Southern Reliability Link Project
Alternatives Analysis

Burlington, Monmouth, and Ocean Counties, New Jersey

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Acronym	Definition
A.D.	Anno Domini
B.P.	Before Present
BMP	Best Management Practice
BOMARC	Boeing Michigan Aeronautical Research Center
CMP	NJ Pinelands Commission Comprehensive Management Plan
CR	County Route
DLUR	Division of Land Use Regulation
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FW	Freshwater
GIS	Geographic Information Systems
MHW	mean high water
msl	mean sea level
NEPA	National Environmental Policy Act
NJBPU	New Jersey Board of Public Utilities
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NJFHA	New Jersey Flood Hazard Areas
NJNG	New Jersey Natural Gas
NJNHP	New Jersey Natural Heritage Program
NPL	National Priority List
NT	Non-trout
NWI	National Wetland Inventory
NWPS	National Wilderness Preservation System
NWR	National Wildlife Refuge
ONRW	Outstanding National Resource Waters
PL	Pinelands Waters
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SC	saline coastal
SE	saline estuarine
SFHA	Special Flood Hazard Areas
SHPO	State Historic Preservation Office
SRL	Southern Reliability Link Project
SWRPA	Special Water Resource Protection Area

Acronym	Definition
T&E	Threatened and Endangered
TM	Trout maintenance
TP	Trout production
TSD	Treatment, Storage, and Disposal
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Watershed Management Area

EXECUTIVE SUMMARY

This report presents the findings of a comprehensive alternatives analysis that was performed by New Jersey Natural Gas (NJNG) to identify a route to construct a new 30-inch natural gas transmission pipeline between specific supply and connection points in Burlington County and Ocean County, New Jersey, referred to herein as the Southern Reliability Link (SRL) Project. The overall objective of the analysis was to identify a route for a new natural gas transmission line route that would minimize impacts both to communities and the environment while providing for constructability, operation, and maintenance of the pipeline.

Need for the Project

In recent years, winter season curtailments, and concerns over system reliability resulting from having a single major interstate supplier with a connection at the northern end of NJNG's service area, have led NJNG to reevaluate their system. These evaluations resulted in the identification of unique system vulnerabilities that will be addressed by the SRL Project. Located in the southern portion of NJNG's service territory, and supplied from a second interstate supplier (Transcontinental Gas Pipe Line Company, LLC (Transco)), the SRL Project will provide redundancy of supply and increase system resilience.

Environmental Setting

The proposed pipeline will cross an area consisting of a variety of land uses and natural resources. Land uses include public roadways, residential properties, forested areas, or agricultural lands. Natural resources include preserved/conserved lands, floodplains, streams, wetlands, and potential threatened and endangered species habitat.

A portion of the proposed pipeline will cross through the New Jersey (NJ) Pinelands Area, where the NJ Pinelands Commission regulates development through the implementation of the NJ Pinelands Comprehensive Management Plan (CMP) (N.J.A.C. 7:50). Due to the special regulatory considerations applied within the Pinelands Area, the Project Study Area was evaluated in two sections:

- Section 1 originates in Chesterfield Township at the proposed Transco compressor station connecting to their interstate pipeline system, and extends east to the Pinelands Area boundary (**Figure 2-1**).

- Section 2 begins at the Pinelands Area boundary and extends east to the project terminus at potential connection points with NJNG's existing natural gas infrastructure in Manchester Township (**Figure 2-1**).

Alternatives Analysis Method

The methodology used in the alternatives analysis was designed to identify potential pipeline routes that minimize impacts on natural resources, cultural resources, and

residential property to the greatest extent. Both quantitative and qualitative evaluation techniques were used in the analysis. The quantitative evaluation was used to initially score and rank the alternative routes according to certain selected criteria. Subsequently, a qualitative evaluation that incorporated professional judgment, external agency comments, and local governmental input was conducted to reach a decision regarding the selected route.

The alternatives analysis consisted of four fundamental phases:

1. Define the *Project Study Area*: The study area for the alternatives analysis was determined based on the physical location of the project start and end points, the geographic characteristics of the region and professional judgment.

2. Generate *Alternative Routes*: Alternative Routes most suitable for pipeline alignments within the Project Study Area were generated taking into account three primary perspectives:

    a. protection of the built environment (i.e., churches, schools, and residences)

    b. protection of the natural environment (i.e., wetlands, streams, and forests), and,

    c. engineering considerations (i.e., length in roadway, bridge crossings, and major utility crossings).

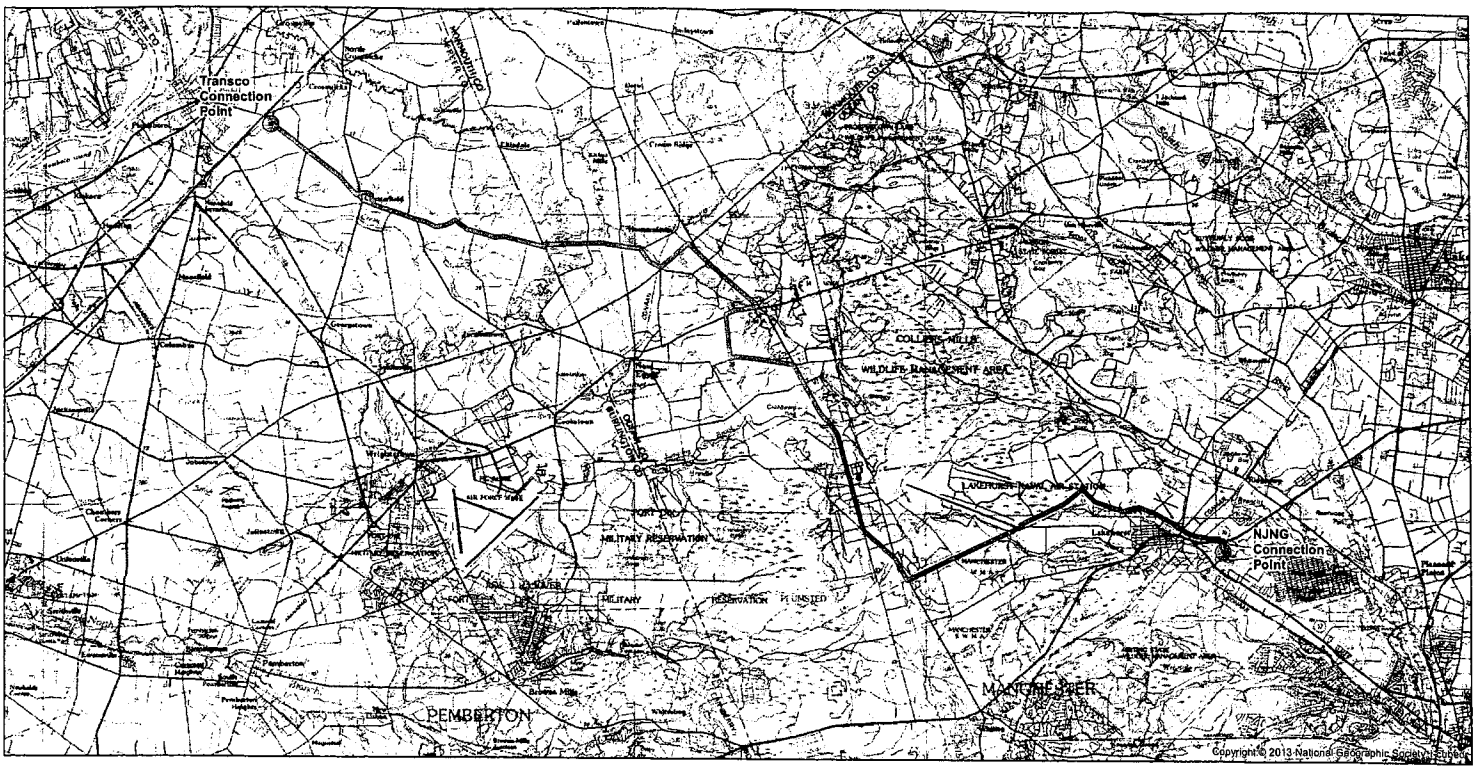
3. Evaluate the *Alternative Routes*: Use select criteria to quantitatively and qualitatively assess the Alternative Routes;

4. Determine the *Selected Route*: Use the information from the quantitative and qualitative assessment to determine the Selected Route.

Alternative Analyses Conclusions

Based on the quantitative and qualitative analyses of the SRL Project Study Area, the Section 1 Route B Alternative combined with the Section 2 Route D Alternative has been identified as the Selected Route for the Project.

The alignment of the Selected Route is presented in **Figure E-1.**



Legend

- Infrastructure Connection Point
- Section 1 Selected Route (Route B)
- Section 2 Selected Route (Route D)

Notes

1. Alternative Routes are not surveyed lines and were drawn at a small scale.

References

NJ Counties (NJOIT)
USGS Topographic Basemap (ESRI)

0 1 2 4
Miles

1 inch = 2 miles

NAD 1983 State Plane
New Jersey FIPS 2900
Projection: Tranverse Mercator
Linear Unit: US Foot

KEY MAP NOT TO SCALE

New Jersey Natural Gas | AECOM

Figure E-1
Selected Route
Alternatives Analysis
Southern Reliability Link Project

Burlington, Monmouth, & Ocean Counties, New Jersey

New Jersey Natural Gas, Wall Township, New Jersey

Prepared By: DJP	Checked By: DY
Job: 28000983	Date: 3/7/2013

S:\Projects\NJNG\SRLPROJECT\Maps\Alternatives Assessment\Final\NJNG SRLP - Alternatives Assessment - Figure E-1 Selected Route.mxd

1.0 INTRODUCTION AND PROJECT NEED

New Jersey Natural Gas Company (NJNG) is a public utility that supplies natural gas to approximately 500,000 customers in New Jersey's Monmouth, Ocean, Morris, Middlesex and Burlington Counties. In recent years, winter season curtailments, and concerns over system reliability resulting from having a single major interstate supplier, the Texas Eastern Transmission System (TETCO), have led NJNG to reevaluate their system. These evaluations have identified system vulnerabilities that the proposed pipeline will address. NJNG is proposing to construct the Southern Reliability Link (SRL) Project to provide a second, redundant, natural gas feed into the southern portion of the NJNG distribution system. The second feed will be from a second major interstate supplier (Transcontinental Gas Pipe Line Company, LLC (Transco)). This new feed will require the construction of a new 30-inch natural gas transmission pipeline between specific supply and connection points in Burlington and Ocean Counties.

