



# ATTACHMENT 2

## Wetland Delineation Technical Report

Glassboro-Camden Line FEIS  
February 2021

Prepared by:



Prepared for:



Project information contained in this document, including estimated limits of disturbance that could result with construction or operation of the proposed GCL, is based on conceptual design parameters that represent a reasonably conservative basis for conducting environmental analyses. As the proposed GCL is advanced through preliminary engineering and construction, efforts will continue to be made to further refine the design and minimize the project footprint. These refinements may result in the potential to avoid and further reduce the adverse effects outlined in this document and as described within this Environmental Impact Statement.

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## Acronyms

AA	Alternatives Analysis
EIS	Environmental Impact Statement
NEPA	National Environmental Policy Act
NOI	Notice of Intent
PIP	Public Involvement Plan
ROD	Record of Decision
USACE	US Army Corp of Engineers
GCL	Glassboro-Camden Line

## Foreword

Following the issuance of the Draft Environmental Impact Statement (November 2<sup>nd</sup>, 2020), revisions have been made to this Technical Report (Attachment 2, “Wetland Delineation Technical Report”) in preparation of the Final Environmental Impact Statement as follows:

- Section 1.4.2, Page 4: Updated the website address for the USDA national hydric soils list
- Minor editorial and typographical revisions, as well as formatting adjustments, have been made as appropriate

Further, this report, originally prepared in January 2014, was based on field work conducted between August 20, 2013 and December 31, 2013. Subsequently, the project was put on hold until 2017, at which point the project design concept had changed slightly (i.e., changes in some limits of disturbance). In order to account for changes in design and possible changes to wetland conditions over time, confirmatory field visits were conducted by Michael L. Francis, Ph.D. in October 2017. These confirmatory field visits were conducted, specifically, in the areas of the proposed Mantua-Pitman Station and several areas along the corridor. Based on the findings of these field investigations, the extent of flagged wetland areas as well as the context as originally described remained substantially unchanged since the original surveys in August-December 2013. Therefore, the description of the potentially affected environs of the project, as described per the original survey, remains valid. It is noted, however, that the identified wetlands will need to be re-flagged and re-surveyed prior to any permit applications, per NJDEP review requirements.

## **1 INTRODUCTION**

This report describes the delineation of wetlands within the Glassboro-Camden Line (GCL) project study area in accordance with relevant federal and state regulation. It contains methodology, findings, a statement of qualifications, and references. The findings of this report are to be used to analyze the potential environmental effects of the proposed GCL.

### **1.1 Project Description**

The Glassboro-Camden Line (“the proposed GCL” or “the proposed project”) is a proposed 18-mile expansion of transit service in Southern New Jersey that would traverse eleven communities between the City of Camden (Camden County) and the Borough of Glassboro (Gloucester County). The proposed GCL would restore passenger rail service primarily along an existing Conrail freight corridor using light rail vehicles similar to the NJ TRANSIT River LINE. In general, this new transit service would operate at-grade, but some portions would be grade-separated over existing roads and waterways. The proposed GCL would run on new dedicated tracks and/or be separated from the freight trains temporarily, allowing the current Conrail freight operations to continue. The proposed project would provide 14 new transit stations, including five walk-up stations and nine proposed park-and-ride facilities, and two vehicle maintenance facilities (VMF). The proposed GCL would provide connections (in Camden) to Philadelphia, Trenton, and other points in the region via the PATCO Speedline, the NJ TRANSIT River LINE, and NJ TRANSIT bus routes.

### **1.2 Regulatory Framework**

Pursuant to Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) was given the responsibility to regulate waterways and freshwater wetlands associated with those waterways. These areas are considered “Waters of the U.S.” As the result of a 1993 Memorandum of Agreement (MOA), the U.S. Environmental Protection Agency (EPA) delegated that authority to the New Jersey Department of Environmental Protection (NJDEP) pursuant to the New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B). The MOA allows NJDEP to assume authority to regulate freshwater wetlands and streams in most of New Jersey. The USACE maintains jurisdiction, along with the NJDEP, over waterways that more clearly affect interstate commerce. Areas under the jurisdiction of the USACE continue to include and tidal (coastal) wetlands, navigable waters, and wetlands located within 1,000 feet inland of navigable waterways. For those wetland and waterways not under the jurisdiction of the USACE, the NJDEP maintains sole jurisdiction. Portions of this project fall within the jurisdiction of both the USACE and the NJDEP.

