was revised multiple times to improve port mobility during LNG operations while not increasing associated safety and security risks.

When the new dual berthing facilities in the off-river slip at the Terminal was placed into service, the RNA was again revised to account for the different possible mooring configurations and to remove several requirements based on the additional level of safety the slip provides. A Notice of Proposed Rulemaking was published for public comment and additional changes were made after considering this feedback.

On January 19, 2007, the Coast Guard published an Interim Rule in the Federal Register to modify the RNA. Among the other proposed changes to the RNA, one significant change would allow outbound LNG vessels departing the port in heel (less than 5 percent of the LNG vessel's carrying capacity) to travel the same as other commercial traffic, *i.e.*, the 2-mile moving safety zone would no longer apply. This Interim Rule went into effect on February 20, 2007 and the Coast Guard received comments until March 20, 2007.

LNG Mooring Slip Security Zone

In addition to the requirements of the RNA, the Coast Guard has established security zone for the Terminal slip (33 CFR Part 165.751). Entry into or movement within the zone is prohibited unless authorized by the COTP Savannah or if the vessels are engaged in the following operations:

- Law enforcement, security, or search and rescue;
- Servicing aids to navigation;
- Surveying, maintenance, or improvement of waters in the security zone; or
- Actively engaged in escort, maneuvering, or support duties for the LNG tankship.

Southern LNG's Waterway Suitability Assessment

The preliminary WSA for the Project was submitted with the LOI in January 2006. The preliminary WSA proposed to use the Sandia Report, as adopted in NVIC 05-05, as the basis for developing the Follow-On WSA. The Coast Guard accepted the proposed plan on January 20, 2006.

In June of 2006, the COTP advised Southern LNG of the need for a site-specific assessment of Zones of Concern for the larger LNG vessels being proposed, as these zones could potentially extend beyond those derived in the Sandia Report and adopted in NVIC 05-05. With Coast Guard involvement, Southern LNG developed a protocol for modeling spills from the larger LNG vessels and submitted the final results to the Coast Guard on September 6, 2006 and to the COTP as part of the Follow-On WSA. The Zones of Concern for the proposed Project are described in section 4.12.4.3.

The Coast Guard, with input from various port stakeholders including the Savannah Pilots Association, the Savannah Maritirme Association, towing industry representatives, emergency service agencies, waterfront facilities, and select members of the Area Maritime Security Committee, has completed a review of Southern LNG's WSA in accordance with the guidance in NVIC 05-05. The WSA participants included members of the port community from maritime industry and government agencies including the Coast Guard, U.S. Customs and Border Protection, local fire and police departments, the Georgia Ports Authority, the Savannah River Pilots Association, local towing companies, the Savannah Maritime Association, and a handful of other stakeholders. The WSA review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these security risks.

Coast Guard Waterway Suitability Report

On June 18, 2007, the Coast Guard sent a letter to the FERC, based on the above WSA review, providing input on the capability of the port community to implement the risk management measures necessary to responsibly manage the risks of LNG marine traffic in the Port of Savannah (see appendix L). As described in this document, the Coast Guard made a preliminary determination that the Savannah River, based on existing measures and additional conditions, is suitable for the larger LNG vessels and the increase in LNG marine traffic associated with this expansion. The Coast Guard letter also stated that, based on certain condition for suitability (see section 1.2.2), the Port of Savannah's experience with LNG import and the cooperative relationship between government agencies and port stakeholders, there would be sufficient capability within the port community to responsibly manage the safety and security risks introduced by this expansion project. With the completion of this final EIS, the Coast Guard will complete its review and may issue an LOR with conditions to address the suitability of the waterways for LNG transport.

If the Coast Guard issues an LOR finding the waterway suitable for additional LNG marine traffic with the conditions referenced in section 1.2.2, the necessary security measures would be incorporated into the detailed *Savannah Area LNG Vessel Management and Emergency Plan*, which would become the basis for appropriate security measures for each Maritime Security threat level. This plan would clearly spell out roles, responsibilities and specific procedures for an LNG vessel transiting the Savannah River navigation channel up to the Terminal, as well as for all agencies involved in implementing security and safety during the operation. It would be required that, prior to the LNG vessel being granted permission to enter the shipping channels, both the vessel and facility must be in full compliance with the appropriate requirements of the Maritime Transportation Security Act and International Ship and Port Facility Security Code, and the security protocols to be established by the COTP in the *Savannah Area LNG Vessel Management and Emergency Plan*. The plan may include security measures such as: Coast Guard and/ or other state/local law enforcement agency patrol boats to enforce safety and security zones around the LNG vessels while in transit and moored at the Terminal; shoreside surveillance and monitoring; and other prevention/mitigation strategies.

We recognize that the *Savannah Area LNG Vessel Management and Emergency Plan* would be a dynamic document and that the port's overall security picture may change over time. In addition, during the time period between the submission of the initial WSA and when the proposed facilities may commence operation, new port activities may commence, infrastructure may be added, or population density may change. Improvements in technology to detect, deter, and defend against intentional acts may also develop. Therefore, **we recommend that until the commencement of service, Southern LNG should annually review its WSA relating to LNG marine traffic for the project; update the assessment to reflect changing conditions which may impact the suitability of the waterway for LNG marine traffic; provide the updated assessment to the cognizant COTP/FMSC for review and validation and, if appropriate, further action by the COTP/FMSC relating to LNG marine traffic; and provide a copy to FERC staff.**

In addition, Southern LNG provides security for the Terminal according to a Facility Security Plan that must be prepared under 33 CFR 105. This plan and any modifications to this plan would need to be approved by the Coast Guard COTP. The requirements of this plan may include:

- a Facility Security Assessment to identify site vulnerabilities, possible security threats, consequences of an attack, and facility protective measures;
- a Facility Security Plan with procedures for responding to security incidents;
- a designated FSO responsible for implementing and periodically updating the Facility Security Plan and Assessment;
- scalable security measures to provide increasing levels of security at increasing Maritime Security (MARSEC) levels;
- security exercises at least once each calendar year and drills at least every 3 months; and
- mandatory reporting of all breaches of security and security incidents.

Security at the facility is provided by both active and passive systems. The entire site is surrounded by a protective enclosure (*i.e.,* a fence) with sufficient strength to deter unauthorized access. The enclosure is also illuminated with not less than 2.2 lux between sunset and sunrise. Intrusion detection systems and day/night camera coverage identify unauthorized access. A separate security staff conducts periodic patrols of the plant, and screen visitors and contractors. The security staff may also assist in maintaining security of the marine terminal during cargo unloading. Southern LNG would be required to submit any revisions to their Facility Security Plan to the COTP for approval 60 days before commencement of operations. In order to ensure that the responsibilities of Southern LNG's security staff enhance overall security, **we recommend that prior to commissioning, Southern LNG should coordinate, as needed, with the Coast Guard to define the responsibilities of Southern LNG's security staff in supplementing other security personnel and in protecting the LNG vessels and terminal.**

Impact of Vessel Security Requirements

The potential impacts of the proposed LNG marine traffic for the proposed Project on other vessels can be addressed in relation to several general security requirements: 1) a moving safety zone for inbound LNG vessels; 2) a security zone around a moored LNG vessel; and 3) other measures as deemed appropriate.

Current Coast Guard regulations place specific restrictions on marine traffic in portion of the Savannah River and the berth areas at the Terminal. These restrictions are outlined in the Coast Guard's RNA for the Port of Savannah (33 CFR Part 165.756) and a Security Zone for the LNG mooring slip (33 CFR Part 165.751).

If the Coast Guard issues a LOR finding the waterway suitable for increased LNG marine traffic, the Coast Guard would continue to enforce the RNA and the required moving safety zone around LNG vessels in excess of heel (less than 5 percent of the LNG vessel's carrying capacity). The moving safety zone would affect other commercial and recreational traffic using the channel. Except for a vessel that is moored at a marina, wharf, or pier, and remains moored, no vessel 1,600 gross tons or greater may come with two nautical miles of a LNG vessel, carrying LNG in excess of heel, which is underway within the Savannah River shipping channel. All vessels less

than 1,600 gross tons must keep clear of transiting LNG vessels and may not approach within 70 yards of LNG vessels, carrying LNG in excess of heel, without permission of the COTP.
The moving safety zone affects other marine traffic using the channel. The magnitude of the effect is also influenced by other factors: the amount of time it takes to obtain a pilot and other competing vessel traffic in the federal navigation channel. The 2-mile moving safety zone around LNG vessels causes one-way marine traffic in the waterway for other transiting vessels over 1,600 gross tons. Commercial vessels less than 1,600 gross tons and the majority of recreational users would be able to pass or over take LNG vessels outside the 70-yard limit. It should be noted that the Coast Guard moving safety zone would not be treated as absolute exclusion zones that would preclude all other vessel movements. Rather, other vessels may be allowed to transit through the moving safety zone with the permission of the COTP.

