ALTERNATIVES ANALYSIS ADDENDUM TO THE JUNE 18, 2012 SOUTH JERSEY GAS – BL ENGLAND GAS ROUTE ANALYSIS REPORT

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Addendum to the June 18, 2012 Route Analysis Report

This addendum to the June 18, 2012 *South Jersey Gas – BL England Gas Route Analysis Report* (Report) has been prepared to provide more detailed assessments of the impacts associated with each alternative. Since the June 18, 2012 submission, and as the project design and details progressed, the project team has been able to better quantify impacts associated with each alternative. Furthermore, in an effort to provide additional avoidance and minimization measures to the impacts documented for the preferred route, minor changes to the preferred route have been incorporated. The following serves as an addendum to the Report, and provides an alternative analysis justifying the selection of the preferred route.

June 18, 2012 Report Summary

To determine the preferred alternative route for the gas pipeline, Woodard & Curran applied a utility-standard value rating system adapted from the Electric Power Research Institute (EPRI) to evaluate the alternative routes using specific environmental, community, cultural, constructability and maintenance criteria. Three possible Supply Routes (SR) were evaluated, **Route A**, which approaches the power station from the west and south; **Route B**, which approaches the power station from the west and north, and **Route C**, which approaches the power station from the west and south. **Route A** was further divided into three sub-routes, each with minor deviations. Refer to Figure 1 of the Report for a map of all alternatives.

The evaluation was derived from publicly-available information and preliminary field investigations including potential environmental impacts, community and neighborhood impacts, constructability issues, and operation and maintenance issues. Based on overall analysis of these factors, a 21.75 mile variation of Route A, referred to as "**Route A3,"** in the report, was determined to be the **Preferred Route** and is referenced as such in the following sections.

Alternatives Analysis

Based on engineering and constructability constraints and in accordance with required state and federal mandates of avoidance and minimization of natural and cultural resource impacts, each alternative was evaluated for its potential impacts to state and federally protected waters and wetlands, threatened and endangered species, cultural resources, engineering constraints, protected lands, and contaminated sites (including groundwater). This alternative analysis utilized existing state and federal databases from

the New Jersey Department of Environmental Protection, the Pinelands Commission, the New Jersey Division of Fish and Wildlife, and the United States Fish and Wildlife Service. Alternatives were evaluated using geographical information system (GIS) data, design requirements/limitations, engineering/construction considerations, and field data gathered by the project design and permitting team.

Each alternative was evaluated consistently using the following assumptions:

- All stream and wetland crossings would be crossed using jack and bore (J&B) or horizontal directional drill (HDD) methods, resulting in no impacts to subject resources where ever possible
- Required cleared ROW in areas that are not cleared would by 50 feet wide
- HDD crossings would require a cleared pipe staging area at one end of 30 feet wide and the length of the HDD
- HDD crossings would require a pad at the other end 30 feet wide by 200 feet long.
- Clearing would not be required along any ROW with enough area to install the pipeline

Below is a description of each alternative along with a discussion of potential impacts or affects to natural and cultural resources. Refer to Table 1 below for totals of evaluated route data by resource area.

Table 1: BL England Power Plant Gas Line Alternatives Analysis Data

	Preferred Route	**Route B**	**Route C**
Length (miles)	21.8	10.5	29
Segments	7	7	8
Road Width (feet)	40-50	16-30	25-50
Engineering Constraints	roads, utility ROW, HDDs	significant HDD, narrow roads	5.9 miles of re-forested area within Pinelands; HDDs
Wetland Impacts (acres)	0	5.2	1.7
Stream/Open Water Crossings	16	8	12
HDD Sections	6	3	11
Approximate Total HDD Length (feet)	19,400	8,030	18,400
T&E Species Potentially Affected	bald eagle, barred owl, black crowned night heron, black skimmer, cattle egret, red headed woodpecker, osprey	bald eagle, black crowned night heron, black skimmer, cattle egret, osprey	northern pine snake, swamp pink, barred owl, Cope's gray treefrog, frosted elfin

Table 1: BL England Power Plant Gas Line Alternatives Analysis Data

	Preferred Route	Route B	Route C
Potential Adverse Effect to T&E	no; minor ROW edge clearing only	yes; significant impacts to estuarine wetland habitat	yes; significant clearing (approx. 36 acres) of T&E habitat required
Natural Heritage Sites	0	0	3
Cultural Resources	10	1	14
Known Contaminated Sites	13	5	21