In addition, the Coast Guard has jurisdiction over tidal waters that are considered navigable. Specifically, these are waters that are subject to tidal influence, and whether listed or not, they are considered navigable for the purposes of general Coast Guard jurisdiction to the limits of tidal influence (“head of tide”).

### **1.3 Definition of Jurisdictional Limits**

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and the EPA as:

“Wetlands are those areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.” (33 CFR Section 328.3 and 40 CFR Section 230.3)

This definition emphasizes three characteristics needed for the creation of wetlands, i.e., hydrophytic vegetation, hydric soils and hydrology.

NJDEP has adopted the January 1989 *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*<sup>1</sup> (the “Federal Manual”) as the technical basis for identifying and delineating wetlands in New Jersey.

NJDEP categorizes water resources into groups. These resources include state open waters, freshwater wetlands, coastal wetlands, and drainage ditches. A description of each resource category is provided below.

### **1.3.1 State Open Water**

“State open waters” include all waters of the State, including waters of the United States, but excluding ground water and freshwater wetlands. The following waters will generally not be considered “State open waters”:

1. Non-tidal drainage and irrigation ditches excavated on dry land;
2. Artificially irrigated areas which would revert to upland if the irrigation ceased;
3. Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
4. Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons;
5. Water-filled depressions created in dry land incidental to construction or remediation activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of “waters of the United States”;
6. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Federal act (other than cooling ponds);
7. Erosional channels less than two feet wide and six inches deep in upland areas resulting from poor soil management practices; and
8. Stormwater management facilities created in uplands.

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<sup>1</sup><https://digitalmedia.fws.gov/digital/collection/document/id/1341/>

### 1.3.2 Freshwater Wetlands

“Freshwater wetland” or “wetland” means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation. These include tidally influenced wetlands which have not been included on a promulgated map pursuant to the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq.

### 1.3.3 Coastal Wetlands

A “coastal wetland” is defined as “any bank, marsh, swamp, meadow, flat or other low land subject to tidal action in the State of New Jersey along the Delaware Bay and Delaware River, Raritan Bay, Barnegat Bay, Sandy Hook Bay, Shrewsbury River including Navesink River, Shark River, and the costal inland waterways extending southerly from Manasquan Inlet to Cape May Harbor, or any inlet, estuary or tributary waterway or any thereof, including those areas now or formerly connected to tidal waters whose surface is at or below an elevation of one foot above local extreme high water, and upon which may grow or is capable of growing any of a list of enumerated plant species.”

### 1.3.4 Drainage Ditch

A “ditch” means a linear topographic depression with bed and banks of human construction, which conveys water to or from a site, which is surrounded by uplands and which is not located within a wetland. This does not include channelized or redirected natural water courses.

## 1.4 Mandatory Technical Criteria for Wetland Identification

According to the *Federal Manual*, wetlands possess three essential technical criteria: hydrophytic vegetation, hydric soils, and wetland hydrology, which are the driving forces creating all wetlands. These characteristics, and their technical criteria for identification purposes, were evaluated in accordance with the following discussions. The three technical criteria specified are typically required to be present for an area to be identified as a wetland.

### 1.4.1 Hydrophytic Vegetation

The Federal Manual defines hydrophytic vegetation as macrophytic plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Hydrophytic vegetation is identified in the field by using the indicators described in Table 1, “Plant Indicator Status According to the National Wetlands Inventory.” Plants occurring in wetlands were categorized in the *USACE North American Digital Flora: National Wetlands Plant List (2013)*. The list separates vascular plants into five basic groups based on a plant species’ frequency of occurrence in wetlands.