For the majority of this trip, an LNG vessel would travel at an average speed of 9 to 11 knots. Based on these assumed speeds, it would take about 2.5 hours for LNG vessels to complete the trip to the Terminal. Additional time (45 to 60 minutes) would be required to maneuver the LNG vessel into the berth. Minimum visibility conditions would have to be satisfied before the LNG vessel would be allowed to proceed inbound from the Atlantic Ocean, ensuring that the Coast Guard could adequately monitor the safety zone. The moving safety zone could cause impacts on other vessels but the impacts would be temporary while the LNG vessel is in transit. Waterway congestion is discussed further in section 4.9.6.1.

The Coast Guard's LNG mooring slip security zone would not have an impact on other marine traffic in the channel since the security zone applies only to the off-river slip at the Terminal.

The Coast Guard routinely provides Notice to Mariners prior to the arrival and departure of LNG vessels. The notification system includes broadcasts on radio frequencies used by mariners. These practices and impacts currently occur during LNG vessel transits. If the Coast Guard issues a LOR finding the waterway suitable for LNG marine traffic, the Coast Guard would continue this practice to mitigate any adverse impacts of moving safety zone.

4.12.5 Emergency Response and Evacuation Planning

Southern LNG has an existing Elba Emergency Response Plan, which currently is in effect for the Terminal and on file with the FERC. As part of its application, Southern LNG filed a draft amendment to the existing Emergency Response Plan for the expansion Project. This draft plan outlines some of the operating philosophies necessary for the organization, training, and emergency procedures needed to comply with 49 CFR Part 193.2509. Prior to commencing service of the proposed facilities, Southern LNG would be required to prepare updated final emergency procedures manuals, as required by 49 CFR Part 193.2509, that provide for: (a) responding to controllable emergencies and recognizing an uncontrollable emergency; (b) taking action to minimize harm to the public including the possible need to evacuate the public; and (c) coordination and cooperation with appropriate local officials. Specifically, Section 193.2509(b)(3) requires "Coordinating with appropriate local officials in preparation of an emergency evacuation plan…"

While the worst-case scenarios evaluated for the onshore facility in section 4.12.3 and for marine spills in section 4.12.4.3 provide guidance on the maximum extent of potential hazards, they should not be assumed to represent the evacuation zone for *every* potential incident. As with any other fuel or hazardous material, the actual severity of the incident would determine what area needs to be evacuated, if any, rather than a worst-case maximum zone. It is anticipated that the emergency evacuation plans would identify evacuation distances based upon increasing severity of events.

On several LNG import terminal proposals, a number of organizations and individuals commented on the need to consider emergency response procedures. Subsequently, Section 3A(e) of the Natural Gas Act, added by Section 311 of the Energy Policy Act of 2005, stipulated that in any Order authorizing an LNG terminal, the Commission shall require the LNG terminal operator to develop an Emergency Response Plan in consultation with the Coast Guard and state and local agencies. The FERC must approve the updated Emergency Response Plan prior to any final approval to begin construction. Therefore, **we recommend that Southern LNG develop an updated Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. This updated plan should include at a minimum:**

a. designated contacts with state and local emergency response agencies;
b. scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;
c. procedures for notifying residents and recreational users within areas of potential hazard along the transit route and in the South Channel;
d. evacuation routes/methods for residents and other public use areas that are within any transient hazard areas along the route of the LNG marine transit;
e. locations of permanent sirens and other warning devices; and
f. an "emergency coordinator" on each LNG vessel to activate sirens and other warning devices.

The Emergency Response Plan should be filed with the Secretary for review and written approval by the Director of OEP prior to initial site preparation. Southern LNG should notify FERC staff of all planning meetings in advance and should report progress on the development of its Emergency Response Plan at 3-month intervals.

FERC has also received comments on other LNG terminal proposals expressing concern that the local community would have to bear some of the cost of ensuring the security and emergency management of the LNG facility and the LNG vessels while in transit and unloading at the berth. In addition, Section 3A(e) specifies that the Emergency Response Plan shall include a Cost-Sharing Plan that contains a description of any direct cost reimbursements the applicants agree to provide to any state and local agencies with responsibility for security and safety at the LNG terminal and in proximity to LNG vessels that serve the facility. To allow the FERC an opportunity to review the plan, **we recommend that the Emergency Response Plan include a**

Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan should include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The Cost-Sharing Plan should be filed with the Secretary for review and written approval by the Director of OEP prior to initial site preparation.

4.12.6 Conclusions on Marine Traffic Safety

The operational safety of LNG marine traffic is under the jurisdiction of the Coast Guard. LNG vessels have safely transited the Savannah River and a Gulf Coast Waterway, the Calcasieu Ship Channel in Louisiana, for the past 20 years and worldwide for 50 years. If the Coast Guard issues an LOR finding the waterway suitable for additional LNG marine traffic with conditions, operational restrictions that may be imposed by the Coast Guard and the Savannah Pilots would minimize the potential for a hazardous event occurring along the waterway from the berthing area to the territorial sea and affecting the safety of the nearby public.

The operation of LNG marine traffic should have a minimal impact on other vessel traffic in the Port channels. With the mitigation measures discussed above, the operation of additional LNG vessels should have a similar impact as other large vessels, and should cause no more disruption than the vessel traffic increases planned by other channel users.

4.12.7 Terrorism and Security Issues

The security requirements for the onshore component of the proposed project are governed by 49 CFR Part 193, Subpart J - Security. This subpart includes requirements for conducting security inspections and patrols, liaison with local law enforcement officials, design and construction of protective enclosures, lighting, monitoring, alternative power sources, and warning signs. Requirements for maintaining safety of the marine terminal are in the Coast Guard's regulations in 33 CFR Part 127. Requirements for maintaining security of the marine terminal are in 33 CFR Part 105.

In the aftermath of the terrorist attacks that occurred on September 11, 2001, terrorism has become a very real issue for the facilities under the Commission's jurisdiction. The FERC, like other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the FERC has removed energy facility design plans and location information from its website to ensure that sensitive information filed under CEII is not readily available (RM02-4-000 and PL02-1-000 issued February 20, 2003).

Since September 11, 2001, the FERC has been involved with other federal agencies in developing a coordinated approach to protecting the energy facilities of the United States. The FERC continues to coordinate with these agencies, specifically with the Coast Guard, to address this issue. The Coast Guard now requires arriving vessels to provide them with a 96-hour advance notice of arrival that includes key information about the vessel and its crew, which

allows the Coast Guard to conduct a terrorism risk assessment and put in place appropriate mitigation before the vessel reaches the vessel channel. In addition, interstate natural gas companies are actively involved with several industry groups to chart how best to address security measures in the current environment. A Security Task Force has been created and is addressing ways to improve pipeline security practices, strengthen communications within the industry and the interface with government, and extend public outreach efforts.

On October 22, 2003, the Coast Guard issued a series of six final rules, which promulgated the maritime security requirements of the Marine Transportation Security Act of 2002: Implementation of National Maritime Security Initiatives; Area Maritime Security; Vessel Security; Facility Security; Outer Continental Shelf Facility Security; and the Automatic Identification System. The entire series of rulemakings establishes a new subchapter H in 33 CFR. In support of the rulemakings, the Coast Guard applied a risk-based decision-making process to comprehensively evaluate the relative risks of various target and attack mode combinations and scenarios for those vessel types and port facilities that pose a risk of a security incident. This approach provides a more realistic estimation of risk than a simple worst-case outcome assessment. Risk management principles acknowledge that while risk generally cannot be eliminated, it can be reduced by adjusting operations to lower consequences, threats, or vulnerability - recognizing that it is easier to reduce vulnerabilities by adding security measures.

On December 29, 2003, all terminal owners or operators subject to 33 CFR Part 105 were required to submit a Facility Security Assessment and Facility Security Plan to the Coast Guard COTP for review and approval. The Facility Security Plans were required to be implemented no later than July 1, 2004, or for facilities constructed after July 1, 2004, 60 days prior to operations. Some of the principal owner or operator responsibilities include:

- designating a FSO with a general knowledge of current security threats and patterns, risk assessment methodology, and the responsibility for implementing the Facility Security Plan and Assessment and performing an annual audit for the life of the project;
- conducting a Facility Security Assessment to identify site vulnerabilities, possible security threats and consequences of an attack, and facility protective measures;
- developing a Facility Security Plan based on the Facility Security Assessment, with procedures for responding to transportation security incidents; notification and coordination with local, state, and federal authorities; prevention of unauthorized access; measures and equipment to prevent or deter dangerous substances and devices; training; and evacuation;
- implementing scalable security measures to provide increasing levels of security at increasing MARSEC levels for facility access control, restricted areas, cargo handling, vessel stores and bunkers, and monitoring;
- conducting security exercises at least once each calendar year and drills at least every 3 months; and
- reporting of all breaches of security and security incidents.