PURPOSE AND NEED

NJNG considered and evaluated various system, design and construction alternatives during the project development process. This evaluation followed a tiered approach. In the first tier, NJNG examined five potential alternatives and their ability to fulfill the basic objectives of the Project. Alternatives included:

1. No Action
2. Postponed Action
3. System Alternatives
4. Operational Alternatives
5. A New Service Feed

As proposed, the SRL Project will provide an additional, redundant supply of natural gas to the NJNG system. Located in the southern end of the system, the second supply, from an alternate supplier of natural gas (Transco) will increase system resilience. Approximately 85% of NJNG's winter season peak day capacity is supplied from a single connection with TETCO. The TETCO connection is northwest of the NJNG system. Therefore, NJNG's customers, particularly those in Ocean, Burlington, and Monmouth counties are the most vulnerable and are likely to be adversely affected by a supply interruption or system failure. NJNG asserts that the proposed connection to the Transco system is the preferred option for meeting the project objectives of:

- Providing an alternate source of natural gas, with a tie-in in the southern portion of the NJNG distribution system; and
- Providing an alternate source of natural gas from a second provider.

In accordance with the New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Board of Public Utilities (BPU) implementing policies, NJNG considered and evaluated various system, design, and construction alternatives during development of the Project. The evaluation of project alternatives followed a tiered

approach. First, potential alternatives, including the No-Action, Postponed Action, System Alternatives, Operational Alternatives, and a New Service Feed were evaluated to identify whether those alternatives were capable of fulfilling the project objectives. Alternatives incapable of fulfilling the basic objectives of the proposed project were considered non-viable and eliminated from further consideration. Viable alternatives (i.e., those which could fulfill the project's objectives) were carried forward for a more detailed, second tier review. For this second tier review, NJNG identified several potential Design and Construction Alternatives (alternative routes) that could accomplish the project's objectives.

The following sections provide detailed descriptions of these alternatives and the results of NJNG's Tier 1 Analysis.

1. NO ACTION ALTERNATIVE

Under the No-Action Alternative, NJNG would not construct the Project. This alternative eliminates the potential impacts resulting from construction activities; however, it does not meet the project objectives as defined above. Specifically, NJNG would not provide a second, redundant, supply of natural gas and system resilience would not be improved.

If the proposed facilities are not constructed, the objectives of the project would not be realized. As such, NJNG has determined that the No Action Alternative is not a viable option.

2. POSTPONED ACTION ALTERNATIVE

The Postponed Action Alternative involves delaying implementation of the proposed project for some period of time. If approved and ultimately constructed, impacts associated with the Postponed Action Alternative would be similar to those associated with the proposed project.

The Postponed Action Alternative is usually selected when insufficient information is available to thoroughly assess a proposed project; however, sufficient information is available to assess the proposed SRL Project. Furthermore, the Postponed Action Alternative fails to accomplish the project objectives. Specifically, as with the No Action Alternative, the Postponed Action Alternative fails to provide a redundant supply of natural gas to the NJNG system. NJNG has therefore determined that the Postponed Action Alternative is not a viable option.

3. SYSTEM ALTERNATIVES

System Alternatives are alternatives to the proposed action that would make use of other existing, modified, or proposed pipeline systems to meet the stated objectives of the proposed project. A viable system alternative would make it unnecessary to construct all or part of the proposed SRL Project, although some modifications or additions to another existing pipeline system may be required to increase its capacity, or another entirely new system may need to be constructed. Such modifications or additions would result in environmental impacts that could be less than, similar to, or potentially greater than those associated with the proposed SRL Project. In order to be a viable system alternative to the proposed SRL Project, potential system alternatives must also meet the project

objectives defined above.

All of the existing interstate connections for NJNG's service area are located at the northern end of the service area. Therefore, system alternatives cannot accomplish the project objective of creating a tie-in to the southern portion of the NJNG system. NJNG has therefore determined that System Alternatives are not a viable option.

4. OPERATIONAL ALTERNATIVES

Operational alternatives consist of modifications to system operation, such as increasing the system operating pressure, which could meet project objective. As with System Alternatives, project objectives cannot be met if a new connection to a second source of natural gas in the southern portion of the NJNG system is not made. NJNG has therefore determined that Operational Alternatives are not a viable option.

5. A NEW SERVICE FEED

Installation of a new service feed involves the construction of approximately 28 miles of 30-inch diameter pipeline between specific supply and connection points in Burlington County and Ocean County. The New Service Feed provides an alternate source of natural gas, with a tie-in in the southern portion of the NJNG distribution system, and provides an alternate source of natural gas from a second provider. NJNG has determined that installation of a new service feed is the only viable alternative to fulfill the basic purpose and need of the SRL Project.

ALTERNATIVES ANALYSIS

An alternatives analysis was conducted to select a pipeline route for the proposed SRL Project. The pipeline will be located underground, however a pig[1] launcher will be located at Transco's facility in Chesterfield Township and valve settings will be located along the pipeline route to provide sectionalized shut-down points.

The objective of the alternatives analysis is to identify a pipeline route that avoids and/or minimizes adverse impacts to the natural, cultural, and social environments to the maximum extent practical, while still maintaining the economic viability and technical feasibility of the Project.

Prior to initiating the alternatives analysis, background research was conducted regarding the overall environmental setting within the Project Study Area. The results of this research are provided in **Chapter 2.0** (Environmental Setting). The alternatives analysis process, described in detail in **Chapter 3.0** and implemented in **Chapter 4.0** of this report, initially determined the extent of the Project Study Area and then reviewed the environmental setting within this area to identify opportunity and constraint features. A visual and technical review process using detailed information from within the Project Study Area was then used to identify alternative routes. Quantitative analyses were then

[1] A pig generally is a device inserted into a pipeline to clean, inspect, or maintain pipelines.

conducted on each of the alternative routes based on three broad categories – the built environment, the natural environment, and engineering considerations. In conjunction with the quantitative analyses, a qualitative assessment process was conducted to evaluate aspects of the alternative routes that are less susceptible to quantitative evaluation, such as special permitting requirements and community concerns. Based on the results of the quantitative and qualitative analyses, a Selected Route was identified for the Project. This report describes the detailed alternatives analysis process and route selection.

2.0 ENVIRONMENTAL SETTING

This chapter provides background information regarding the general environmental setting within the Project Study Area. The environmental setting is divided into two main sections:

- Natural environment components, such as streams, wetlands, and preserved lands, and
- Human/built environment components, such as residential development, linear utility corridors, and historic sites.

The features identified during the environmental setting review generally define the potential opportunities and constraints within the Project Study Area.

The Project Study Area was developed based on the two proposed endpoints, which include the proposed Transco compressor station in Chesterfield Township, Burlington County and NJNG's existing transmission system connection point in Manchester Township, Ocean County. The Project Study Area extends from Burlington County southeast through Monmouth County and then to Ocean County (**Figure 2-1**).

A portion of the Project Study Area crosses through the New Jersey (NJ) Pinelands Area, where the NJ Pinelands Commission regulates development through the implementation of the NJ Pinelands Comprehensive Management Plan (CMP) (N.J.A.C. 7:50). Due to the special regulatory considerations applied within the Pinelands Area, the Project Study Area was evaluated in two sections:

- **Section 1** originates in Chesterfield Township at the proposed Transco compressor station and extends east to the Pinelands Area boundary (**Figure 2-1**).
- **Section 2** begins at the Pinelands Area boundary and extends east to the project terminus at potential connection points with NJNG's existing natural gas infrastructure in Manchester Township (**Figure 2-1**).

The information contained in this report was obtained from a variety of Federal, State, and local GIS databases, published reports and maps, and field reconnaissance surveys of the Project Study Area.

2.1 Natural Environment

Features of the natural environment are an important consideration in the alternatives analysis process. This section provides a general description of the environmental setting of the Project Study Area including the physiography and geology, surface waters, vegetation, special use areas, and wildlife.

2.1.1 Physiographic Region and Topography

The State of New Jersey is divided into several physical geographic regions known as physiographic provinces, which are defined by unique geology, soil types, topographic expression, and landforms. The Project Study Area is contained entirely within the Coastal Plain Physiographic Province (N.J. Geological Survey 2003) (**Figure 2-2**). The general landscape of the Coastal Plain is generally flat to very gently undulating. However, erosion-resistant gravel or iron-cemented sediment underlies upland areas and

isolated hills.

2.1.2 Geology and Soils

Bedrock geology of the Project Study Area is shown in **Figure 2-3**. Principle rock formations that occur within the Project Study are presented in **Table 2-1.** The Coastal Plain is comprised of sequences of quartz sand, mixed with clay and glauconitic sands (N.J. Geological Survey 2006).

Table 2-1: Geologic Formations within the Project Study Area

Geologic Feature Name	Lithology
Cohansey Formation	quartz sand, medium- to coarse grained
Englishtown Formation	quartz sand, fine- to coarse-grained, locally interbedded with thin- to thick beds of clay
Hornerstown Formation	glauconite sand, fine- to medium-grained
Lower Member	quartz sand and clay
Manasquan Formation	quartz-glauconite sand, clayey; and fine grained quartz sand or silt
Marshalltown Formation	quartz and glauconite sand, silty, and clayey
Mt. Laurel Formation	quartz sand, fine- to coarse-grained, slightly glauconitic
Navesink Formation	glauconite sand, clayey
Shrewsbury Member	quartz sand, fine- to coarse-grained
Vincentown Formation	quartz sand, medium-grained, clayey; and glauconitic near base; locally a calcarenite or coquina
Wenonah Formation	quartz sand, fine-grained, silty, clayey micaceous
Woodbury Formation	clay-silt

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service's (NRCS) Soil Series Geographic Database for Burlington, Monmouth and Ocean Counties, soils within the Project Study Area range from very poorly drained to excessively drained (USDA, NRCS 2008). **Table 2-2** lists the soil series mapped within the Study Area. The USDA/NRCS rating of the hydric capacity of these soils is illustrated in **Figure 2-4a.** Additionally, soils with a high acidic rating, which can have some bearing on pipeline corrosion, are illustrated in **Figure 2-4b**.