**Table 1: Plant Indicator Status According to the National Wetlands Inventory**

Indicator Category	Symbol	Occurrence in Wetlands
Obligate Wetland	OBL	>99%
Facultative Wetland	FACW	67 to 99%
Facultative	FAC	34 to 66%
Facultative Upland	FACU	1 to 33%
Upland	UPL	<1%

A site is dominated by hydrophytic vegetation when the most abundant species in each stratum (e.g., tree, shrub, and/or herbaceous) are designated as obligate wetland, facultative wetland, or facultative species.

#### 1.4.2 Hydric Soils

The definition of a hydric soil is a soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part. The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are included in the concept of hydric soils. Also, soils in which the hydrology has been artificially modified are considered hydric if the soil, in an unaltered state, was hydric. Some soil series, designated as hydric, have phases that are not hydric depending on water table, flooding, and ponding characteristics.

Several indicators are available for determining whether a given soil meets the definition and criteria for hydric soils. The manual lists several indicators for non-sandy and sandy soils; the presence of any one of which allows for the determination of a soil as hydric.

Hydric soils lists developed for individual detailed soil surveys are known as Local Hydric Soils Lists. They are available from state or county NRCS offices and over the internet from the Soil Data Mart (<http://soildatamart.nrcs.usda.gov/>). Local Hydric Soils Lists have been compiled into a National Hydric Soils List available at (<https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>). However, use of Local Hydric Soils Lists is preferred since they are more current and reflect local variations in soil properties.

#### 1.4.3 Wetland Hydrology

Wetland hydrology indicators are used in combination with indicators of hydric soil and hydrophytic vegetation to determine whether an area is a wetland under the *Federal Manual*. Indicators of hydrophytic vegetation and hydric soil generally reflect a site's medium to long term wetness history. They provide readily observable evidence that episodes of inundation or soil saturation lasting more than 5 percent of the growing season have occurred repeatedly over a period of years and that the timing, duration, and frequency of wet conditions have been sufficient to produce a characteristic wetland plant community and hydric soil morphology. If hydrology has not been altered, vegetation and soils provide the strongest evidence that wetland hydrology is present. Wetland hydrology indicators provide evidence



that the site has a continuing wetland hydrologic regime and that hydric soils and hydrophytic vegetation are not relicts of a past hydrologic regime. Wetland hydrology indicators confirm that an episode of inundation or soil saturation occurred recently, but may provide little additional information about the timing, duration, or frequency of such events (National Research Council, 1995).

Permanent or periodic inundation, or seasonal soil saturation are the driving forces behind wetland formation. The presence of water for one week or more during the growing season typically creates anaerobic conditions in the soil, which affects the types of plants that can grow and the types of soils that develop. Numerous factors influence the wetness of an area, including precipitation, stratigraphy, topography, soil permeability, and plant cover. All wetlands have at least a seasonal abundance of water. This water may come from direct precipitation, overbank flooding, surface water runoff due to precipitation or snow melt, or groundwater discharge. The frequency and duration of inundation and soil saturation may vary widely from permanent flooding or saturation to irregular flooding or saturation.

## **2 PRINCIPAL CONCLUSIONS**

Thirty-two jurisdictional water resources were found within the study area, based on off-site and on-site findings. As identified in Table 3, “Water Resources Summary,” the resources identified include mapped coastal wetlands, freshwater wetlands, and drainage ditch. Locations of the wetlands can be found in Appendix 2-A, “Water Resource Location Map.” Datasheets for the wetland and upland points can be found in Appendix 2-B, Wetland Data Forms.” Photographs of the resources are located in Appendix 2-C, “Photographs.”

## **3 METHODOLOGY**

Wetlands were identified and delineated utilizing the *Federal Manual*. Both off-site and on-site methodologies were used in this study. The project study area was defined as an area encompassing a 200-foot radius of the proposed GCL alignment (See Figure 2, “NRCS Soil Survey Map”).