Increased security awareness has occurred throughout the industry and the nation. President Bush established the Office of Homeland Security with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to,

and recover from terrorist attacks within the United States. The Commission, in cooperation with other federal agencies and industry trade groups, has joined in the efforts to protect the energy infrastructure, including the more than 300,000 miles of interstate natural gas transmission pipeline and associated LNG facilities.

Safety and security are important considerations in any Commission action. The attacks of September 11, 2001 have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities. However, the likelihood of future acts of terrorism or sabotage occurring at the proposed Terminal expansion, or at any of the myriad of natural gas pipeline or energy facilities throughout the United States is unpredictable given the disparate motives and abilities of terrorist groups. However, existing and proposed security measures discussed in this section make significant impacts to human life and property from a terrorist attack unlikely. The continuing need to construct facilities to support the future natural gas pipeline infrastructure is not diminished from the threat of any such unpredictable acts.

4.12.8 Pipeline Safety Standards

The transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between 5.0 percent and 15.0 percent in air. Unconfined mixtures of methane in air are not explosive. However, a flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

The DOT is mandated to provide pipeline safety under Title 49, U.S.C. Chapter 601. The Pipeline and Hazardous Materials Safety Administration (PHMSA), OPS, administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is

responsible for enforcement action. The majority of the states have either 5(a) certifications or 5(b) agreements, while nine states act as interstate agents.

The DOT pipeline standards are published in Parts 190-199 of Title 49 of the CFR. Part 192 of 49 CFR specifically addresses natural gas pipeline safety issues. Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993 between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with Section 3(e) of the Natural Gas Pipeline Safety Act.

The FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipeline under the Commission's jurisdiction. The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the Elba Express Pipeline Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Part 192 also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined as follows:

- Class 1 Location with 10 or fewer buildings intended for human occupancy.
- Class 2 Location with more than 10 but less than 46 buildings intended for human occupancy.
- Class 3 Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people during normal use.
- Class 4 Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be

installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock. All pipelines installed in navigable rivers, streams, and harbors must have a minimum cover of 48 inches in soil or 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (*e.g.*, 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, MAOP, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. In addition, all pipeline interconnects, and pipeline facilities within the fenced enclosures of the meter stations, launcher and receiver, and MLVs would be designed and constructed to meet Class 3 requirements.

If a subsequent increase in population density adjacent to the right-of-way indicates a change in class location above existing design for the pipeline, EEC would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the DOT code of regulations for the new class location.

In 2002, Congress recently passed an act to strengthen the Nation's pipeline safety laws. The pipeline Safety Improvement Act of 2002 (HR 3609) was passed by Congress on November 15, 2002, and signed into law by the President in December 2002. Since December 17, 2004, gas transmission operators are required to develop and follow a written integrity management program that contains all the elements described in Section 192.911 and addresses the risks on each covered transmission pipeline segment. Specifically, the law establishes an integrity management program which applies to all high consequence areas (HCAs). The DOT (68 FR 69778, 69 FR 18228, and 69 FR 29903) defines HCAs as they relate to the different class zones, potential impact circles, or areas containing an identified site as defined in Section 192.903 of the DOT regulations.

OPS published a series of rules from August 6, 2002 to May 26, 2004 (69 FR 29903), that defines HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate in 49 USC 60109 for OPS to prescribe standards that establish criteria for identifying each gas pipeline facility in a high density population area.

The HCA may be defined in one of two ways. In the first method an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[10] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

In the second method, an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs on its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within the HCAs. The DOT regulations specify the requirements for the integrity management plan at Section 192.911.

Table 4.12.8-1 identifies preliminary class locations for the Elba Express Pipeline Project, by milepost, as defined in Title 49 CFR Part 192. The majority of the proposed pipeline route would cross open land that is sparsely populated. About 171.0 miles of proposed pipeline route would be located in a Class 1 area, 4.8 miles would be in a Class 2 area, and 12.1 miles would be in Class 3 area. No portions of the proposed route would be located in a Class 4 area. Prior to construction of the pipeline, EEC will reassess the class locations along the pipeline route and will ensure that the pipeline is designed and constructed for the current class locations as well as for any anticipated future changes in class locations. EEC also will assess the pipeline route for HCAs in accordance with 49 CFR Part 192.761 prior to construction. The pipeline integrity management rule for HCAs requires inspection of the entire pipeline in HCAs every seven years.

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. The proposed pipeline would be continuously monitored and controlled via computer and local logic controllers at the manned control center at the LNG terminal site. A locally based, full-time staff would be assigned to operate and maintain the natural gas pipeline. The staff would be fully trained in pipeline operations, maintenance, and normal, abnormal, and emergency procedures. The pipeline would be patrolled and inspected on the ground on a periodic basis per DOT requirements or better. The frequency of these inspections would be affected by activity along the pipeline route such as construction or possible encroachment. These inspections would identify conditions indicative of pipeline leaks, evidence of pipeline damage or deterioration, damage to erosion controls, loss of cover, third-party activities or conditions which may presently or in the future affect pipeline integrity, safety, or operation of the pipeline. The pipeline system would participate in the state “One Call” system.

Under Section 192.615, each pipeline operator must also establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency shutdown of system and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and

- protecting people first and then property, and making them safe from actual or potential hazards.

TABLE 4.12.8-1

Preliminary Area Class Locations for the Elba Express Pipeline Project

Milepost From	Milepost To	Length Miles	Location Class	Construction Design Factor	Diameter (inches)	Wall Thickness	Grade
42-inch Outside Diameter (OD) Pipeline							
0.0	9.5	9.5	3	a/	42	a/	X80
9.5	11.1	1.6	2	0.60	42	0.547	X80
11.1	12.6	1.5	1	0.72	42	0.456	X80
12.6	13.3	0.7	2	0.60	42	0.547	X80
13.3	14.3	1.0	3	0.50	42	0.656	X80
14.3	16.2	1.9	1	0.72	42	0.456	X80
16.2	16.9	0.7	3	0.60	42	0.656	X80
16.9	101.4	84.5	1	0.72	42	0.456	X80
101.4	102.8	1.4	2	0.60	42	0.547	X80
102.8	104.3	1.5	1	0.72	42	0.456	X80
104.3	105.2	0.9	3	0.50	42	0.656	X80
105.2	114.8	9.6	1	0.72	42	0.456	X80
Miles Class 1		99.0					
Miles Class 2		3.7					
Miles Class 3		12.1					
Total Miles		114.8					
36-inch OD Pipeline							
114.8	184.9	70.1	1	0.72	36	0.391	X80
184.9	186.0	1.1	2	0.60	36	0.469	X80
186.0	187.9	1.9	1	0.72	36	0.391	X80
Miles Class 1		72.0					
Miles Class 2		1.1					
Miles Class 3		0.0					
Total Miles		73.6					

a/ To be determined.
Note: All information included herein is preliminary. The final class location will be performed after the engineering surveys are complete.

Part 192 requires that each operator must establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. EEC would provide the appropriate training to local emergency service personnel before the pipeline is placed in service. No

additional specialized local fire protection equipment would be required to handle pipeline emergencies.

4.12.9 Pipeline Accident Data

Since February 9, 1970, 49 CFR 191 has required all operators of transmission and gathering systems to notify the DOT of any reportable incident and to submit a report on form F7100.2 within 20 days. Reportable incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization;
- required taking any segment of transmission line out of service;
- resulted in gas ignition;
- caused estimated damage to the property of the operator, or others, or both, of a total of $5,000 or more;
- required immediate repair on a transmission line;
- occurred while testing with gas or another medium; or
- in the judgment of the operator was significant, even though it did not meet the above criteria.

The DOT changed reporting requirements after June 1984 to reduce the amount of data collected. Since that date, operators must only report incidents that involve property damage of more than $50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. Table 4.12.8-2 presents a summary of incident data for the 1970 to 1984 period, as well as more recent incident data for 1986 through 2005, recognizing the difference in reporting requirements. The 14.5-year period from 1970 through June 1984, which provides a larger universe of data and more basic report information than subsequent years, has been subject to detailed analysis, as discussed in the following sections.

During the 14.5-year period, 5,862 service incidents were reported over the more than 300,000 total miles of natural gas transmission and gathering systems nationwide. Service incidents, defined as failures that occur during pipeline operation, have remained fairly constant over this period with no clear upward or downward trend in annual totals. In addition, 2,013 test failures were reported. Correction of test failures removed defects from the pipeline before operation. Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.12.8-2 provides a percentage distribution of the causal factors as well as the annual frequency of each factor per 1,000 miles of pipeline in service.