Table 2-2: Soil Series within the Project Study Area

Series ID	Series Name	Drainage Class
AdmA	Adelphia fine sandy loam, 0 to 2 percent slopes	Moderately well drained
AdmB	Adelphia fine sandy loam, 2 to 5 percent slopes	Moderately well drained
AdmkA	Adelphia fine sandy loam, clayey substratum, 0 to 2 percent slopes	Moderately well drained

Series ID	Series Name	Drainage Class
AdmmA	Adelphia high glauconite variant fine sandy loam, 0 to 2 percent slopes	Moderately well drained
AdmmB	Adelphia high glauconite variant fine sandy loam, 2 to 5 percent slopes	Moderately well drained
AdnA	Adelphia loam, 0 to 2 percent slopes	Moderately well drained
AdnB	Adelphia loam, 2 to 5 percent slopes	Moderately well drained
AtsA	Atsion sand, 0 to 2 percent slopes	Poorly drained
BerAr	Berryland sand, 0 to 2 percent slopes, rarely flooded	Very poorly drained
BerAt	Berryland sand, 0 to 2 percent slopes, frequently flooded	Very poorly drained
BugA	Buddtown loamy fine sand, 0 to 2 percent slopes	Moderately well drained
BugB	Buddtown loamy fine sand, 2 to 5 percent slopes	Moderately well drained
BuhA	Buddtown fine sandy loam, 0 to 2 percent slopes	Moderately well drained
BuhB	Buddtown fine sandy loam, 2 to 5 percent slopes	Moderately well drained
CoeAs	Colemantown loam, 0 to 2 percent slopes, occasionally flooded	Poorly drained
CokB	Collington sandy loam, 2 to 5 percent slopes	Well drained
CokC2	Collington sandy loam, 5 to 10 percent slopes, eroded	Well drained
CokC2	Collington sandy loam, 5 to 10 percent slopes	Well drained
CokD3	Collington sandy loam, 10 to 15 percent slopes, severely eroded	Well drained
ComA	Collington fine sandy loam, 0 to 2 percent slopes	Well drained
ComB	Collington fine sandy loam, 2 to 5 percent slopes	Well drained
ComC	Collington fine sandy loam, 5 to 10 percent slopes	Well drained
ConA	Collington loam, 0 to 2 percent slopes	Well drained
ConB	Collington loam, 2 to 5 percent slopes	Well drained
DoaA	Donlonton fine sandy loam, 0 to 2 percent slopes	Somewhat poorly drained
DobA	Donlonton loam, 0 to 2 percent slopes	Somewhat poorly drained
DocB	Downer loamy sand, 0 to 5 percent slopes	Well drained
DoeA	Downer sandy loam, 0 to 2 percent slopes	Well drained
DoeB	Downer sandy loam, 2 to 5 percent slopes	Well drained
EveB	Evesboro sand, 0 to 5 percent slopes	Excessively drained
EveC	Evesboro sand, 5 to 10 percent slopes	Excessively drained
EveD	Evesboro sand, 10 to 15 percent slopes	Excessively drained
FanA	Fallsington fine sandy loam, 0 to 2 percent slopes	Poorly drained
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	Somewhat poorly drained
FrfB	Freehold loamy sand, 0 to 5 percent slopes	Well drained
FrfC	Freehold loamy sand, 5 to 10 percent slopes	Well drained
FrkB	Freehold sandy loam, 2 to 5 percent slopes	Well drained

Series ID	Series Name	Drainage Class
FrkC3	Freehold sandy loam, 5 to 10 percent slopes, severely eroded	Well drained
FrkD2	Freehold sandy loam, 10 to 15 percent slopes, eroded	Well drained
FrkD3	Freehold sandy loam, 10 to 15 percent slopes, severely eroded	Well drained
FrmA	Freehold fine sandy loam, 0 to 2 percent slopes	Well drained
FrmB	Freehold fine sandy loam, 2 to 5 percent slopes	Well drained
FrmC	Freehold fine sandy loam, 5 to 10 percent slopes	Well drained
FrmD	Freehold fine sandy loam, 10 to 15 percent slopes	Well drained
FrmE	Freehold fine sandy loam, 15 to 25 percent slopes	Well drained
GahB	Galloway sand, 0 to 5 percent slopes	Moderately well drained
GamB	Galloway loamy sand, 0 to 5 percent slopes	Somewhat poorly drained
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	Moderately well drained
HboA	Hammonton sandy loam, 0 to 2 percent slopes	Moderately well drained
HocB	Holmdel sandy loam, 2 to 5 percent slopes	Moderately well drained
HodA	Holmdel fine sandy loam, 0 to 2 percent slopes	Moderately well drained
HodB	Holmdel fine sandy loam, 2 to 5 percent slopes	Moderately well drained
HodkA	Holmdel fine sandy loam, clayey substratum, 0 to 2 percent slopes	Moderately well drained
HodkB	Holmdel fine sandy loam, clayey substratum, 2 to 5 percent slopes	Moderately well drained
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	Poorly drained
JdrA	Jade Run fine sandy loam, 0 to 2 percent slopes	Poorly drained
KeaA	Keansburg fine sandy loam, 0 to 2 percent slopes	Very poorly drained
KeoA	Keyport loam, 0 to 2 percent slopes	Moderately well drained
KeoB	Keyport loam, 2 to 5 percent slopes	Moderately well drained
KeoC	Keyport loam, 5 to 10 percent slopes	Moderately well drained
KeoD	Keyport loam, 10 to 15 percent slopes	Moderately well drained
KeoE	Keyport loam, 15 to 25 percent slopes	Moderately well drained
KreA	Kresson fine sandy loam, 0 to 2 percent slopes	Somewhat poorly drained
KrhA	Kresson loam, 0 to 2 percent slopes	Somewhat poorly drained
KrhB	Kresson loam, 2 to 5 percent slopes	Somewhat poorly drained
LakB	Lakehurst sand, 0 to 5 percent slopes	Moderately well drained
LakhB	Lakehurst sand, loamy substratum, 0 to 5 percent slopes	Moderately well drained
LakkB	Lakehurst sand, clayey substratum, 0 to 5 percent slopes	Moderately well drained
LasB	Lakewood sand, 0 to 5 percent slopes	Excessively drained
LasC	Lakewood sand, 5 to 10 percent slopes	Excessively drained
MakAt	Manahawkin muck, 0 to 2 percent slopes, frequently flooded	Very poorly drained

Series ID	Series Name	Drainage Class
MaoC	Marlton sandy loam, 5 to 10 percent slopes	Moderately well drained
MapB	Marlton fine sandy loam, 2 to 5 percent slopes	Well drained
MapC	Marlton fine sandy loam, 5 to 10 percent slopes	Well drained
MarB	Marlton loam, 2 to 5 percent slopes	Well drained
MumA	Mullica sandy loam, 0 to 2 percent slopes	Very poorly drained
MunA	Mullica fine sandy loam, 0 to 2 percent slopes	Very poorly drained
MunhA	Mullica fine sandy loam, loamy substratum, 0 to 2 percent slopes	Very poorly drained
PefB	Pemberton sand, 0 to 5 percent slopes	Moderately well drained
PeftB	Pemberton sand, thick surface , 0 to 5 percent slopes	Moderately well drained
PegB	Pemberton loamy sand, 0 to 5 percent slopes	Moderately well drained
PhbB	Phalanx loamy sand, 2 to 5 percent slopes	Well drained
PssA	Psamments, 0 to 3 percent slopes	Well drained
SaeB	Sassafras fine sandy loam, 2 to 5 percent slopes	Well drained
SaeC	Sassafras fine sandy loam, 5 to 10 percent slopes	Well drained
SaekB	Sassafras fine sandy loam, clayey substratum, 2 to 5 percent slopes	Moderately well drained
ShrA	Shrewsbury sandy loam, 0 to 2 percent slopes	Poorly drained
ShsA	Shrewsbury fine sandy loam, 0 to 2 percent slopes	Poorly drained
ShskA	Shrewsbury fine sandy loam, clayey substratum, 0 to 2 percent slopes	Poorly drained
ThfB	Tinton sand, 0 to 5 percent slopes	Well drained
ThfC	Tinton sand, 5 to 10 percent slopes	Well drained
ThftB	Tinton sand, thick surface, 0 to 5 percent slopes	Well drained
ThgB	Tinton loamy sand, 0 to 5 percent slopes	Well drained
ThgB	Tinton loamy sand, 0to 5 percent slopes	Well drained
ThgC	Tinton loamy sand, 5 to 10 percent slopes	Well drained
URSAAB	Urban land, sandy, 0 to 8 percent slopes	Excessively drained
WedB	Westphalia loamy fine sand, 2 to 5 percent slopes	Well drained
WeeA	Westphalia fine sandy loam, 0 to 2 percent slopes	Well drained
WeeB	Westphalia fine sandy loam, 2 to 5 percent slopes	Well drained
WobB	Wooodmansie sand, 0 to 5 percent slopes	Well drained
WobC	Woodmansie sand, 5 to 10 percent slopes	Well drained
WofA	Woodstown fine sandy loam, 0 to 2 percent slopes	Moderately well drained
WofkA	Woodstown fine sandy loam, clayey substratum, 0 to 2 percent slopes	Moderately well drained
WofkB	Woodstown fine sandy loam, clayey substratum, 2 to 5 percent slopes	Moderately well drained

2.1.3 Surface Waters

Surface water resources mapped within the Project Study Area include freshwater streams, rivers, floodplains, open water (ponds and lakes) and wetlands. The information presented in this section is based upon publicly available data from the NJDEP and the USGS.