### **3.1 Off-Site Methodology**

The following off-site activities were conducted:

- The Woodbury, Pitman West and Pitman East, New Jersey United States Geological Survey (USGS) 7.5-minute topographic quadrangles were reviewed for local and regional environmental setting relevant to surface waters, wetlands, and contours;
- The U.S. Department of Agriculture, Natural Resource Conservation Service Soil Surveys for Camden and Gloucester County, New Jersey were reviewed for project study area soil types;
- The NJDEP GeoWeb was reviewed for mapped New Jersey Wetlands;
- The applicable Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Camden County (dated 9/2007) and Gloucester County (dated 1/2012) were reviewed for 100-year floodplain areas; and

- Camden and Gloucester County aerial mapping, GIS mapping, tax and parcel data were reviewed to identify potential wetlands, streams and 100-year floodplains. The GIS mapping uses National Wetland Inventory (NWI) maps as their basis for wetland identification.

### 3.2 On-Site Methodology

On-site investigative activities included site reconnaissance of the entire project study area to identify potential wetlands and waterways. Among these tasks were the identification of hydrophytic plant species, evidence of hydrology, and hydric soils. The indicator status of plants collected from the site was determined using the *National Wetland Plant List* (2013). Soil samples were obtained at depths of approximately 46 to 66 centimeters (18 to 26 inches). Soil colors were determined using the Munsell Soil Color Chart (Gretag-Macbeth, 2000).

Soil samples were obtained at locations that exhibited wetland hydrology and/or vegetation to verify whether the area was a wetland. Data sheets to document results of soil analysis, types of vegetation present and hydrologic indicators were prepared at each sample location. The field data sheets are found in Appendix 2-B, "Wetland Data Forms." Due to the similarity of conditions within the project study area, only representative upland datasheets were completed. Limits of the identified wetlands were flagged and labeled. The wetland boundaries depicted were surveyed using a Global Positioning System (GPS) with sub-meter accuracy and plotted on drawings (See Appendix 2-A, "Water Resource Location Maps").

## 4 FINDINGS

### 4.1 Off-Site Findings

Review of the region-specific USGS topographic quadrangles (Figure 1, "USGS Site Location Map") revealed that land use adjacent to the project study area is a mix of residential, commercial and educational uses as well as some undeveloped forested and non-forested areas.

Based on a review of soils mapping, hydric and non-hydric soils were identified throughout the project study area (Figure 2, "NRCS Soil Survey Map"). Table 2, "Project Study Area Soils," identifies specific soils within the project study area.