Table 4.12.8-3 summarizes transmission pipeline incidents reported in 2005 by cause. The leading causes of transmission line incidents resulted from heavy rains/flooding and third-party excavation damages. Using the annual average for incidents (114) and average miles of transmission pipelines (297,150) between 2001 and 2005, there were 0.00038 incidents per pipeline mile per year.

TABLE 4.12.8-2

Natural Gas Service Incidents by Cause

Cause	Incidents per 1,000 Miles of Pipeline (percentage)	
	1970-1984	**1986-2005**
Outside Force	0.70 (53.8)	0.10 (38.5)
Corrosion	0.22 (16.9)	0.06 (23.1)
Construction or Material Defect	0.27 (20.8)	0.04 (15.4)
Other	0.11 (8.5)	0.06 (23.1)
Total	**1.30**	**0.26**

The dominant incident cause is outside forces, constituting 53.8 percent of all service incidents. Outside forces incidents result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.12.8-3 shows that human error in equipment usage was responsible for approximately 75 percent of outside forces incidents. Since April 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (*e.g.*, oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts. The 1986 through 2005 data (as shown on table 4.12.8-4) show that the portion of incidents caused by outside forces has decreased to 38.5 percent.

TABLE 4.12.8-3

Office of Pipeline Safety: Transmission Pipeline Incident Summary by Cause, 1/1/2005-12/31/2005

Cause	Incidents	Property Damage	Deaths	Injuries
Body of Pipe	4	$424,538	0	0
Butt Weld	4	$1,898,032	0	0
Car, Truck or Other Vehicle Not Related to Excavation Activity	11	$8,780,233	0	1
Component	7	$3,409,521	0	0
Corrosion, External	14	$89,936,893	0	0
Corrosion, Internal	14	$6,058,934	0	0
Earth Movement	8	$31,154,179	0	0
Fillet Weld	0	0	0	0
Fire/Explosion as Primary Cause	1	$100,000	0	0
Heavy Rains/Flood	46	$60,496,959	0	0
High Winds	8	$19,824,208	0	0
Incorrect Operation	4	$791,887	0	3
Joint	3	$430,800	0	0
Lightning	0	0	0	0
Malfunction of Control/Relief Equipment	11	$2,180,943	0	0
Miscellaneous	12	$3,094,360	0	1
No Data	0	0	0	0
Operator Excavation Damage	2	$301,427	0	0

TABLE 4.12.8-3

Office of Pipeline Safety: Transmission Pipeline Incident Summary by Cause, 1/1/2005-12/31/2005

Cause	Incidents	Property Damage	Deaths	Injuries
Pipe Seam Weld	0	0	0	0
Rupture of Previously Ruptured or Leaking	1	$1,600,000	0	0
Rupture or Leaking Seal/Pump Packing	1	$50,001	0	0
Temperature	2	$50,000	0	0
Third-Party Excavation Damage	18	$2,412,046	0	1
Thread Stripped Broken Pipe Coupling	2	$215,119	0	0
Unknown	7	$18,852,506	0	1
Vandalism	1	$55,000	0	0
Total	**181**	**$252,117,586**	**0**	**7**
Average		**$1,392,915**	**0**	**0**

Source: USDOT 2005 (http://ops.dot.gov/).

TABLE 4.12.8-4

Outside Forces Incidents by Cause (1970-1984)

Cause	Percent
Equipment Operated by Outside Party	67.1
Equipment Operated by the Operator	7.3
Earth Movement	13.3
Weather	10.8
Other	1.6

The pipelines included in the data set in table 4.12.8-4 vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of service incidents is strongly dependent on pipeline age. While pipelines installed since 1950 exhibit a fairly constant level of service incident frequency, pipelines installed before that time have a significantly higher rate, partially due to corrosion. Older pipelines have a higher frequency of corrosion incidents, since corrosion is a time-dependent process. Further, new pipe generally uses more advanced coatings and cathodic protection to reduce corrosion potential.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Table 4.12.8-5 clearly demonstrates the effectiveness of corrosion control in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly

reduces the rate of failure compared to unprotected or partially protected pipe. The data shows that bare, cathodically protected pipe actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

TABLE 4.12.8-5

External Corrosion by Level of Control (1970-1984)

Corrosion Control	Incidents per 1,000 miles per year
None-bare Pipe	0.42
Cathodic Protection Only	0.97
Coated Only	0.40
Coated and Cathodic Protection	0.11

4.12.10 Impacts on Public Safety

The service incident data summarized in table 4.12.8-1 include pipeline failures of all magnitudes with widely varying consequences. Approximately two-thirds of the incidents were classified as leaks, and the remaining third classified as ruptures, implying a more serious failure.

Table 4.12.8-6 presents the average annual fatalities that occurred on natural gas transmission and gathering lines from 1970 to 2005. Fatalities between 1970 and June 1984 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Of the total 5.0 nationwide average, fatalities among the public averaged 2.6 per year over this period. The simplified reporting requirements in effect after June 1984 do not differentiate between employees and nonemployees. However, the data show that the total annual average for the period 1984 through 2005 decreased to 3.6 fatalities per year. Subtracting two major offshore incidents in 1989, which do not reflect the risk to the onshore public, yields a total annual rate of 2.8 fatalities per year for this period.

TABLE 4.12.8-6

Annual Average Fatalities - Natural Gas Transmission and Gathering Systems a/, b/

Year	Employees	Nonemployees	Total
1970-June 1984	2.4	2.6	5.0
1984-2005 c/	--	--	3.5
1984-2005 c/			2.8 d/

a/ 1970 through June 1984 - American Gas Association, 1986.

b/ DOT Hazardous Materials Information System.

c/ Employee/nonemployee breakdown not available after June 1984.

d/ Without 18 offshore fatalities occurring in 1989 – 11 fatalities resulted from a fishing vessel striking an offshore pipeline and seven fatalities resulted from explosion on an offshore production platform.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 4.12.8-7 in order to provide a relative measure of the industry-wide safety of natural gas pipelines. Direct comparisons between accident categories should be made cautiously; however, because individual exposures to hazards are not uniform among all

categories. Nevertheless, the average 2.6 public fatalities per year is relatively small considering the more than 300,000 miles of transmission and gathering lines in service nationwide.

Furthermore, the fatality rate is approximately two orders of magnitude (100 times) lower than the fatalities from natural hazards such as lightning, tornadoes, floods, earthquakes, *etc.*

TABLE 4.12.8-7

Nationwide Accidental Deaths a/

Type of Accident	Fatalities
All Accidents	90,523
Motor Vehicles	43,649
Falls	14,985
Poisoning	9,510
Fires and Burns	3,791
Drowning	3,488
Suffocation by Ingested Object	3,206
Tornado, Flood, Earthquake, *etc.* (1984-93 average)	181
All Liquid and Gas Pipelines (1986-2003 average) b/	22
Gas Transmission and Gathering Lines, Nonemployees Only (1970-84 average) c/	2.6

a/ All data, unless otherwise noted, reflects 1996 statistics from the U.S. Department of Commerce, Bureau of the Census, "Statistical Abstract of the United States 118th Edition."

b/ U.S. Department of Transportation, Office of Pipeline Safety, www.ops.dot.gov/stats.

c/ American Gas Association, 1986.

The available data show that natural gas pipelines continue to be a safe, reliable means of energy transportation. Based on approximately 301,000 miles in service, the rate of public fatalities for the nationwide mix of transmission and gathering lines in service is 0.01 per year per 1,000 miles of pipeline. Using this rate, EEC's Project might result in a public fatality every 532 plus years. This would represent a slight increase in risk to the nearby public.

4.13 CUMULATIVE IMPACTS

NEPA requires the lead federal agency to consider the potential cumulative impacts of proposals under their review. Cumulative impacts may result when the environmental effects associated with the proposed action are superimposed on or added to either temporary or permanent impacts associated with past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Generally, we believe that cumulative impact could result only from the construction of other projects in the same vicinity and time frame as the proposed facilities. In such a situation, although the impact associated with each project might be minor, the cumulative impact resulting from all projects being constructed in the same general area could be greater.

Impacts subject to cumulative effects analysis for the Elba III Project were identified by determining the environmental impact issues associated with the proposed action, establishing

the geographic scope of the study area, establishing the timeframe of the analysis, and identifying other past, present, or future actions that have affected, or could affect, the resources of concern.

Construction of the Terminal Expansion facilities would result in both short- and long-term, minor to moderate environmental impacts. Impacts associated with construction of the Elba Express Pipeline generally are short-term and minor because resources in the project area that would be affected during construction can generally be restored or allowed to return back to their original condition following pipeline installation. Some long-term impacts occur, however, when resources cannot be quickly restored to original conditions (*e.g.*, cleared forest lands), or when resources are permanently affected due to operational and maintenance requirements (*e.g.*, expansion of the LNG terminal facilities, aboveground facilities associated with the pipeline, and maintenance requirements along the proposed pipeline ROW).