The NJDEP divides the State into 20 Watershed Management Areas (WMAs). The Study Area traverses three (3) WMAs, which are listed in **Table 2-3** and illustrated in **Figure 2-5**. Major streams and lakes shown on USGS topographic maps are also illustrated on **Figure 2-5** and discussed below (refer also to **Section 2.1.3.3**).

Table 2-3: Watershed Management Areas within the Project Study Area

WMA Number	Name of Watershed Management Area
13	Barnegat Bay
19	Rancocas
20	Assiscunk, Crosswicks, and Doctors

2.1.3.1 Streams and Rivers

Surface water quality standards are developed by NJDEP pursuant to the New Jersey Water Quality Planning Act, N.J.S.A. 58:11A et seq. and the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A et seq. Water quality criteria are developed for both fresh and saline waters for individual pollutants to protect aquatic life (i.e., plants and animals that live and reproduce in water) and human health. Criteria are developed to protect water quality for designated uses, including survival, growth and reproduction of aquatic life, and drinking water and fish consumption for human health protection. Uses identified include: drinking water supply, fish consumption, shellfish resources, propagation of fish and wildlife, recreation and agricultural and industrial water supplies.

These uses are designated for a particular waterbody through the assignment of surface water classifications. Surface waters classified as FW1 are not subject to any human-produced wastewater discharges; they are designated as set aside for posterity to represent the natural aquatic environment and associated biota. Additional designated uses for FW1 waters include primary and secondary contact recreation; maintenance, migration and propagation of aquatic biota, as well as any other reasonable uses. All other freshwaters are considered FW2 waters. Designated uses for FW2 waters include: maintenance, migration and propagation of aquatic biota, primary and secondary contact recreation, industrial and agricultural water supply, public water supply and any other reasonable uses. Freshwaters are further classified based on their ability to support trout: trout production (FW2-TP), trout maintenance (FW2-TM), or non-trout (FW2-NT). Additionally, there are three levels of antidegradation designations: Outstanding National Resource Waters (ONRW), which include waters within the NJ Pinelands (classified as "PL" waters), as well as FW1 waters. The other antidegradation categories are Category One waters (C1), and Category Two (C2) waters. All waters of the State are classified and assigned with one of the three antidegradation designations. C1 waters are protected from "measurable or calculable changes" in water quality; this classification is frequently applied to waters flowing through parks, wildlife refuges and to FW2-TP streams (NJDEP 2010).

Several of the waterways in the Project Study Area are designated as ONRW, and classified as PL waters. They are maintained in their natural state and changes are allowed only toward natural water quality. Major streams and lakes shown on USGS topographic maps that are present in the Project Study Area are illustrated in **Figure 2-5**.

In addition to surface water quality standards, NJDEP has implemented riparian zone protection standards within the Flood Hazard Area Control Act rules (N.J.A.C. 7:13), Theses rules require riparian zones that are 50, 150, or 300 feet in width along each side of surface waters throughout the State. The riparian zone width depends on the environmental resources being protected, with the most protective 300-foot riparian zone applicable to waters designated as Category One (C1) and certain upstream tributaries. Certain waters supporting trout, or habitats of threatened or endangered species critically dependent on the watercourse to survive, or watercourses which flow through areas that contain acid-producing soil deposits, receive a 150-foot riparian zone.

Table 2-4 shows the major rivers and streams located within the Project Study Area, along with their classifications:

Table 2-4: River and Stream Classifications within the Project Study Area

River/Stream Name	Water Quality Classification
Annaricken Brook	FW2-NTC1
Annaricken Brook UNT	FW2-NTC1
Assiscunk Creek	FW2-NTC1
Assiscunk Creek UNT	FW2-NTC1
Bacons Run	FW2-NT
Bacons Run UNT	FW2-NT
Barkers Brook UNT	FW2-NT
Beaverdam Brook	FW2-NT
Beaverdam Brook UNT	FW2-NT
Blacks Branch	PL
Blacks Branch UNT	PL
Blacks Creek	FW2-NT
Blacks Creek UNT	FW2-NT
Bog Run	FW2-NT
Bog Run UNT	FW2-NT
Bordens Mill Branch	PL
Bordens Mill Branch UNT	FW2-NT
Crafts Creek	FW2-NT
Crafts Creek UNT	FW2-NT
Crosswicks Creek	FW2-NT
Crosswicks Creek UNT	FW2-NT
Dark Branch	PL
Dark Branch UNT	PL
Deep Run	FW2-NT

River/Stream Name	Water Quality Classification
Deep Run UNT	FW2-NT
Dove Mill Branch	FW2-NTC1
Dove Mill Branch UNT	FW2-NTC1
Elisha Branch	PL
Fern Brook	FW2-NT
Fern Brook UNT	FW2-NT
Forked Brook	PL
Forked Brook UNT	PL
Gaskin Branch	PL
Gaskin Branch UNT	PL
Gaunts Brook	PL
Gaunts Brook UNT	PL
Goodwater Branch	PL
Harris Branch	PL
Harris Branch UNT	PL
Jensen Lake	FW2-NT
Jumping Brook	FW2-NT
Jumping Brook UNT	FW2-NT
Lahaway Creek	FW2-NT
Lahaway Creek UNT	FW2-NT
Little Hurricane Branch	PL
Little Hurricane Branch UNT	PL
Long Brook	PL
Long Brook UNT	PL
Manapaqua Brook	PL
Manapaqua Brook UNT	PL
Maple Root Branch	PL
Maple Root Branch UNT	PL
Middle Ruckels Branch	PL
Middle Ruckels Branch UNT	PL
Miry Run	FW2-NT
Miry Run UNT	FW2-NT
North Ruckels Branch	PL
North Ruckels Branch UNT	PL
North Run	FW2-NT
North Run UNT	FW2-NT
Obhanan Ridgeway Branch	PL
Obhanan Ridgeway Branch UNT	PL
Old Hurricane Brook	PL
Old Hurricane Brook UNT	FW2-NT

River/Stream Name	Water Quality Classification
Pleasant Run	FW2-NT
Pleasant Run UNT	FW2-NT
Prospertown Brook	FW2-NT
Prospertown Brook UNT	FW2-NT
Ridgeway Branch	PL
Ridgeway Branch UNT	PL
Shannae Brook	PL
Shannae Brook UNT	PL
Shoppen Run	FW2-NT
South Branch Metedeconk River UNT	FW2-NTC1
South Hurricane Brook	PL
South Hurricane Brook UNT	PL
South Ruckels Branch	PL
South Ruckels Branch UNT	PL
Stony Ford Brook	FW2-NT
Stony Ford Brook UNT	FW2-NT
Success Branch	PL
Success Branch UNT	PL
Sucker Run	FW2-NT
Sucker Run UNT	FW2-NT
Thorton Creek UNT	FW2-NT
Toms River	FW2-NTC1
Toms River UNT	FW2-NTC1
Uncoded Tributary	PL
Union Branch	PL
Union Branch UNT	FW2-NT
Wrangle Brook	FW2-NTC1
Wrangle Brook UNT	FW2-NTC1

2.1.3.2 100-year Floodplains

Areas adjacent to streams and rivers that would be inundated by a flood elevation that has a one-percent annual chance of being equaled or exceeded are designated as 100-year floodplains. The Federal Emergency Management Agency (FEMA) delineates the extent of 100-year floodplains for larger rivers and streams on Flood Insurance Rate Maps (FIRMs). Under the New Jersey Flood Hazard Areas (NJFHA) program, NJDEP also maps the floodplains within the State and, due to the methodology used, produce floodplains that may differ from those generated by FEMA. Since the FEMA floodplain data is available in GIS format, and NJFHS data was not available in GIS format, FEMA data was used for the floodplain analysis conducted as part of this siting study in lieu of the NJFHA data. (NJFHA rules were followed for other aspects of the project development, however.) The FEMA floodplain areas are mapped as Special Flood

Hazard Areas (SFHA) and are further classified based on risk of flooding. A designation of Zone A or AE signifies that the area is subject to inundation by the 100-year flood. Areas designated as Zone X are subject to moderate or minimal hazards from principal sources, while Zone X500 are areas within the 100- and 500-year flood zones.

The 100-year floodplain boundaries shown on **Figure 2-6** were acquired from FEMA datasets. Most of the major streams and rivers listed in **Table 2-4** possess associated 100-year floodplains, but not all are mapped by FEMA. The 100-year floodplains associated with all rivers, streams, and tributaries with drainage basins greater than 50 acres are regulated by the NJDEP, but not all of these floodplains are pre-determined, and some may require delineation to identify the extent of the regulated areas.

2.1.3.3 Open Water

In addition to streams and rivers, numerous lakes and ponds are located throughout the Project Study Area. Ponds and lakes within the Project Study Area were identified using the National Hydrologic Data Set (NHD) and are illustrated in **Figure 2-6**. **Table 2-5** lists these features along with approximate size and water quality classification:

Table 2-5: Open Water Bodies within the Project Study Area

Waterbody Name	Size (km sq.)	Water Quality Classification
Bass Lake	0.083	PL
Bunker Hill Lake	0.057	FW2-NT
Butterfly Pond	0.079	FW2-NTC1
Cassville Lake	0.049	FW2-NTC1
Clayton Brothers Sand Mining Company Lake #1	0.985	PL
Club House Lake	0.09	PL
Colliers Lake	0.087	Not listed
Colliers Pond	0.01	Not listed
Cookstown Pond	0.001	Not listed
Glidden Lake	0.057	PL
Horicon Lake	0.239	PL
Kuser Pond	0.005	Not listed
Oakford Lake	0.165	FW2-NT
Pickerel Lake	0.099	PL
Prospertown Lake	0.351	FW2-NT
Success Lake	0.231	PL
Shanock Lake		FW2-NT
Turnmill Lake	0.259	PL

2.1.3.4 Wetlands

Based on NJDEP 2010 Land Use/Land Cover GIS data, wetlands within the Project Study Area include palustrine forested (PFO), palustrine scrub/shrub (PSS) and palustrine emergent (PEM) systems (**Figure 2-6**) (NJDEP 2010). These wetlands are generally associated with river and stream corridors. Wetlands are classified in accordance with the Cowardin classification system (Cowardin et al. 1979), which also includes open waters (e.g., streams, ponds, lakes) as wetlands. Wetlands depicted in the NWI database are based primarily on aerial photographic interpretation of photographs taken in the 1980s. The locations of wetlands were confirmed to be generally accurate as mapped per preliminary field observations; however, detailed wetland delineations will be required as project design progresses.