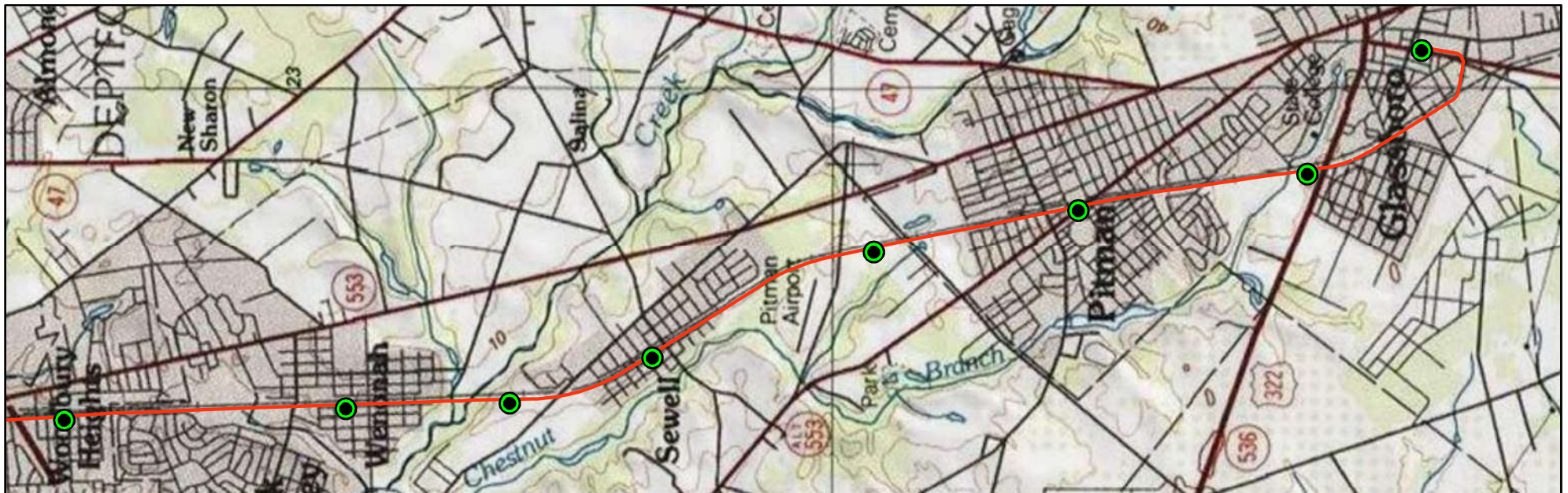
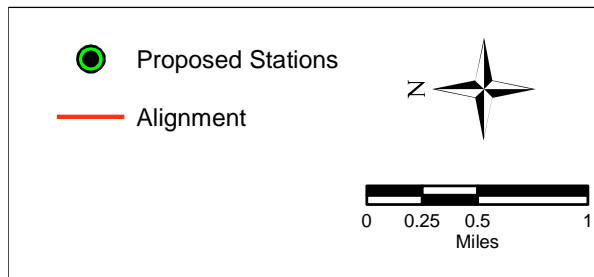
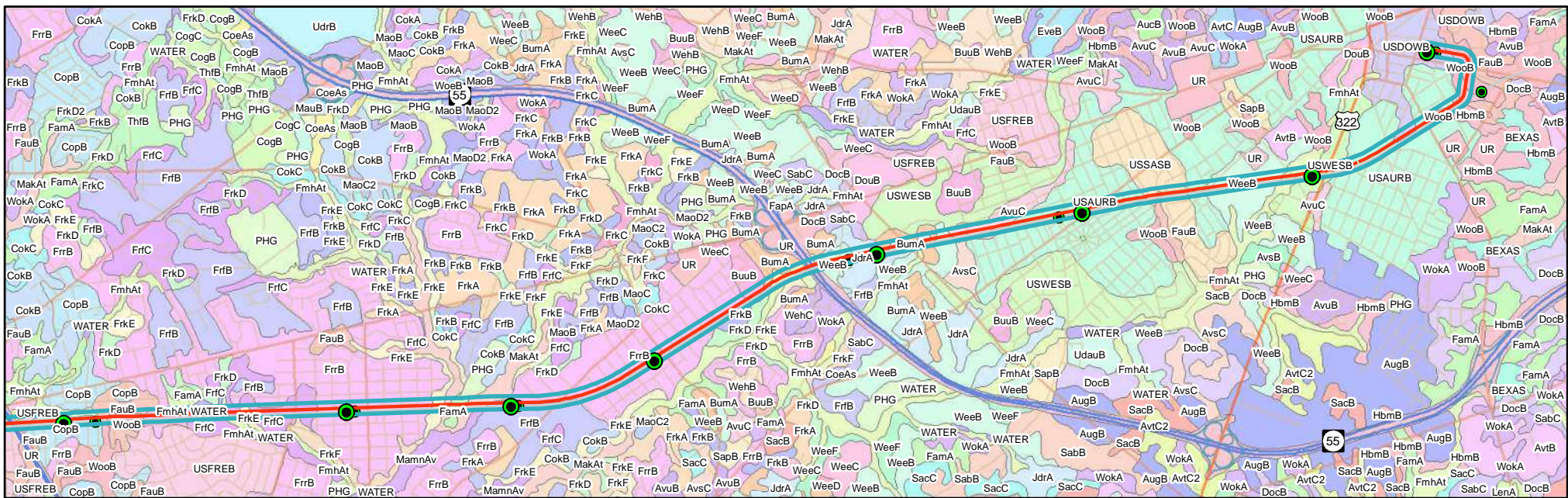
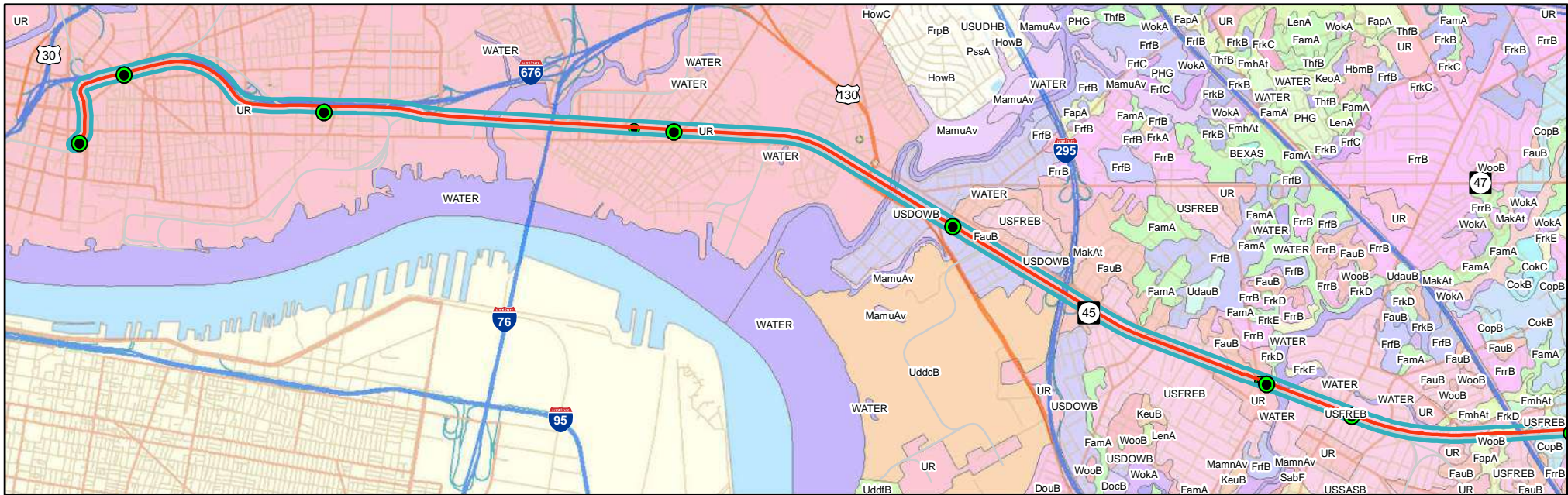