In addition to the Elba III Project, we considered ten activities and projects in our cumulative impact analysis (see table 4.13-1). These are known projects with potential impacts on the same resources for which some effect has been evaluated for the Elba III Project. Of these projects, four are pertinent to the Terminal Expansion Project and the remaining six are pertinent to the Elba Express Pipeline.

Terminal Expansion

South Atlantic International Terminal

In its October 31, 2002 *Memorandum for Commander South Atlantic Division (CESAD-CM-P)* regarding the SHEP, Georgia and South Carolina General Reevaluation and Scoping Meeting Project Guidance Memorandum, the COE reported that government officials for Jasper County, South Carolina, want to develop a container terminal (South Atlantic International Terminal [SAIT]), on the north side of the lower Savannah River to receive more of the economic benefits of a deep draft harbor. The proposed SAIT would be located directly across from the Terminal Expansion site along the shoreline of the Savannah River.

The South Carolina side of the lower Savannah River consists of salt marshes and CDFs that are owned by the State of Georgia, controlled by the Georgia DOT, and used for operation and maintenance of the Savannah Harbor navigation channel. The original Jasper County plan was to use about 1,800 acres of land for development of four wharfs (marshalling areas), terminal storage, and associated appurtenances including a gate complex, administration building, equipment storage, maintenance complex, fueling area, and intermodal operation building.

The SAIT has a long history of legal and political challenges. Ongoing litigation between the South Carolina State Ports Authority, Jasper County, and the Georgia Department of Transportation will likely delay any development in the immediate future. We also note that a new port on the Savannah River in Jasper County would require a tremendous investment in infrastructure as the area currently has no road or rail access.

TABLE 4.13-1

Existing, Approved, or Proposed Activities/Projects that Could Contribute to Cumulative Impacts Associated with Construction of the Elba III Project

Activity/Project	Counties and States Where Project Coincides with the Elba III Project	Description	Timeframe
Terminal Expansion Project			
South Atlantic International Terminal (Jasper County Port)	Jasper County, SC adjacent to Chatham County, GA	Construct and operate a new deep-water terminal on the north side of the lower Savannah River.	Undetermined
Savannah Harbor Expansion Project	Chatham County, GA	Deepen about 20 miles of the Savannah Harbor navigation channel from 42 feet to 48 feet.	2010
Port of Savannah, Garden City Terminal Expansion	Chatham County, GA	Construct and operate a new container berth and development of additional open, paved storage areas.	2006
Port of Savannah, Ocean Terminal Expansion	Chatham County, GA	Develop additional open, paved storage for the productive handling of roll-on roll-off cargo.	Undetermined
Elba Express Pipeline			
Cypress Pipeline Project	Chatham and Effingham Counties, GA	Construct and operate 167 miles of mainline pipeline, 10 miles of pipeline loop, and appurtenances.	2007, 2009, and 2010
U.S. Route 1/State Route 4 Widening and Reconstruction Project	Jefferson County, GA	Widen and reconstruct U.S. Route 1/State Route 4 for about 21.8 miles.	Undetermined
State Route 17 Widening and Reconstruction Project	McDuffie and Wilkes Counties, GA	Widen, reconstruct, and relocate State Route 17 for 15.9 miles.	Undetermined
State Route 72 Widening, Reconstruction, and Relocation Project	Elbert County, GA	Widen, reconstruct, and relocate State Route 72 for 14.4 miles.	Undetermined
Planned Developments	Effingham County, GA	Research Forest Tract ("Tract B"), Braniger Estates, Parkway Place, and Stafford Shire Estates.	Undetermined
Thomas-McDuffie Regional Airport Runway Expansion Project	McDuffie County, GA	Runway extension and repaving, and construction of new corporate aircraft hangars.	Undetermined

Savannah Harbor Expansion Project

On January 22, 2002, the Savannah District of the COE issued an *Intent to Prepare a Draft Tier II Environmental Impact Statement for the Savannah Harbor Expansion Project, Savannah, Georgia* (SHEP). The EIS describes the potential impacts of deepening the navigation channel at Savannah, Georgia. The COE's *Savannah Harbor Expansion Project Formulation of Alternatives, General Re-evaluation Report and Environmental Impact Statement* was released in March 2004 and revised in April 2005.

The SHEP would include the following harbor improvements:

- deepening the existing Savannah Harbor navigation channel, in increments, from an existing depth of 42 feet MLW to a potential depth of 48 feet MLW from the Savannah River entrance channel at Station 0+000 to the Georgia Port Authority's Garden City Terminal at about Station 103+000;

- widening bends in the entrance channel at two locations and in the inner harbor channel at 10 locations;
- enlarging the Kings Island Turning Basin (used by both the Garden City and Ocean Terminals, described below) to a width of 1,676 feet; and
- raising the dikes from 2.6 feet to 5.5 feet in disposal areas 12A, 14B, and Jones/Oysterbed Island.

The recommended plan of improvement for the SHEP would require dredging and subsequent placement of a maximum of 27 million cubic yards of sediment. Sediment excavated from the entrance channel would be deposited in the approved ocean CDF site. Sediment excavated from the inner harbor would be deposited in CDFs currently used by the existing federal navigation project. Dike raising would be performed to accommodate the sediment deposited in those CDFs to regain lost disposal capacity. Further consideration of near shore and/or beach placement of excavated sediment would be made during the engineering and design phase of the project. The Terminal Expansion site would be within the SHEP limits.

Port of Savannah, Garden City Terminal Expansion

Owned and operated by the Georgia Port Authority, Garden City Terminal is a secured, dedicated container facility and is the largest of its kind on the East and Gulf Coasts. It is a 1,200-acre single-terminal facility with 9,693 feet of continuous berthing, and more than 1.3 million square feet of covered storage. The terminal is equipped with 15 high-speed container cranes and an extensive inventory of yard handling equipment. Garden City Terminal is within 6.3 miles of I-16 and 5.6 miles of I-95. CSX Transportation and Norfolk Southern Railroad provide Class I rail service to the facility.

The Georgia Port Authority is in the advanced planning stages of developing the terminal's eighth container berth (CB-8) which would expand the facility by 83-acres and add 2,100 feet of new berthing. CB-8 would be equipped with state-of-the-art cargo handling equipment and technology. The Garden City Terminal is about 11.0 miles north-northwest of Elba Island.

Port of Savannah, Ocean Terminal Expansion

Owned and operated by the Georgia Port Authority, Ocean Terminal is a secured, dedicated break-bulk facility that specializes in the rapid and efficient handling of a vast array of forest and solid wood products, steel, RO-RO project shipments and heavy-lift cargoes. It is a 208-acre facility with 6,688 feet of deepwater berthing, about 1.5 million square feet of covered storage, and 96 acres of open, versatile storage. Ocean Terminal is within 1.2 miles of I-16 and 10 miles of I-95. CSX Transportation and Norfolk Southern Railroad provide Class I rail service to the facility.

The Georgia Port Authority identified a large tract of land along the southwest side of the Ocean Terminal for the development of additional open, paved storage to accommodate the productive handling of RO-RO cargo. The Ocean Terminal is about 8.0 miles north-northwest of Elba Island.

Elba Express Pipeline

Southern's Proposed Cypress Pipeline Project

On June 15, 2006, Southern was authorized to construct and operate its Cypress Pipeline Project (Docket No. CP05-388-000). These natural gas pipeline facilities consist of:

- about 167 miles of new 24-inch-diameter mainline pipeline extending from Southern's existing Rincon Gate Meter Station in Effingham County, Georgia to Florida Gas Company's (FGT's) existing pipeline system in Clay County, Florida;
- about 9.8 miles of 30-inch-diameter pipeline loop adjacent to Southern's three Wrens-Savannah pipelines between Southern's existing Port Wentworth Meter Station in Chatham County, Georgia and the Rincon Gate Meter Station in Effingham County, Georgia; and
- about 0.1 mile of 12-inch-diameter lateral pipeline in Florida; and
- various aboveground facilities including three new compressor stations (Liberty and Glynn Counties, Georgia and Nassau County, Florida), four new meter stations in Florida, modification/expansion of to three existing meter station (Chatham, Effingham, and Cobb Counties, Georgia), and various new block valves and pig launcher/receivers.

Of particular relevance to the Elba III Project cumulative impacts discussion are the 9.8 miles of loop pipeline between Port Wentworth and Rincon, modification of the existing Port Wentworth Meter Station (Chatham County), and expansion of the Rincon Gate Meter Station (Effingham County).