Preferred Route

The Preferred Route is approximately 21.8 miles in length starting just east of the intersection of NJ Route 49 and CR 671 (Union County Road) in Maurice River Township, Cumberland County, at the location of an existing gas line. The line would follow NJ Route 49 to the east about 12 miles to its intersection with Cedar Avenue. To avoid the downtown area of the Village of Tuckahoe, the proposed route was modified to follow Cedar Avenue south about 0.4 miles to the intersection of CR 557, where it would turn east for about 0.65 miles to the intersection of CR 664 (Mt Pleasant – Tuckahoe Road). From there, the route would travel south on CR 664 for about 0.42 miles to the intersection with Marshall Ave., then east for about 0.20 miles to NJ Route 50. The route would then follow NJ Route 50 south for about 1.71 miles to the intersection with CR 662 (Tuckahoe Road); then east about 4.1 miles to Oceanwoods Ave. To avoid impacts to US Route 9 (Shore Road), the route would divert from Tuckahoe Road at the intersection with Oceanwoods Avenue. From there, the route would travel north for about 0.3 miles to the Atlantic City Electric ("ACE") electric transmission ROW leading to the Facility. From there, the pipeline would follow the ACE transmission lines for about 1.7 miles then following the general path of the power lines through a horizontal directional drill into the B.L. England property. The remaining 0.8 miles of the pipeline would travel parallel to the rail line into the Facility.

Wetlands, Buffers, Streams, and Open Waters: This alternative would cross 16 streams and open waters including the Manumuskin River, Tuckahoe River, and Cedar Swamp Creek. All stream, open water, or wetland crossings would be accomplished by HDD or J&B construction techniques that would avoid impacts to these resources. Wetland buffer impacts would be minimal and consist of road ROW areas only. Due to road widths and available road ROW, HDD laydown and staging areas would not require wetland impacts for construction.

Threatened and Endangered Species: The Preferred Route has habitat mapped for 19 threatened and endangered species. Construction of this alternative would require minimal clearing of existing forested edges within the area where the pipeline would parallel the existing ACE transmission ROW. This clearing is not likely to significantly impact any protected species habitat or have adverse effects to any population of threatened or endangered species.

Cultural Resources: The Preferred Route has 10 known cultural resources identified in the States GIS data located within the proposed project corridor's vicinity. These consist of the Manumuskin River bridge, Cumberland Methodist Church and Head of the River Church on Route 49, the Marshallville Historic District, the South Tuckahoe Historic District (multiple areas), and Tuckahoe Railroad Station. Of these, no impacts or effects to any historic structures are anticipated from project construction since the pipeline would be constructed in the road ROW; however, historic properties fronting the roadways could be temporarily affected during construction. No permanent affects to any historic resource are anticipated from construction of this alternative.

Engineering Constraints: These include significant HDDs of Tuckahoe River and Cedar Swamp Creek. Numerous roadways and three crossings of overhead utility ROWs would be required. Adequate ROW is available for construction and HDD pipe staging without significant environmental impacts or road closures.

Protected Lands: The Manumuskin River Natural Heritage site is located on the south side of Route 49 at the beginning of the alternative. Construction would be in the existing road ROW and this site would not be affected by construction.

Contaminated Sites: No known areas of contaminated groundwater would be disturbed by construction of this alternative. Thirteen known contaminated sites are listed within the vicinity of the Route A corridor. These sites consist of current and former fueling stations, NJDOT maintenance facilities, and a water company. Due to proposed construction within the road and utility ROWs, it is unlikely Route A construction would impact any of these sites.

Alternative Route B

Route B would be approximately 10.5 miles in length. The route starts in Hamilton Township at CR 559/Ocean Heights Ave & Egg Harbor Road and travels in a southeastern direction on CR 559 until CR 575/English Creek Ave. At that point, the proposed route leaves CR 575 and follows School House Road to Somers Point/Mays Landing Road. The route then follows Mays Landing Road to Morris Avenue. The route stays on Morris Avenue into Jefferson Landings and finally a HDD of approximately 7,000 linear feet across Great Egg Harbor would be required to reach the BL England Plant**.**

Wetlands, Buffers, Streams, and Open Waters: This alternative would cross eight known streams and open waters including the Great Egg Harbor Bay. The HDD of Great Egg Harbor Bay would be approximately 7,000 linear feet. The Bay would be crossed with HDD; however, approximately 5.2 acres of estuarine wetlands would be impacted by required pipe staging along Morris Avenue due to the narrow width of existing paving and fill. Additionally, significant area of wetland buffer would be impacted along Route B for construction and HDD staging. Due to the narrow road width of 16 feet, pipe and equipment would need to be placed outside of

the road ROW, which would impact coastal wetlands. All other streams, wetlands, or open waters would be J&B or HDD with no impacts.