Figure 1: USGS Site Location Map



Source: United States Geological Survey (USGS) Topographic Maps. [http://goto.arcgisonline.com/maps/USA\\_Topo\\_Maps](http://goto.arcgisonline.com/maps/USA_Topo_Maps). STV Incorporated, 2020.



**Figure 2: NRCS Soil Survey Map**



AtsA	AvsC	BumA	CosB	EveC	FrkA	HbmB	LanB	MaoC2	PHG	SapB	UddcB	WeeD2
AtsAr	AviB	BuuB	CosC	EveE	FrkB	HbrB	LasB	MaoD	PHM	ThfB	UddrB	WeeF
AucB	AvtC	ChsAt	DocB	EvfMB	FrkC	JdrA	LasC	MaoD2	SabB	UR	UddrB	WehB
AugA	AviC2	CoeAs	DocC	EvuB	FrkD	JduA	LatvB	MauB	SabC	USAURB	UdrB	WehC
AugB	AvuB	CogB	DockB	Fama	FrkD2	KemB	LenA	MbsB	SabD	USDOWB	WATER	WoeA
AugC	AvuC	CogC	DoeA	FmkE	FrkE	KemC2	MakAt	MbtA	SabF	USFREB	WOUB	WoeB
AupB	BEXAS	CokA	DoeB	FauB	FrkF	KeoA	MammAv	MbtB	SacA	USSASB	WOUKB	WokA
AvdB	BerAr	CokB	DonC	FmhAt	FrkB	KeuB	MamuAv	MumA	SacB	USWESB	WeeB	WooB
AveB	BerAt	CokC	DouB	FrkB	FrkC	KreA	MaoB	OTKA	SacC	Udaub	WeeC	
AvsB	BeukAr	CopB	EveB	FrkC	GamB	LakB	MaoC	PEEAR	SacD	UddB	WeeD	

- Proposed Stations
- Alignment
- 200' Buffer
- Rail Lines

0 0.25 0.5 1 Miles

Source: United States Department of Agriculture National Resource Conservation Service, Web Soil Survey (WSS). STV Incorporated, 2020.