Southern will construct its Cypress Pipeline Project in three phases with planned in-service dates of May 2007 (Phase I), May 2009 (Phase II), and May 2010 (Phase III). The 9.8-mile-long pipeline loop between the Port Wentworth and Rincon Gate Meter Stations and the meter station modification and expansions in Chatham and Effingham Counties would be constructed as Phase III. As previously discussed, the gas authorized to be transported by Southern's Cypress Phase III pipeline loop is now proposed to be transported by the Elba Express Pipeline between Port Wentworth and Rincon. This would substantially reduce cumulative construction impacts on landowners and environmental resources along Southern's existing three-pipeline corridor between MP 0.0 to about MP 9.8 in Chatham and Effingham Counties. At Rincon Gate, the Cypress 24-inch-diameter mainline would begin at an interconnection with the Elba Express Pipeline at the proposed EEC/Cypress Meter Station and head south to Florida.

U.S. Route 1/State Route 4 Widening and Reconstruction Project

On March 7, 2006, the Georgia DOT held a public information open house for the US Route 1/State Route 4 Widening and Reconstruction Project (US 1/SR 4 Project) in Jefferson County, Georgia. The US 1/SR 4 Project includes four separate projects that begin near Louisville and end in Wrens. Wrens is about 3.0 miles south of the Elba Express route at MP 104.7. The US 1/SR 4 Project includes a total of 21.8 miles of widening and reconstruction of the roadway from two to four lanes with a grassed median.

State Route 17 Widening and Reconstruction Project

On September 22, 2005, the Georgia DOT held a public information open house for the State Route 17 Widening and Reconstruction Project (SR 17 Project) McDuffie and Wilkes Counties. The SR 17 Project includes two separate projects that begin near the intersection of SR 43 in McDuffie County and continue north to its terminus at the Washington Bypass in Wilkes County. The US 1/SR 4 Project includes a total of 15.9 miles of widening and reconstruction of the roadway from two to four lanes with a grassed median. The SR 17 Project is about 5.5 miles west of the Elba Express route between about MPs 130.0 and 135.0 and intersects the Elba Express Pipeline at about MP 140.5.

State Route 72 Widening, Reconstruction, and Relocation Project

On January 10, 2006, the Georgia DOT held a public information open house for the State Route 72 Widening, Reconstruction, and Relocation Project (SR 72 Project) in Elbert County. The SR 72 Project includes a total of 14.4 miles of widening and reconstruction of existing two and four 12-foot-wide lanes with 10-foot shoulders to four 12-foot lanes with flush median. The SR 72 Project intersects the Elba Express route at about MP 169.3 and is about 0.2 mile north of Construction Yard CEL-001.

Planned Developments in Effingham County, Georgia

Research Forest Tract ("Tract B") is owned by the Effingham County Industrial Development Authority and consists of 1,752 acres of land that is slated for industrial development within the next 5 to 10 years. Tract B is located near approximate MP 7.4 of the Elba Express Pipeline. Proposed residential developments along the Elba Express Pipeline include the Braniger and Stafford Shire Estates also near approximate MP 7.4 and Parkway Place near approximate MP 14.

Thomas-McDuffie Regional Airport Runway Expansion Project

The Thomas-McDuffie Regional Airport is about 6 miles east of the Elba Express Pipeline route at MP 128.5. The airport has a 5,200-foot-long runway, and the expansion project includes an expanded 5,500-foot-long runway and new corporate aircraft hangars.

4.13.1 Geology

The Elba III Project would have minimal impacts on geologic resources because blasting would not be required on the Terminal Expansion site; however, blasting may be required along the Elba Express Pipeline route. Blasting could be required along the along widening and reconstruction projects in Jefferson, McDuffie, Wilkes, and Elbert Counties, Georgia, should Georgia DOT encounter bedrock at or near the surface. If required, we expect that Georgia DOT would conduct blasting in accordance with all federal, state, and local regulations as EEC would. If topographic contours and drainage conditions for each of the projects would be restored to the extent practicable, cumulative impact on regional drainage patterns would be avoided or minimized.

In Elbert County, Georgia, the Elba Express Pipeline route would be within 2,500 feet of six mining operations. Although the SR 72 Project in Elbert County would involve the widening and reconstruction of 14.4 miles of roadway, we have not identified any mining operations that this project would affect. Although mineral resources within or near the pipeline ROW would be precluded from the extraction of gravel and other minerals, we do not expect a cumulative impact on these resources because the Georgia DOT roadway project would be located adjacent to existing roadways that already preclude mining.

4.13.2 Soils

Clearing and grading associated with construction of the Terminal Expansion Project, SAIT, and the Garden City and Ocean Terminals could accelerate the soil erosion process and, without adequate protection, could result in discharge of sediment to adjacent waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair revegetation. Southern LNG would implement its Plan to establish a baseline for minimizing the potential for erosion as a result of water or wind action and to aid in reestablishing vegetation after construction. In addition, Southern LNG would implement the project-wide Spill Plan that provide guidance erosion control and stormwater management. None of the land within the Terminal Expansion site is currently under active cultivation, and no prime farmland would be permanently converted as a result of the Terminal Expansion Project. The SAIT and Garden City and Ocean Terminals would also comply with regulations that pertain to construction disturbances to soils and mitigation. Therefore, we do not expect the Terminal Expansion Project to significantly contribute to the cumulative impact on soils.

The Elba Express Pipeline would be located within Southern's existing multi-pipeline easement for about 106 miles between MPs 0.0 to MP 106.1. Because a 125-foot-wide construction ROW would be used to construct the pipeline, soil disturbance within the first 106.1 miles would be 1,607.6 acres, including a portion of Southern's existing ROW. In addition to this amount, Southern's existing pipeline ROWs previously disturbed about 524.0 acres of soils. Cumulative soil disturbance along this portion of Southern's existing pipeline ROW is 2,131.6 acres. In addition, the Georgia DOT widening and reconstruction projects in Jefferson, McDuffie, Wilkes, and Elbert Counties could disturb between 922.7 and 1,937.0 acres of soils.

Potential cumulative erosion could occur where construction disturbance areas overlap between MPs 0.0 and 106.1. However, Southern's existing pipelines have been installed for a number of years and the construction ROWs have been partially or completely restored to pre-existing conditions. EEC would implement its Plan and BMPs for soil management and protection would be applied across all ownerships for each pipeline project. Revegetation mixtures would be applied that are appropriate to soil conditions and expected future uses. As a consequence, the potential for cumulative erosion caused by one or more of these pipeline projects is low because consistent erosion control practices would be applied, and structural erosion control measures would be integrated between adjacent pipeline projects. We expect that Georgia DOT would also be required to implement BMPs for soil management and protection. Therefore, we do not expect the Elba Express Pipeline to significantly contribute to a cumulative impact on soils.

4.13.3 Water Resources

As noted in table 4.13-1, the SAIT and SHEP would involve dredging activities. Although the volume of dredged material that would be generated to develop the SAIT is unknown, up to 27 million cubic yards of sediment would be dredged as a result of the SHEP. About 72,000 cubic yards of material would be dredged for the proposed Terminal Expansion Project, which would account for only about 0.2 percent of the dredge material to be produced for these future projects. Maintenance dredging of the Savannah Harbor navigation channel is performed annually by the COE. The Terminal Expansion Project would only marginally increase the volume of material generated by maintenance dredging required for the existing berthing slip at Elba Island, which is currently about 230,000 cubic yards each year. The dredged sediments for the SHEP would be deposited at existing CDFs along the Savannah River whereas the sediments generated for the Terminal Expansion Project would be piped into one of two upland CDFs owned and operated by Southern LNG on the northwest end of Elba Island. Increased turbidity and sedimentation from initial dredging during the deepening of the navigation channel and modification of Southern LNG's existing berthing area, in addition to future maintenance dredging, would temporarily decrease water quality in the immediate vicinity of each project. If dredging associated with the Terminal Expansion Project were to occur concurrently with the SHEP, the reduction in water quality could be exacerbated. However, the negative effects of dredging in and adjacent to the existing Savannah River navigation channel would be temporary, and water quality would be expected to return to ambient conditions soon after completion of activities. We do not expect the Terminal Expansion Project to significantly contribute to the cumulative impact on water resources or the disposal of dredged material in the project area.

The proposed Elba Express Pipeline would require the crossing of 353 waterbodies, of which 161 would be perennial waterbodies. Cumulative effects on surface water resources affected by the Elba Express Pipeline would be limited primarily to waterbodies that are affected by other projects located within the same major watersheds. Direct in-stream effects associated with open-cut crossings would result in the greatest impact on water resources. Runoff from construction activities near waterbodies could also result in cumulative impacts, although this effect would be relatively minor. Most of the projects listed in table 4.13-1 are within the same major watersheds crossed by the Elba Express Pipeline, and some of these projects (*e.g.*, Georgia DOT widening and reconstruction projects) would likely involve direct in-stream impacts.