Wetland permits available under the Freshwater Wetlands Protection Act at N.J.A.C. 7:7A do not restrict permit availability by wetland type (PFO, PSS, and PEM); however, PFO wetlands are sometimes regarded as providing higher habitat value. Additionally, the conversion of one wetland type to another (PFO to PSS or PEM) is considered wetland disturbance, and is therefore counted toward permit acreage thresholds. Restoration and mitigation for disturbances to PFO wetlands can also be more complex than PSS or PEM wetlands, in that forest structure is often dependent on slow growing tree species, which can require decades of growth to reach maturity. Alternately, PSS and PEM wetlands are capable of achieving habitat maturity after several growing seasons, based on the growth rates of the particular species. Identifying wetland type is also valuable for related ecological studies, including wildlife and/or threatened and endangered species studies. In addition to regulating wetlands, NJDEP also regulates transition areas or buffers adjacent to wetlands. The magnitude of the transition area is governed by the value of the wetlands: 150 feet for exceptional resource value wetlands; 50-feet for intermediate value wetlands; and no transition area for ordinary value wetlands.

Specific wetlands may be provided additional regulatory protection based on their inclusion on the EPA Priority Wetland list (USEPA 1994). This list recognizes those wetland areas that are considered to be the most important and vulnerable wetlands in the State as identified by various environmental groups and Federal and State agencies. Within the Project Study Area, all wetlands which are components of the Barnegat Bay tributary system are considered to be EPA Priority Wetlands.

2.1.4 Vegetation Communities

Vegetation within the Study Area includes undeveloped vegetated lands and maintained plant communities, such as agricultural fields, lawns and landscaped areas. Forest and agricultural lands are the primary vegetative cover types. Forested wetlands are present at several locations within the Project Study Area, with larger areas associated with the larger river and stream systems. Wetlands are discussed in more detail in **Section 2.1.3.4** above.

In Burlington and Monmouth counties, upland forest composition is primarily dominated by American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), tulip poplar (*Liriodendron tulipifera*), and various oak species (*Quercus spp.*) with an understory comprised of multiflora rose (*Rosa multiflora*) and honeysuckle (*Lonicera spp.*).

Forested wetlands consist of communities largely dominated by red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua),* and silky dogwood *(Cornus amomum).*

In the Ocean County, the study area extends through portions of the Pinelands Area and upland forested plant communities transition to a mixed deciduous/coniferous forest dominated by pitch pine (*Pinus rigida*), various oak species, and lowbush blueberry (*Vaccinium vacillans*) as is typical of vegetative communities within the NJ Pinelands. Forested wetlands consist of communities dominated by pitch pine, sweet gum, and highbush blueberry (*Vaccinium corymbosum*) as well as Atlantic white cedar (*Chamaecyparis thyoides*) wetlands.

2.1.5 Threatened and Endangered Species

The project study area contains potentially suitable habitat for Federally and NJ State listed threatened and endangered (T&E) species.

Within the Project Study Area, the potential for T&E animal species was evaluated using the NJ Landscape Project Mapping (Version 3.1) (**Figure 2-7**). The potential presence of T&E plant species was assessed using the NJ Natural Heritage Program (NJNHP) Grid Maps, General Locations of Rare Plant Species and Ecological Communities, (NJ Natural Heritage Program 2009). Forty-three Federally and/or State listed T&E animal species and 92 listed plant species are known to occur within the Pinelands Area (NJPC 2012). Potentially suitable habitat for the T&E species listed in **Table 2-6** has been identified within the Project Study Area.

Table 2-6: Potential Threatened and Endangered Species Habitat in Project Study Area

Common Name	Scientific Name	Federal Listing Status	NJ Listing Status
Bald Eagle*	*Haliaeetus leucocephalus*	Not Listed	Endangered (breeding)
Bog Turtle* (**)	*Glyptemys muhlenbergii*	Threatened	Endangered
Least Tern	*Sternula antillarum*	Not Listed	Endangered
Timber Rattlesnake* (**)	*Crotalus horridus*	Not Listed	Endangered
Upland Sandpiper	*Bartramia longicauda*	Not Listed	Endangered
Barred Owl*	*Strix varia*	Not Listed	Threatened
Northern Pine Snake	*Pituophis melanoleucus*	Not Listed	Threatened
Pine Barrens Treefrog*	*Hyla andersonii*	Not Listed	Threatened
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Not Listed	Threatened
Long's Woolgrass	*Scirpus longii*	Not Listed	Endangered, LP
Narrow-leaf Vervain	*Verbena simplex*	Not Listed	Endangered, LP
Pine Barrens Boneset	*Eupatorium resinosum*	Not Listed	Endangered, LP

Common Name	Scientific Name	Federal Listing Status	NJ Listing Status
Sickle-leaved golden-aster	*Pityopsis falcata*	Not Listed	LP
Slender Rattlesnake Root	*Prenanthes autumnalis*	Not Listed	LP

Notes:
* Classified as *Wetland Dependent* per NJ Freshwater Wetlands Protection Act (N.J.A.C. 7:7A)
**Classified as *Critically Dependent on Water Quality for Survival* per NJ Flood Hazard Area Control Act (N.J.A.C. 7:13)
LP Indicates taxa listed by the Pinelands Commission as threatened or endangered within the Pinelands Preservation Area (N.J.A.C. 7:50-6.27).

2.1.6 Special Use Areas

This section describes areas that are set aside for special use by humans or wildlife because of their uniqueness or value. Such areas include federally designated wilderness areas, federally designated wild and scenic rivers, federal, state, and county park lands, NJDEP National Priority Heritage Sites, and the NJ Pinelands Area.

2.1.6.1 Wilderness Areas

In 1964, the Wilderness Act was passed and 54 areas, representing 9.1 million acres, in 13 states were designated as wilderness. This federal law established these areas as part of the National Wilderness Preservation System (NWPS). Since 1964, the NWPS has grown almost every year and now includes 756 areas (109,492,591 acres) in 44 states and Puerto Rico.

There are no areas designated under the NWPS (NWPS 2009) in the Project Study Area.

2.1.6.2 Wild and Scenic Rivers

No federally designated wild and scenic rivers are located within the Project Study Area (USFWS 2011).

2.1.6.3 National, State, and County Park Lands

The Project Study Area includes two NJ State Wildlife Management Areas: Manchester Wildlife Management Area and Colliers Mills Wildlife Management Area (**Figure 2-8**).

The Project Study Area also includes several county parks, municipal parks, and recreation areas. In addition to providing passive recreation opportunities, these parklands provide valuable habitat for the region's wildlife.

Parklands within the Project Study Area are identified in **Figure 2-8.** Each of the counties and municipalities in the Project Study Area also has a number of parks, recreation areas, and county golf courses that provide both active and passive recreational opportunities as well as valuable wildlife habitat.

2.1.6.4 Natural Heritage Priority Sites

The NJDEP Natural Heritage Priority Sites were created to identify critically important areas to conserve New Jersey's biological diversity, with particular emphasis on rare plant species and ecological communities (NJDEP ONLM 2001). Natural Heritage Priority Sites are designated by NJDEP based on analysis of information in the New Jersey

Natural Heritage Database. Each site is ranked according to its significance for biological diversity using a scale developed by The Nature Conservancy, the network of Natural Heritage Programs across the U.S., and the New Jersey Natural Heritage Program. The global biodiversity significance ranks range from B1 to B5, with B1 designating the highest significance. It should be noted that these ranks are for planning and conservation purposes and as such are not regulatory in nature. Therefore these sites do not cover all known habitat for federal or state endangered and threatened species in New Jersey.

The Project Study Area contains one Natural Heritage Priority Site (partially located within its boundaries): West of Hornerstown, Monmouth County – B4

West of Hornerstown is a wooded ravine and floodplain of Crosswicks Creek. The ravine is covered with mature deciduous forest and the floodplain is crisscrossed with numerous marshes (both wooded and open), small ponds, or pools, and swampy woods following large and small tributaries. The primary boundary encompasses wetlands that are habitat to rare plant species. The secondary boundary includes immediately adjacent uplands and wetlands that drain toward the wetland habitat. Also of concern, but not included within the boundaries are watershed lands upstream of the site.

West of Hornerstown is ranked B4, signifying moderate significance on a global level, such as a viable occurrence of a globally rare element, a good occurrence of any ecological community, a good or excellent occurrence or only viable state occurrence of an element that is critically imperiled in the State, an excellent occurrence of an element that is imperiled in the State, or a concentration (4+) of good occurrences of elements that are imperiled in the State or excellent occurrences of elements that are rare in the State. The site contains a good population of a State-listed Endangered Plant Species.

2.1.6.5 NJ Pinelands Area

The NJ Pinelands Commission issues two types of standard approvals for development projects proposed within the NJ Pinelands: Certificate of Filing and Public Development Approval. In order to obtain either of these approvals, proposed activities must meet the Land Use (Subchapter 5) and Development Standards (Subchapter 6) of the NJ Pinelands Comprehensive Management Plan (CMP) at N.J.A.C. 7:50.

Within the CMP, natural gas transmission lines are included in the use of the term "Public Service Infrastructure." The term is defined at N.J.A.C. 7:50 -2.11 as "sewer service, gas, electricity, water, telephone, cable television and other public utilities developed linearly, roads and streets and other similar services provided or maintained by any public or private entity."

The boundary of the New Jersey Pinelands National Reserve is illustrated in **Figure 2-8.**

2.1.6.5.1 Pinelands Management Areas

The New Jersey Pinelands National Reserve is divided into two sections: a Protection Area and a Preservation Area. Within the Pinelands Protection Area and Preservation Area extent boundaries, specific resource areas are further classified into distinct Management Areas, each with their own development criteria, as described in the CMP. The Pinelands Management Areas are shown on **Figure 2-9** and include:

- Preservation Area District;
- Agricultural Production Area;
- Special Agricultural Production Area;
- Forest Area;
- Rural Development Area;
- Military and Federal Installation Area;
- Pinelands Towns, and
- Regional Growth Areas.