In addition, the long HDD across Great Egg Harbor Bay presents potential increased risk of "fluid frac-out" in the estuary during the drilling process. Fluid frac-out—the inadvertent return of drilling mud to the surface—is a potential concern whenever the HDD technique is used under sensitive habitats and waterways. The HDD procedure uses bentonite slurry as a drilling mud. A fluid frac-out occurring in the Great Egg Harbor estuary would have the potential to affect benthic invertebrates, fish, and other aquatic organisms.

Threatened and Endangered Species: Eleven species of threatened or endangered species have habitat mapped along Route B. Of these, bald eagle (*Haliaeetus leucocephalus*), black crowned night heron (*Nycticorax nycticorax*), black skimmer (*Rynchops niger*), cattle egret (*Bublucus ibis*), and osprey (*Pandion haliaetus*) are known to utilize estuarine wetlands and open waters within the Great Egg Harbor Bay and surrounding areas and have habitat mapped within the Route B corridor. Due to the wetland impacts required for the HDD of the Bay, the above species may be adversely affected by construction of this alternative. Effects to bald eagle, black, skimmer, and osprey would likely consist of foraging disturbance only; however, black crowned night heron and cattle egret may be affected by habitat loss associated with the coastal wetland impacts.

Cultural Resources: Alternative Route B has one known cultural resource identified in the States GIS data bases along its corridor. The Andrew B Scull House is located on Mays Landing Road. No impacts or effects to this historic structure are anticipated from project construction since the pipeline would be constructed in the road ROW; however, the house fronts the roadway and could be temporarily affected during construction. No permanent impacts or affects to any historic resource are anticipated from construction of this alternative.

Engineering Constraints: There are numerous homes on School House Road that are less than 15 feet from the road, and the paving on the road leading from Jefferson Landings is only 16 feet wide which is the only access road to the homes located on the end of Jobs Point Rd. – Morris Ave. This route would require 2 major HDD's. The 7,000 foot crossing of Great Egg Harbor Bay requires two vertical and one horizontal curve in its design. It would also require road closure and the relocation of the residents during most of the construction period.

Protected Lands: There are no known protected lands or natural heritage sites along this alternative.

Contaminated Sites: One area of known groundwater contamination is located at Zion and Schoolhouse Road along this alternative. This area would be crossed or paralleled by the pipeline and could result in disturbance of contaminated groundwater and/or soils. Three other

known contaminated sites are located along Route B. These sites consist of the BL England power station and two road side properties.

Alternative Route C

Route C is approximately 29 miles long. This alternative route starts at the same location as Route A, but deviates off of NJ Route 49 to Port Elizabeth Road to a Conrail railroad ROW. From there, following the railroad ROW, it travels through the Town of Woodbine and then traverses either up CR 610 or would continue to US Route 9 and up US Route 9 to the power plant.

Wetlands, Buffers, Streams, and Open Waters: This alternative would cross 12 known streams and many large wetland systems including coastal wetlands associated with Dennis Creek and require 11 HDDs. Due to succession and re-forestation along the Conrail ROW, this alternative would require approximately 5.9 miles of clearing the re-vegetated rail line ROW within the Pinelands. This clearing would result in approximately 1.7 acres of direct wetland impact associated with clearing enough width to construct the pipeline. In addition, significant area of wetland buffer would be impacted by clearing and construction of this alternative.

Threatened and Endangered Species: Nineteen threatened or endangered species have habitat mapped along Route C. Of these, barred owl (*Strix varia*), black crowned night heron, Cope's gray treefrog (*Hyla chrysoscelis*), frosted elfin (*Callophrys irus*), northern pine snake (*Pituophis melanoleucus*), and swamp pink (*Helonias bullata*) have mapped habitat within the approximately 5.9 mile length of rail ROW within the Pinelands that would require clearing for project construction. This area is listed as occupied habitat for northern pine snake. Clearing of this area for construction of Route C could result in significant adverse impact to the above species from habitat loss, edge creation, habitat fragmentation, disturbance, and in case of the known population of northern pine snake, potential take.