To minimize impacts on surface water resources, we expect that each project proponent would implement BMPs for crossing waterbodies as EEC has proposed in its Procedures. In addition, each proponent would comply with applicable local, state, and federal permit requirements for each waterbody crossing. Waterbodies that were crossed as part of Southern's existing pipeline system (between MPs 0 and 106.1) have been mitigated to an acceptable level. In general, impacts from pipeline construction across surface waters are short-term, and no long-term or cumulative effects on the waterbodies crossed by the proposed, past, and foreseeable future projects would be expected following mitigation and restoration.

4.13.4 Wetlands

The projects listed in table 4.13-1 would likely permanently impact tidal flats, salt marsh, and/or freshwater wetlands. Each proponent would be required by the terms and conditions its respective Section 404 permits to provide compensatory mitigation for unavoidable wetland impacts. The construction and operation of the proposed Elba III Project, along with the other potential projects and activities, could result in a cumulative reduction in the amount of wetlands in the vicinity of the project. However, proposed and required mitigation for wetlands affected by the proposed Elba III Project and the other projects listed could result in a net increase and/or improvement in the regional coastal marsh resource. Dredged material placement for the Terminal Expansion Project, SAIT, and SHEP could result in the creation of shallow emergent wetlands along the Savannah Harbor navigation channel area.

The locations where cumulative impacts on wetlands would occur are where the Elba Express Pipeline route and Southern's existing pipeline system would be collocated between MPs 0.0 and 106.1. However, wetlands along Southern's existing pipeline system ROWs (between MPs 0 and 106.1) have been mitigated to an acceptable level. Cumulative impacts on forested wetlands could occur along the ROWs since both EEC and Southern would remove trees within 15 feet of the pipeline centerline as part of their vegetative maintenance programs. EEC would apply its Procedures, and would be subject to conditions contained in the COE's Section 404 permits and state water quality permits. As discussed in section 4.4.2, impacts from the pipeline on wetlands would generally be temporary, and none of the wetlands would be permanently drained or filled for operation of the Elba Express Pipeline.

4.13.5 Vegetation and Wildlife

When projects are constructed at or near the same time, the combination of construction activities could have a cumulative impact on vegetation and wildlife living in the immediate area. Clearing and grading and other construction activities associated with the Elba III Project, along with other area construction projects, would result in the removal of vegetation, alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as increased population stress, predation, forest fragmentation, and establishment of invasive plant species.

The construction of multiple large industrial projects at or near the same time can result in a significant amount of land clearing activities that could have a cumulative impact on forest resources in the immediate area of the projects. However, the Terminal Expansion site is devoid of trees. The total amount of vegetation that may be affected by the Elba Express Pipeline project, Georgia DOT widening and reconstruction projects, and planned developments could appear large but still relatively minor compared to the abundance of similar vegetation cover types and wildlife habitats in the project area. Impacts resulting from construction of the pipelines and roadways would result in the long-term and permanent loss of woody vegetation and would cause a small incremental increase in fragmentation of forested areas.

During construction activities, mobile species would be able to relocate to adjacent habitat and then reoccupy open project lands after they have been restored. We believe that all of the projects would make use of mitigation measures designed to minimize the potential for erosion,

revegetate disturbed areas, increase the stabilization of site conditions, and in many cases control the spread of noxious weeds, thereby minimizing the degree and duration of the cumulative impact on vegetation and terrestrial wildlife from these projects.

4.13.6 Aquatic Resources

No brackish marsh or intertidal mud flat habitat would be impacted by the Terminal Expansion Project; however, minor temporary effects on subtidal soft sediments and the water column would occur during modifications to the existing berthing slip. Deepening the Savannah Harbor navigation channel as part of the SAIT and/or SHEP would impact aquatic habitats including brackish and salt marshes and unconsolidated bottom habitats. As a result of this dredging, these habitats would be converted to deeper water, and maintained as such through periodic maintenance dredging. Most other impacts associated with dredging would be short-term, such as localized increased turbidity during dredging operations. Impact on submerged aquatic vegetation would be addressed through compensatory mitigation.

Cumulative impacts to egg and larval species from ballast and cooling water withdrawal would be expected to be minimal. The proposed project could add up to 95 additional vessels per year (a 3 percent increase in current commercial shipping on the Savannah River). Vessel water intakes have bars spaced 0.5 inch apart and flow control measures to lessen the likelihood of entrainment of juvenile and adult fish species. As stated in section 4.6.2.3, egg and larvae species generally occur in shallow, nearshore areas, while ballast and cooling water intakes are located near the bottom of the vessels (about 30 feet in depth), thereby lessening the impacts. While current impacts associated with ballast water withdrawal are unknown, the incremental increase in shipping would not appreciably add to the current impacts.

As with surface water resources, cumulative impacts on fisheries resources would be limited primarily to waterbodies that are affected by other projects located within the same major watersheds. Potential impacts on fisheries resources resulting from pipeline construction and other types of project construction activities (*i.e.*, Georgia DOT widening and reconstruction projects) can include sedimentation and turbidity, alteration or removal of instream and stream bank fish cover, and introduction of water pollutants. To minimize impacts on fisheries, EEC would implement its Procedures, and other project proponents would comply with local, state, and federal permit requirements. In general, impacts from pipeline construction across surface waters are short-term, and no long-term or cumulative effects on fisheries would be expected following mitigation and restoration.

4.13.7 Special Status Species

Because about 106.1 miles (56 percent) of the Elba Express Pipeline would be collocated with Southern's existing pipeline system, we believe that this configuration has the potential to affect special status species suitable habitat discussed in section 4.7.1 and 4.7.2 of this EIS. EEC would be required to consult with federal, state, and local agencies to determine which species may occur within its project area, evaluate potential impacts on those species as a result of construction and operation, and implement measures to avoid, minimize, or mitigate impacts on special status species and their habitats. As part of Southern's installation of its existing pipeline

system, it was required to do the same. Thus, we believe that the cumulative impacts on special status species and their habitats would not be significant.

4.13.8 Land Use and Visual Resources

The Elba III Project would incrementally add to the cumulative impact of changes in on land uses in the project area. The majority of this additional impact would be permanent; however, the proposed Terminal Expansion site is currently dedicated to industrial use. The Garden City Terminal expansion would be adjacent to industrial lands and near a residential area, and the Ocean Terminal expansion would be within an existing area of industrial use.

Although the Terminal Expansion would have some visual impact on the immediate surroundings, this element of the proposed action would be consistent with ongoing industrial activities and existing facilities along the Savannah Harbor navigation channel, and would not significantly alter the visual landscape of the area. Along the Elba Express Pipeline, construction work areas would be restored, as near as possible, to pre-construction contours and revegetated. Once revegetation is complete, there would be no significant cumulative alteration of the landscape in the region.

Fishing, boating, and other recreational activities take place in and adjacent to the Savannah River. The potential increase of 95 LNG vessels per year associated with the Terminal Expansion, the potential for increased vessels traffic associated with the expansions of the Garden City and Ocean terminals, and the possible construction of the SAIT could have cumulative impact on recreational boating.

Where the Elba Express Pipeline would be collocated with Southern's existing pipeline system (Port Wentworth to Wrens, MPs 0-104.8), most land uses, except forest and planted pine, would be allowed to revert to pre-construction uses following construction. Some land uses would be restricted or prohibited on the new permanent pipeline ROW, such as construction of aboveground structures. The construction work areas would be restored, as near as possible, to pre-construction contours and revegetated. Once revegetation is complete, there would be no significant cumulative alteration of the landscape in the region. Most of the Northern Segment, however, would be "greenfield" pipeline, establishing a new ROW. While the new ROW would be noticeable (after revegetation) only where forested areas are crossed, the impact would be noticeable where it crosses areas of high public use (roads and highways). The proposed compressor station, meter stations, block valves, and other aboveground facilities would have more visual impact than the buried pipeline. Of the projects listed in table 4.13-1, the proposed planned developments would have the most impact on visual resources in the area, resulting from the loss of vegetation and construction of permanent aboveground structures. Although EEC's 106.1-mile-long collocation of its proposed pipeline with Southern's existing pipeline system would incrementally reduce the area available for future development, use of established utility corridors minimizes cumulative land use impacts.

4.13.9 Socioeconomics

The Elba III Project and the projects listed on table 4.13-1 would generate temporary construction jobs. Many of these workers would reside locally. The influx of non-local laborers could represent an increase in the percent of the total population in the project area (assuming half the construction workers are non-local). The potentially vacant or rental units available in the project area would offer enough housing for non-local workers. Likewise, the counties have the necessary infrastructure to provide public services and utilities to support the projects. No identified minority or low-income populations would be disproportionately impacted by the projects.