2.1.6.5.2 Preservation Area District

The Preservation Area District is the heart of the Pinelands environment and the most critical ecological region. It consists of a large, contiguous wilderness-like area of forest which supports diverse plant and animal communities and is home to many threatened and endangered species. Residential development is generally not permitted, except for one acre lots in designated infill areas (total 2,072 acres) and special "cultural housing" exceptions, on minimum 3.2 acre lots for property owned by families prior to 1979. Designated infill areas permit only limited commercial uses. Natural gas transmission/distribution (Public Service Infrastructure) use is conditionally permitted, as it can be permitted at the Towns' discretion if it will serve only the needs of the Preservation Area District.

2.1.6.5.3 Agricultural Production Area

These are areas of active agricultural use, generally upland field agriculture and row crops, including adjacent areas with soils suitable for the expansion of agricultural operations. Farm-related housing on 10 acres and non-farm housing on 40 acres are allowed. Permitted non-residential uses are agricultural commercial and roadside retail within 300 feet of preexisting commercial uses. Natural gas transmission/distribution (Public Service Infrastructure) use can be permitted at the Towns' discretion.

2.1.6.5.4 Special Agricultural Production Area

These are areas primarily used for berry agriculture and horticulture of native Pinelands plants. Only residential farm-related housing on 40 acres, and expansion of existing non-residential uses are permitted. Natural gas transmission/distribution (Public Service Infrastructure) use is conditionally permitted, as it can be permitted at the Towns' discretion if it will serve only the needs of the Special Agricultural Production Area District.

2.1.6.5.5 Forest Area

Similar to the Preservation Area District in terms of ecological value, this is a largely undeveloped area which is an essential element of the Pinelands environment. It contains high quality water resources and wetlands and provides suitable habitat for many threatened and endangered species. Permitted residential densities average one home for every 28 acres. Natural gas transmission/distribution (Public Service Infrastructure) use is conditionally permitted, as it can be permitted at the Towns' discretion if it is intended to serve primarily the needs of the Forest Area District.

2.1.6.5.6 Rural Development Area

This is a transitional area that balances environmental and development values between conservation and growth areas. Limited, low-density residential development and roadside retail is permitted. Residential densities average one home for every five acres. Natural gas transmission/distribution (Public Service Infrastructure) use can be permitted at the Towns' discretion.

2.1.6.5.7 Military and Federal Installation Area

These are Federal enclaves within the Pinelands. Permitted uses are those associated with function of the installation or other public purpose uses. Natural gas transmission/distribution (Public Service Infrastructure) use is conditionally permitted if it is associated with the function of the Federal installation, or is sanctioned by the installation and undertaken for public use purpose on behalf of another level of government.

2.1.6.5.8 Pinelands Villages and Towns

Pinelands Villages include 247 small, existing, spatially discrete settlements which are appropriate for infill residential, commercial and industrial development compatible with their existing character. There are 6 spatially discrete Pinelands Towns. Residential development is permitted on minimum 1-acre lots if not sewered, and 2 to 4 homes per acre with sewers. Commercial and industrial uses are also permitted, including natural gas transmission/distribution (Public Service Infrastructure).

2.1.6.5.9 Regional Growth Area

These are areas of existing growth and adjacent lands capable of accommodating regional growth influences while protecting the essential character and environment of the Pinelands. Residential development of approximately 3 homes per acre with sewers is permitted. Commercial and industrial uses are also permitted, including natural gas transmission/distribution (Public Service Infrastructure).

2.1.7 Wildlife

Typical wildlife species found within the Project Study Area include those found in wetlands, forested habitats, scrub-shrub habitats, open/agricultural lands and developed or disturbed areas within New Jersey. A diversity of wildlife habitats exist within the Project Study Area primarily within special use areas such as preserved open space lands. The area is likely to contain numerous common and state listed birds, including waterfowl, wading birds, raptors, woodpeckers and songbirds.

Common mammals expected to be present within the Study Area include white-tailed deer (*Odocoileus virginianus*), common muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), woodchuck (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis marsupialis*) and eastern cottontail (*Sylvilagus floridanus*).

2.2 Human and Built Environment

Human impacts on the natural environment of the Project Study Area are represented by a number of development types and land use patterns. These are discussed below using

classifications of the land use codes provided through the NJDEP Land Use/Land Cover dataset (NJDEP 2010). These major classifications are shown in **Figure 2-10**.

The information presented in the following sections describes the human and built environment, as it exists today. Over the past 35 years, the population in the area has increased significantly, leading to an increase in the number of homes, businesses, and industries, and resulting in the high-density development patterns present today.

2.2.1 Government Services

County and municipal bodies that are located within the Project Study Area provide government services to the region. Each municipality provides standard government services, except where shared service arrangements have been made between adjacent municipalities.

County government offices are located in Mount Holly (Burlington), Freehold (Monmouth), and Toms River (Ocean), New Jersey. **Table 2-7** lists the 11 municipalities located partially or wholly within the Project Study Area.

Table 2-7: Municipalities in the Project Study Area

Municipalities		
Bordentown Township	Manchester Township	Plumsted Township
Chesterfield Township	Mansfield Township	Springfield Township
Jackson Township	New Hanover Township	Upper Freehold Township
Lakehurst Borough	North Hanover Township	

2.2.2 Agriculture

Agricultural lands are a significant portion of the land use within the Project Study Area, with a majority of these lands located within the western half. Most of the agricultural areas are used to grow row crops such as corn, soybeans, wheat, and assorted vegetables, but some of the areas contain orchards and others are used for grazing farm animals.

The New Jersey Department of Agriculture's State Agricultural Development Committee (SADC) oversees the Farmland Preservation Program that has preserved many farms across the state. The SADC coordinates with County Agriculture Development Boards, municipal governments, nonprofit organizations, and landowners to develop the plans to preserve specific farmlands. Most farms have entered the Farmland Preservation Program through the sale of their development rights. Incentives for the landowners include financial aid, capital to expand agricultural operations, limited protection from government acquisition of land through eminent domain, and protection from public and private nuisance complaints. This program safeguards farms from development in perpetuity. Each of the counties within the Project Study Area has developed county-specific farmland management or farmland preservation plans. Most of the farms in the Project Study Area that are preserved under the Farmland Preservation Program are located in Burlington and Monmouth Counties (**Figure 2-8**).

2.2.3 Urban

Urban lands, which consist of industrial, commercial, and residential lands, also comprise

a significant portion of the Project Study Area. The largest urban areas are the Fort Dix and McGuire Air Force base complex in the south-central portion of the Project Study Area and the Lakehurst Naval Air Station in the eastern portion. Most of the residential and commercial development is located along the major roadways and concentrated in towns including Columbus, Cookstown, New Egypt, Manchester, and Lakehurst.

2.2.4 Proposed Developments

Indications of additional planned residential developments within the Project Study Area were identified during preparation of this report. According to the U.S. Census Bureau, the population of Burlington County increased by 5.6% between 2000 and 2010; Monmouth County increased by 2.4%, and Ocean County increased by 11.39% during the same time frame (U.S. Census 2011). Much of the residential growth in recent years has occurred in the southern and eastern portions of the Project Study Area, which is also the area of heaviest proposed development.

2.2.5 Educational Services

The low population density within the Project Study Area is associated with only a handful of schools in the vicinity. Many of the individual townships and boroughs have their own public school districts. Some of the districts are composed solely of one building that serves the needs of kindergarten to twelfth grade; others, such as the School District of Plumsted Township, have separate elementary, middle and high schools. The Project Study Area contains four properties associated with educational services.

2.2.6 Forest, Wetlands, and Water

Large tracts of forested lands are located in the central and eastern portions of the Project Study Area. Most of these forests are associated with the Pinelands Area. Wetland areas are noted across the Project Study Area with large concentrations located within Joint Base McGuire-Dix-Lakehurst (JB MDL) and within Manchester and Colliers Mills Wildlife Management Areas. Open water features are also concentrated in these two areas with the largest being Mirror Lake, Brindle Lake, and Success Lake.

Many state, county and municipal parks and natural areas are associated with these forested and wetland areas. Through the efforts of land preservation programs, such as the NJDEP Green Acres Program, additional properties have been preserved as open space. Parks and other conserved natural areas are illustrated in **Figure 2-8** and also discussed in **Section 2.1.6.3** as important habitat for wildlife.

2.2.7 Transportation

Major transportation corridors within the Study Area include NJ Route 70, and County R utes (CR) 527, 528, 537, 539, 543, 545, 616, 660, 665 and 677. All of these roadways serve as important corridors for both local and commuter traffic, and also serve as important connectors for tourist traffic to New Jersey shore points.

The three counties associated with the Project Study Area contain a comprehensive network of major roadways, rail transit systems, and freight rail lines that exist near the Project Study Area. Primary highways in these three counties include the New Jersey Turnpike, I-195, and State Route 70. These roadways connect to other major transportation corridors in the region and are illustrated in **Figure 2-11**.

2.2.8 Barren Lands

Barren or vacant lands are sporadically present within the Project Study Area and are associated with a variety of land cover types. In addition to undeveloped, cleared lands, barren land areas include extractive mining areas, altered land, and transitional areas.

2.2.9 Other Linear Features

Additional linear features present in the Project Study Area include pipelines and existing electric transmission corridors, as illustrated in **Figure 2-11**.

2.2.9.1 Pipelines

Two gas pipelines identified by PowerMap, Existing Utility Corridors (Platts PowerMap 2012-2013) data traverse along the boundary of the Project Study Area. The Transco natural gas pipeline infrastructure crosses southwest to northeast along the northwestern edge of the Project Study Area, while a NJNG pipeline crosses west to east along the northeastern edge.