Cultural Resources: Alternative Route C has 14 known cultural resources identified in the State's GIS data bases located within the proposed project corridor's vicinity. These consist of two bridges at the beginning of the route; the Manumuskin River bridge and a bridge over a tributary to the Manumuskin River. The remaining cultural resource areas located along US 9 and include the Reeves-Iszard-Godfrey House, Seaville Methodist Church, John Corson House, Captain S. Corson House, Enos Corson House, Palermo Baptist Church, Trinity United Methodist Church, Beesley's Point School, Isaiah Stites house, Thomas Stites House, Townsend Stites House, Ashmead Mansion, and John Stites House. Cumberland Methodist Church and Head of the River Church on Route 49, the Marshallville Historic District, the South Tuckahoe Historic District (multiple areas), and Tuckahoe Railroad Station. Of these, no impacts or effects to any historic structures are anticipated from project construction since the pipeline would be constructed in the road ROW; however, historic properties fronting the roadways could be temporarily affected during construction. No permanent affects to any historic resource are anticipated from construction of this alternative.

Engineering Constraints: The approximately 5.9 miles of clearing required and improvements along the railroad ROW present significant constraints to engineering and construction. In addition, the 11 required HDDs would require extensive design considerations. Heavily populated areas and cultural resources along US 9 would limit work space resulting in potential exacerbation of traffic flow and control issues.

Protected Lands: There are three Natural Heritage sites located along Route C. These consist of Manumuskin River, Woodbine Pond, and the Seaville Methodist Church sites. Manumuskin River would be paralleled by Route C with potential impacts along the northern and eastern boundaries only. Woodbine Pond is crossed by Route C along the railroad ROW. Impacts to the Woodbine Pond site and associated natural communities would result from ROW widening in this area. The Seaville Methodist Church site is crossed by Route C along US 9. Due to available road ROW, impacts to the Seaville site are not anticipated.

Contaminated Sites: Three areas of known groundwater contamination are located along this alternative route. These consist of the Beesley's Point site, the Palermo Community site, and the Marmora site. All of these areas would be crossed by the pipeline and could result in disturbance of contaminated groundwater and/or soils. Eighteen other known contaminated sites are located along Route C. These sites consist of fueling stations, auto repair facilities, the Woodbine municipal airport, a landfill, a mobile home park, other small businesses, and the New Jersey American Water Company.

Conclusion

All routes would cross or are adjacent to regulated wetlands, streams, and open waters. No stream impacts would be anticipated from any alternative. Wetland impacts would be minimized to the maximum extent practicable for all alternatives; however, the Preferred Route is the only alternative that would not directly impact wetlands. Route B would impact approximately 5.2 acres of wetlands and extensive clearing required on Route C would impact approximately 1.7 acres of wetlands. In addition, Route C would encroach on the most wetland buffer area, primarily due to required clearing of the rail ROW.

Threatened and endangered species habitat is located along all alternatives. The Preferred Route would be unlikely to adversely affect listed species since only minor ROW clearing would be required. Route B would have an adverse impact on threatened and endangered species habitat and could adversely impact listed species due to required wetland impacts. Route C would have a significant adverse impact on listed species habitat due to required clearing and could result in loss of listed species habitat and potential taking of protected species.

Each route passes through areas of known cultural and natural resources. The majority of historic resources consist of buildings and bridges. There are no anticipated impacts to historic bridges by construction of any alternative. Because construction would occur within existing ROWs, it is unlikely

that historic properties would be affected unless clearing of vegetation associated with the subject property is required.

Route B presents significant engineering constraints due to the depth and length of the required HDD under Great Egg Harbor Bay and the limited work space on narrow roadways adjacent to environmentally sensitive areas. The Preferred Route and Route C present constraints due to surrounding landuse in populated areas and multiple HDDs. Route C would require extensive clearing and ROW improvement in addition to the above.

The Preferred Route and Route B would not impact Natural Heritage sites. Route C would require clearing and impact wetlands within a Natural Heritage site. The Preferred Route would not cross any areas of known groundwater contamination. Route B would cross one area of known groundwater contamination. Route C would cross three areas of known groundwater contamination. Routes B and C could disturb groundwater contamination during construction. Although impacts to other listed contaminated sites that are not within road or rail ROW are not anticipated, Route C has the highest number of known contaminated sites along its corridor.

In summary, Routes B and C would have greater potential environmental impact with regard to wetlands, protected species, protected lands, and contaminated sites. Route C would significantly impact wetlands, buffers, protected species, and would not comply with Pinelands or CAFRA requirements that the gas pipeline be located within an existing transportation corridor since the railroad ROW has re-vegetated and could result in disturbance to multiple contaminated sites. Coupled with engineering and construction constraints, impacts and effects to natural resources would be much higher from construction of Routes B or C than from the Preferred Route. As a result of these findings, the Preferred Route is the least impactful alternative for implementation of the project.