There would be positive cumulative economic benefits from these projects. Taxes generated from operation of the Terminal Expansion Project, Garden City and Ocean terminals, the SAIT, and planned developments would result in an annual tax revenue increase. Permanent employment would also increase as a result of the operation of these projects, with the cumulative benefit of potentially lowering local unemployment rates.

4.13.10 Marine Transportation

Vessel traffic on the Savannah River has increased by about 15 percent over the last decade. The Georgia Port Authority indicated that rapid growth rates are expected for future operations. In 2002, the Georgia Port Authority served 2,180 vessels carrying 1.137 million TEUs. In 2005, total TEUs increased to 1.76 million. By 2015, the Georgia Port Authority estimates that the Port of Savannah would have the capacity to handle 4.37 million TEUs, an almost 11 percent annual increase in the number of containers over the 2002 level. When fully operational, the Terminal Expansion would result in about 95 additional shipments of LNG per year. Assuming full utilization of the Elba Island LNG Terminal it would receive a total of 142 to 299 shipments of LNG per year (number varies depending on the size of the LNG vessel). This would be a modest addition in terms of the overall increase in vessel traffic entering the Savannah River entrance channel. While an LNG vessel is docked at the Terminal, the channel would remain available for vessels and boats to pass the facility. Consequently, unloading operations at the Terminal should not impede or otherwise adversely affect vessel traffic in the river.

4.13.11 Land Transportation

The Terminal Expansion Project, Garden City and Ocean terminals, Elba Express Pipeline, Georgia DOT widening and reconstruction projects, and planned developments in the Elba III Project area would increase daily vehicle trips during peak construction periods. If all these projects were to be constructed at the same time, traffic would increase on the major thoroughfares near each of the project sites. However, given the spatial distribution of the projects and the limited amount of time pipeline construction would remain in any one area, significant cumulative impact is not expected. It is also unlikely that all of the projects would be under construction at the same time. Operation of these projects would result in an increase in daily vehicle trips entering and exiting the Terminal and development sites; however, potential cumulative impact is expected to be minor.

4.13.12 Cultural Resources

Past disturbances to cultural resources in the project area have resulted from agricultural and mining practices, intentional destruction or vandalism, and construction and maintenance operations associated with existing roads, railroads, utility lines, and electrical transmission line ROWs. The projects listed in table 4.13-1 that are defined as federally regulated projects would include mitigation measures designed to avoid or minimize additional direct impacts on cultural resources. Where direct impacts on significant cultural resources are unavoidable, mitigation (*e.g.*, recovery and curation of materials) would occur before construction. Non-federal actions would need to comply with any identification procedures and mitigation measures required by the State of Georgia. Additionally, EEC has developed project-specific plans to address unanticipated discoveries of cultural resources and human remains in the event they are discovered during construction. The proposed Elba Express Pipeline project would only incrementally add to the effects of other projects on cultural resources in the area.

4.13.13 Air Quality and Noise

Construction of the proposed Elba III Project and some of the reasonably foreseeable projects and activities listed in table 4.13-1 would involve the use of heavy equipment that produces noise, air contaminants, and dust. Operation of the proposed Elba III Project (including the Terminal and vessels delivering LNG to the Terminal) and some of the reasonably foreseeable projects would also contribute cumulatively to ongoing air emissions and noise.

Although the region is currently in attainment with air quality standards, increases in point industrial sources could have a deleterious effect on local and regional air quality. If all of the proposed projects are built, there could be an increase in emissions during construction and operation. Each of the individual projects would need to apply to the GADNR for an air quality permit, which may require controls to limit the emission of certain criteria pollutants or HAPs.

During operation of the LNG terminals listed in table 4-13-1, air emissions from LNG marine traffic and other project related vessels would occur along the entire waterway from the boundary of territorial waters to the vessel berths. Due to the transitory nature of these mobile sources and the large area covered, the associated emissions would not have a significant cumulative impact on air quality along the waterway.

As discussed in section 4.11.1, detailed modeling was performed to quantitatively evaluate the impacts from operation of the expanded Elba Terminal and significant regional sources by its self against the NAAQS. The analysis indicated that the expanded terminal and would not cause the NAAQS to be exceeded. Further, analysis of potential impacts to Class I areas within 300 km of the facility indicated that neither the allowable PSD increment nor the AQRV would be exceeded. Therefore, the project is not considered to be significant and no further Class I area analysis is required.

The Elba III Project and those listed in table 4.13-1 may affect ambient noise levels during construction. Noise produced during construction of the projects could create short-term annoyances to some residences, and could have short-term impacts on some marine mammals.

Noise impacts during the construction phase would be localized and would attenuate quickly as the distance from the noise source increases. However, because construction proceeds as a moving assembly line along the pipelines, the duration of construction activities, and therefore noise impacts, at any one location would be limited and short-term. Therefore, cumulative noise impacts associated with construction of all of the projects are not anticipated to be significant, even in the unlikely event that multiple projects occur at the same time and in the same location.

The closest NSAs to the Elba Express Compressor Station are located 1,400 feet west (NSA 1) and 3,500 feet east-southeast (NSA 2) of the compressor station. As discussed in section 4.11.2, the noise analysis indicated that increases in noise at NSA 1 would be on the order of 6 dBA; however, project noise levels would remain below our noise criterion. Increases in noise at NSA 2 would be less than 1 dBA and project noise levels at this location would be well below our criterion. Based on the noise analyses conducted, we conclude that no significant noise impacts would occur with operation of the compressor station.

4.13.14 Reliability and Safety

Impacts on reliability and public safety would be mitigated through the implementation of applicable federal, state, and local rules and regulations for each individual project. The specific rules and regulations that apply to each individual project would ensure that the applicable design standards are implemented to protect the public and to prevent accidents and failures. The Terminal Expansion Project would be sited, designed, constructed, operated, and maintained in compliance with the federal safety standards summarized in table 2.7-1.

Several of the present or reasonably foreseeable future projects, including the proposed Elba III Project, would involve cargo terminals that could be expected to vessel hazardous materials. Accidents involving such materials represent a potential impact on public safety. Continued growth in international commerce is likely to result in increased quantities of hazardous materials being shipped to and from the region.

It is difficult to evaluate the cumulative risk that such growth represents or has represented. The Terminal Expansion and associated increase in LNG vessel traffic would not significantly change the risk of an intentional attack in the Savannah Harbor navigation channel. It is reasonable to assume that the rate of vessel accidents (including those involving the release of hazardous materials) is likely to rise with more vessel traffic, which could cumulatively increase the risk of an accident having an impact on public safety. As discussed in section 4.9.6.1, the Savannah River Pilots manage vessel traffic to ensure safe transit in the Savannah Harbor navigation channel. The Coast Guard would also enforce a moving safety zone and moored vessel security zone around LNG vessels. These and other operational controls by the Coast Guard and Savannah River Pilots would minimize the risk of accidents involving LNG vessels. Furthermore, the implementation of federal, state, and local rules and regulations concerning security and the results of the WSA with its associated operations and Emergency Response Plan would minimize the risk to the LNG vessels and Terminal.

Emergency response time is a key aspect of public health and safety. No significant cumulative impacts on emergency services are expected during construction or operation of the proposed

project because sufficient emergency services and facilities exist in the area to accommodate the cumulative projects. Section 4.12.5 includes our recommendation that Southern LNG prepare a modified Emergency Response Plan and coordinate procedures with local emergency planning groups, fire departments, state and local law enforcement, the Coast Guard, and other appropriate federal agencies to be used in the event of an incident. Southern LNG would be required to prepare a comprehensive plan that identifies the cost sharing mechanisms for funding these emergency response costs. With the implementation of the coordination procedures in the Emergency Response Plan and the funding of additional emergency management equipment and personnel, no cumulative impacts would be expected on emergency response services during operation of the proposed Project.

The pipelines and aboveground facilities associated with the Elba Express Pipeline would be designed, constructed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in Title 49 CFR Part 192. We believe that no cumulative operational safety impacts are expected for the portions of the proposed Elba Express Pipeline or existing Southern pipeline system located in the same general utility corridor because of the spacing between pipelines, the depth of soil cover, and requirements to meet DOT Minimum Federal Safety Standards, which are intended to protect the public and to prevent natural gas facility accidents and failures.

4.13.15 Conclusion

A determination of significance for the cumulative impacts for a specific resource is problematic because well-defined threshold values are typically undetermined. However, the majority of impacts we have identified for the proposed Elba III Project would be temporary and minor. Consequently, their addition to other reasonably foreseeable impacts in the region does not result in an overall significant cumulative impact.