2.2.9.2 Transmission Corridors

A transmission corridor is the area of land used by transmission, cable, or telephone lines to deliver services to customers. The corridors provide a pathway for physical structures, such as wires and poles or towers, which provide connection between energy suppliers, resources, or other utilities and the consumer of these services.

In the Project Study Area, transmission corridors are owned by Jersey Central Power and Light (JCP&L), Public Service Electric and Gas Company (PSE&G), and PECO Energy Company (PECO). Individual cable and telephone service providers are also located in some of these corridors. The largest transmission corridors in the Project Study Area are JCP&Ls transmission lines. From these high-voltage lines, smaller distribution lines run to provide electricity to the surrounding communities.

2.2.10 Historic, Cultural, and Archaeological Resources

The State of New Jersey is rich in both prehistoric and historic (ca. 1600 A.D. to present) cultural resources. The Project Study Area contains sites, districts, structures, buildings, and objects that have archaeological, historic, architectural, and cultural significance. Prehistoric resources include archaeological sites and objects from the prehistoric period that are known to exist as well as those subject to future discovery. A brief overview of the prehistoric setting of New Jersey, along with typical attributes of areas in which these sites have potential to be found, is provided in the following section. Information regarding significant prehistoric and historic cultural resources registered or eligible to be registered in New Jersey and the National Register of Historic Places (NRHP) are listed in **Table 2-5** and their locations are shown on **Figure 2-12**.

2.2.10.1 Prehistoric Setting

The Project Study Area crosses multiple archaeological site grids, which indicate the potential for sensitive archaeological resources (**Figure 2-12**). These site grids indicate that there is the potential for prehistoric archaeological sites from each of the three major prehistoric periods, including the *Paleo-Indian Period* (12,000 – 10,000 Before Present [B.P.]), *Archaic Period* (910,000 – 3,000 BP), and *Woodland Period* (2,700 B.P. – 1,600

A.D.), to be present within the Project Study Area. While there are differences in the sizes, use durations, and characteristics of prehistoric sites from each period, all are typically located in proximity to previously important resources, such as river terraces, streams, marshes, and estuarine environments. Proximity of previously resource-rich locales (where food, lithic, or other resources would have been abundant), in conjunction with well-drained, level, or gently sloping soils, serves as a discriminating factor in determining areas with a high potential for prehistoric occupation. Due to their cultural value, the locations of many archaeological sites are not made publicly available.

2.2.10.2 Historic and Cultural Resources

Historic periods that cover the time between initial European contact with Native American inhabitants of New Jersey and the present time include European Intrusion (1500 A.D. – 1700 A.D.), Initial Colonial Settlement (1630 A.D. –1775 A.D.), Early Industrialization, Urbanization, and Agricultural Development (1775 A.D. –1860 A.D.), Suburban Development (1840 A.D. – A.D. 1940), Immigration and Agricultural, Industrial, Commercial, and Urban Expansion (1850 A.D. –1920 A.D.), Metropolitan New Jersey (1910 A.D. –1945 A.D.), and Modern New Jersey (1945 A.D. – Present). Historic cultural resources noted in **Table 2-8** are illustrative of these periods.

Table 2-8: New Jersey and NRHP Resources within the Project Study Area

Name	Status
Arneytown Historic District	Listed
Cassville Crossroads Historic District	Listed
Lakehurst Historic District	Identified
New Egypt Historic District	Eligible
New Jersey Southern Railroad Historic District	Eligible
Recklesstown Historic District (Village of Chesterfield)	Listed
Anthony Woodward House (1351-64)	Identified (Indv.)
Bank of Mid-Jersey Branch Office	Listed (HD)
Boeing Michigan Aeronautical Research Center (BOMARC) Missile Site	Eligible (Indv.)
Cassville Hotel/Whitney's Taven	Listed (HD)
Cassville United Methodist Church	Listed (HD)
Chambers Building	Eligible (HD)
Chesterfield House	Listed (HD)
Chesterfield Township Elementary School	Listed (HD)
Clayton House	Listed (HD)
Diner	Eligible (HD)
Edward B. Woodward House (1351-10)	Identified (Indv.)
Emson House (Albert W. Hopkins Goose Farm)	Eligible (Indv.)
Farm Complex	Eligible (Indv.)
General Store	Listed (HD)
Gilbert House	Listed (HD)
Higgins House	Listed (HD)
Jan's	Eligible (HD)

Name	Status
Jewell House	Listed (HD)
Kessler House	Listed (HD)
Methodist Episcopal Church	Eligible (HD)
Municipal Building	Listed (HD)
New Egypt Firehouse	Eligible (HD)
New Egypt Library	Eligible (HD)
NJ Route 70 Bridge over NJS Southern Secondary	Eligible (HD)
NJS Communications Kiosk	Eligible (HD)
NJS Signal Bridge	Eligible (HD)
Old Chamber Building	Eligible (HD)
Peppler House	Listed (HD)
Plumsted Township Municipal Building	Eligible (HD)
Prospertown-Cassville Road	Eligible (Indv.)
Province Line Road Streetscape/Ellisdale Town (1351-60)	Identified (Indv.)
Rulon House	Listed (HD)
Satterthwait House	Listed (HD)
Stucco Rancher	Listed (HD)
Tantum House	Listed (HD)
Thomas Leonard House (1351-12)	Identified (Indv.)
Thomas Woodward House (1351-65)	Listed (HD)
Troth House	Listed (HD)
Van Hise/Van Ness/Long House	Listed (HD)
Weiner Department Store	Eligible (HD)

2.2.11 Hazardous Materials

According to the NJDEP 2012 Known Contaminated Sites List for NJ, various known contaminated sites are located within the Project Study Area, including approximately 10 superfund sites (**Figure 4-1**).

3.0 OVERVIEW OF ANALYSIS METHODOLOGY

This chapter provides an overview of the methodology used to define and evaluate the alternative routes and select the route. A detailed discussion of how this process was implemented for the project is provided in **Chapter 4**. The alternatives analysis identified major opportunities and constraints within the Project Study Area, identified viable alternative routes, and then used a quantitative and qualitative evaluation process to compare these routes. The methodology used for the alternatives analysis, as described in this section, provided a framework from which to select the routes most suited for a natural gas pipeline corridor. The ultimate goal of the study was to select a route that avoids or minimizes adverse impacts to the cultural/built and natural environments to the maximum extent practicable, while still maintaining the economic viability and technical feasibility of the project.

Prior to initiation of the analysis used to identify alternative routes, background research was conducted regarding the overall environmental setting within the Project Study Area. This information is provided within **Chapter 2.0** (Environmental Setting).

The implementation of the alternatives analysis phases for the Southern Reliability Link Project are described in detail in **Chapter 4.0** (Alternative Route Selection Process and Results).

3.1 Alternatives Analyses Methodology

The methodology utilized in these analyses incorporates GIS technology, statistical evaluation, and professional judgment into the decision-making process. Data was drawn from a variety of sources including state and local GIS databases, field reconnaissance surveys, information supplied by public agencies, published documents and publicly available electronic information. The approach formalizes many of the methods and principles used in the industry and by consultants over the last several years.

The alternatives analysis methodology used for this project includes both quantitative and qualitative evaluation techniques. The quantitative evaluation was used to initially develop, score, and rank alternative routes according to certain selected criteria. Subsequently, a qualitative evaluation that incorporated practical information regarding construction, real estate, permitting, and other relevant aspects of the project was conducted in order to reach a decision regarding the selected route.

The process consisted of four fundamental phases:

1. Define the *Project Study Area*: The study area for the alternatives analysis was determined based on professional judgment, the geographic characteristics of the region, and the physical location of the existing endpoints.
2. Generate *Alternative Routes*: Alternative Routes most suitable for pipeline alignments within the Project Study Area were generated taking into account three primary perspectives:
    a. protection of the built environment;
    b. protection of the natural environment; and,
    c. engineering considerations.

3. Evaluate the *Alternative Routes*. Use select criteria to quantitatively and qualitatively assess the Alternative Routes.
4. Determine the *Selected Route*. Use the information from the quantitative and qualitative assessment to determine the Selected Route.

3.1.1 Overview of Phase I – Definition of the Project Study Area

An initial task in the alternatives analysis was the definition of the Project Study Area. The study area was selected based on the geographic characteristics of the region, as well as the physical location of the existing endpoints of the analysis. In general, a selected study area should be within reasonable distance of the endpoints of the proposed pipeline and it should provide the opportunity to identify multiple potentially feasible alternative pipeline routes for further evaluation. In this case, the boundaries of the study area were developed based on a review of USGS maps, state and county road maps, aerial photographs, and GIS analysis. Constraints such as major roadways, rivers, national parks, residential development, and the locations of the endpoints can play key roles in determining the boundaries of the study area.

3.1.2 Overview of Phase II – Alternative Route Generation

In this step, multiple alternative routes were generated within the Project Study Area for Section 1 and Section 2. The routes took into consideration three general potential opportunity scenarios, including:

- opportunities to parallel existing pipeline and other linear utility ROWs;
- opportunities to co-locate within or parallel to existing road ROWs; and,
- opportunities to cross undeveloped land (cross country).

Each of these opportunity scenarios presents conditions generally favorable for the development of new linear utilities. Paralleling existing ROWs can limit new resource impacts by possibly overlapping ROWs and minimizing the need for new access roads, use of roadway ROWs can limit impacts to residential properties and natural resources; and crossing undeveloped lands can limit engineering concerns by reducing interactions with other utility resources. Most alternative pipeline routes are typically hybrids of these opportunity scenarios, with each route consisting of its own unique combination.

In contrast to the potential benefits, these opportunity scenarios sometimes also involve aspects that may prove to be detrimental to the proposed pipeline. For example, paralleling an existing transmission line involves considerations regarding cathodic protection. Installation and operation of the cathodic protection equipment and monitoring of these conditions is a design factor to be considered. Similarly, these existing utility ROWs may extend through areas of sensitive natural resources that were not protected during the initial development of the ROW corridor. Paralleling a utility ROW through a state park or a wildlife refuge area may negate the benefits of co-locating with the ROW.

Identification of the alternative routes was conducted through analysis of aerial photographs and USGS maps that took into account an assessment of land uses and

natural resources. Variables reviewed during this process are based on three fundamental perspectives:

- *Built environment* - protecting human and cultural resource areas, by reducing potential project conflicts with existing residential neighborhoods and other community-valued buildings or historic sites.
- *Natural environment* - protecting plants, animals and aquatic resources, by minimizing the project impact to ecological resources and natural habitat.
- *Engineering considerations* - maximizing co-location and minimizing cost and schedule challenges for the project, by seeking the shortest path or using existing ROWs, while avoiding areas that pose significant construction obstacles, such as steep slopes or those used for unique agricultural practices.

Each route takes into consideration varying aspects of these perspectives. Some routes are guided toward socially built areas to protect sensitive natural resources, such as state parks, while other routes may be guided toward open fields and forested areas to avoid dense residential areas. Engineering considerations ranging from the use of existing roads for construction access to the extent of co-location in a road ROW that will require extensive coordination with local utilities are also involved in the route alignments.

3.1.2.1 State Regulatory Framework on Analysis Methodology

The NJDEP provides protection to natural resources, including streams, flood hazard areas, riparian zones, wetlands and open waters, coastal areas, tidal waters and estuaries, as well as habitat for threatened and endangered species, and cultural resources through various environmental laws and implementing regulations. Within the Pinelands Area, the NJ Pinelands Commission implements the land use and development standards for the CMP. Different levels of protection are assigned to these resources depending on resource value or classification. The environmental resources protected by these regulatory programs were described in **Chapter 2.0** of the report. The levels of protection determined by New Jersey regulatory agencies were incorporated into the methodology, especially in determining avoidance areas. The special regulatory framework of the NJ Pinelands Commission and the CMP necessitated a methodology which evaluated the Project Study Area within two sub-sections (Sections 1 and 2).

3.1.2.1.1 Farmland Preservation Program

The New Jersey Department of Agriculture's State Agricultural Development Committee (SADC) oversees the Farmland Preservation Program that has preserved many farms across the state. The SADC coordinates with County Agriculture Development Boards, municipal governments, nonprofit organizations, and landowners to develop the plans to preserve specific farmlands. Most farms have entered the Farmland Preservation Program through the sale of their development rights. Incentives for the landowners include financial aid, capital to expand operations, limited protection from government acquisition of land through eminent domain, and protection from public and private nuisance complaints (SADC 2015). This program safeguards farms from development in perpetuity. Each of the counties within the Project Study Area has developed county-specific farmland management or farmland preservation plans. Most of the farms in the

Project Study Area that are preserved under the Farmland Preservation Program are located in Burlington and Monmouth Counties.

Specific parcels which are designated as Preserved Farmland through the NJ Department of Agriculture are preserved in perpetuity. Only farming activities can occur on these lands. Permits to cross these lands are not available, and are expressly prohibited by law.

3.1.2.1.2 NJ Pinelands Area

Development projects proposed within the NJ Pinelands are subject to compliance with the Land Use and Development Standards of the Pinelands Comprehensive Management Plan, N.J.A.C. 7:50 (CMP), administered by the NJ Pinelands Commission. The NJ Pinelands Commission issues two types of standard approvals for development projects proposed within the NJ Pinelands: Certificate of Filing and Public Development Approval. In order to obtain either of these approvals, proposed activities must meet the Land Use (Subchapter 5) and Development Standards (Subchapter 6) of the CMP.

Within the CMP, natural gas transmission lines are included in the use of the term "Public Service Infrastructure." The term is defined at N.J.A.C. 7:50 -2.11 as "sewer service, gas, electricity, water, telephone, cable television and other public utilities developed linearly, roads and streets and other similar services provided or maintained by any public or private entity." Public Service Infrastructure is only permitted, or conditionally permitted, in certain Land Use Management Areas within the Pinelands, and therefore is a significant siting constraint.

3.1.2.1.3 Streams

Section 2.1.3 describes NJDEP surface water quality standards, criteria, and classifications and provides an overview of FEMA flood hazard area mapping. NJDEP regulations related to flood hazard areas are summarized in the following paragraphs.

The New Jersey Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 *et seq.*, and implementing regulations, N.J.A.C. 7:13, afford protection to streams based in part on surface water classification. The regulated riparian zone varies based on stream classification and other factors, ranging from 300-foot riparian zones (along PL and C1 waters and some tributaries), to 150-foot zones (TP and TM freshwaters, waters with water quality dependent threatened and endangered species, and streams through areas of acid producing soils), or to 50-foot zones along all other regulated waters. In addition to regulating activity within the riparian zone, activities within the flood hazard area, which includes the floodway and flood fringe, are also regulated under the New Jersey Flood Hazard Area Control Act. Depending on the type and location of a proposed activity, a permit may be required from the NJDEP, Division of Land Use Regulation (DLUR) prior to construction.

3.1.2.1.4 Wetlands

Freshwater wetlands, unmapped tidal wetlands, and State open waters in New Jersey are regulated under the New Jersey Freshwater Wetlands Protection Act, N.J.S.A. 13-9B-1 *et seq.*, and implementing regulations, N.J.A.C. 7:7A. The NJDEP has assumed authority for implementing protection of navigable waters and wetlands in accordance with Section 404 of the Federal Water Pollution Control Act, 33 U.S.C. §§1251 *et seq.*, commonly referred to as the Clean Water Act. Accordingly, with the exception of interstate and

tidal waters, jurisdiction for these resources falls primarily to the NJDEP DLUR. While the NJDEP DLUR also regulates interstate and tidal waters, the USACE retains Clean Water Act authority in these areas.

The New Jersey Freshwater Wetlands Protection Act, N.J.A.C. 7:7A identifies three different wetland classifications: exceptional resource value, intermediate resource value, and ordinary resources value.

- *Exceptional resource value* wetlands are those that provide habitat for certain threatened or endangered species or which discharge to FW1-TP or FW2-TP waters or their tributaries.
- *Ordinary resource value* wetlands include certain isolated wetlands, drainage ditches, swales, and detention facilities created in uplands which do not meet the definition of exceptional value.
- All other freshwater wetlands are considered *intermediate resource value* wetlands.

NJDEP also regulates transition areas or buffers adjacent to wetlands. Transition areas range in width from 150-feet for exceptional resource value, to 50-feet for intermediate value, to 0-feet for ordinary value wetlands.

Wetlands under the jurisdiction of the NJ Pinelands Commission are identified using Pinelands specific methodology, the 1991 *New Jersey Pinelands Commission Manual for Identifying and Delineating Pineland Area Wetlands.* Pinelands wetland transition areas vary by wetland quality and proposed activity, and are determined using the 1985 *Buffer Delineation Model for NJ Pinelands Wetlands.* In accordance with the CMP, wetland transition areas can extend up to 300 feet from the upland/wetland boundary.

Any permanent or temporary disturbance to State open waters, freshwater wetlands, or transition areas would require a permit from NJDEP and/or the NJ Pinelands Commission. Mitigation would be required in accordance with permit conditions.

3.1.2.1.5 Protected Lands and Sensitive Habitats

Federal, State, county and municipal parklands often support rare, threatened, and endangered (T&E) species, provide important wildlife habitat or wetlands, or function as floodplains. Many of these lands are protected through the regulatory programs described in previous sections. Throughout much of the Project Study Area, protection specific to T&E species is implemented through the New Jersey Freshwater Wetlands Protection Act and New Jersey Flood Hazard Area Control Act.

Within the Pinelands Area, the CMP regulates development which mav adversely affect T&E species, including specific Pinelands listed species.

Potentially suitable T&E species habitat is mapped by the New Jersey Landscape Project, which was developed using New Jersey Natural Heritage Program Database records and habitat suitability models. Landscape Project Version 3.1 provides habitat mapping for the entire State. The New Jersey Landscape Project ranks potentially suitable habitat value based on the listing status of the species and record of occurrence. The following

five categories, or conservation ranks, are assigned for habitats throughout the State based on the conservation status of species present:

- Rank 1 = minimum size requirements are met and suitable habitat is present, however, no species records
- Rank 2 = records for non-listed state species of special concern
- Rank 3 = records for state threatened species
- Rank 4 = records for state endangered species
- Rank 5 = records for federally endangered or threatened species

These rankings, as applicable within the Project Study Area, are illustrated in **Figure 2-7**.

State, county, and municipal parklands, as well as privately owned preserved open space are subject to various development regulations. Activities proposed on public or private parcels acquired with funds from – or encumbered by – the NJ Green Acres Program would require a formal diversion of those properties, subject to review and approval of the NJ State House Commission. The Green Acres Program also administers the leasing of State owned parklands.

Green Acres encumbered parcels are presented in **Figure 2-8**.

3.1.3 Overview of Phase III – Alternative Route Evaluation

To assess the advantages and disadvantages of the alternative routes, feature metrics, or specific parameters measured for a particular feature were considered for each of the Section 1 and Section 2 alternative routes. The metrics were based on the three perspectives noted above (built environment, natural environment, and engineering considerations) and consist of several factors, including, for example, the number of residences within 150 feet and the number of stream crossings per route. These quantitative feature metrics were normalized, assigned relative weights, and organized within the three perspectives (built environment, natural environment and engineering considerations). The metrics were normalized to provide a means to compare the data. Using a normalized 0-100 scale allows the different data values to be mathematically combined and compared without being distorted by differences in measurement scale. Establishing these quantitative values allowed overall scoring for each alternative route. Lower scores are preferred as they indicate potentially less impact along that route. The numerical score provides an objective reference for comparing each of the alternative routes.

The next step in the analysis was to incorporate the information provided in the quantitative assessment and to apply professional judgment to qualitatively rank the alternative routes. Each alternative was assessed based on five important considerations, including visual concerns, community concerns, schedule delay risk, special permit issues, and construction, maintenance, and accessibility issues.

3.1.4 Overview of Phase IV – Selected Route Determination

This quantitative and qualitative analyses process was designed to evaluate the alternatives and determine a final Selected Route in an objective, consistent, and

comprehensive manner. A Selected Route can be determined through the evaluation of these values and conclusions.