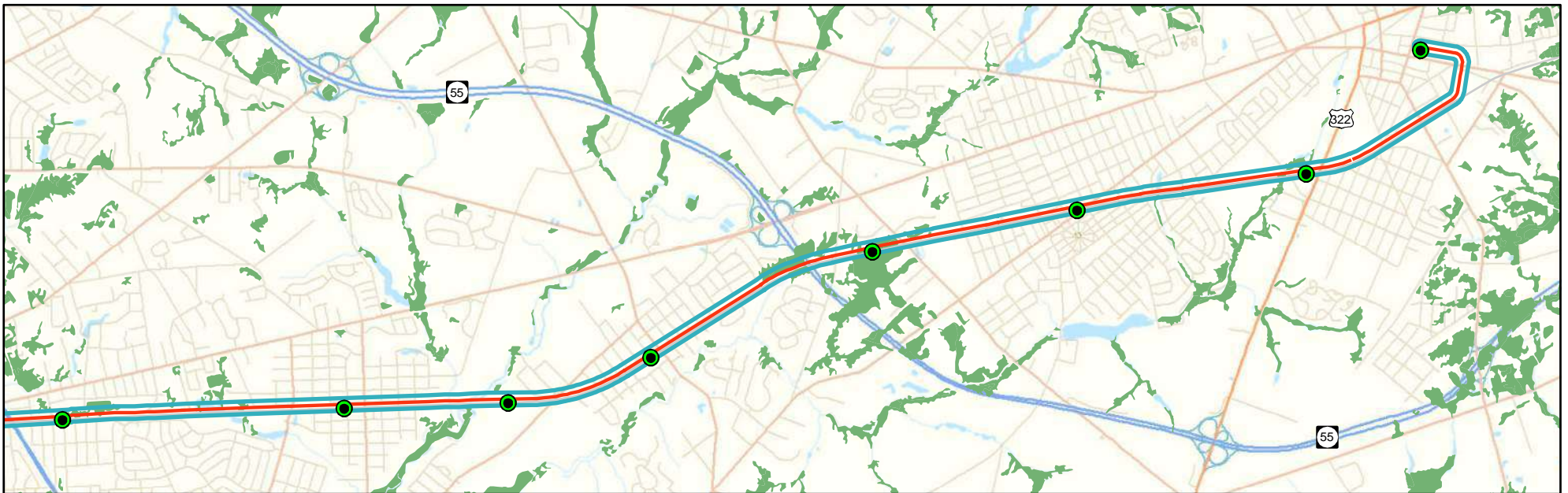
**Table 2: Project Study Area Soils**

Map Symbol	Map Unit Name	Rating
FrFC	Freehold loamy sand, 5 to 10 percent slopes	Non-hydric
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	Non-hydric
FrkD	Freehold sandy loam, 10 to 15 percent slopes	Non-hydric
FrkE	Freehold sandy loam, 15 to 25 percent slopes	Non-hydric
FrrB	Freehold-Urban land complex, 0 to 5 percent slopes	Non-hydric
FrkF	Freehold sandy loam, 25 to 40 percent slopes	Non-hydric
MakAt	Manahawkin muck, 0 to 2 percent slopes, frequently flooded	Hydric
FamA	Fallsington sandy loam, 0 to 2 percent slopes	Hydric
MamnAv	Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded	Hydric
FrFB	Freehold loamy sand, 0 to 5 percent slopes	Non-hydric
BumA	Buddtown-Deptford complex, 0 to 2 percent slopes	Non-hydric
FrkB	Freehold sandy loam, 2 to 5 percent slopes	Non-hydric
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	Non-hydric
JdrA	Jade Run fine sandy loam, 0 to 2 percent slopes	Hydric
BumA	Buddtown-Deptford complex, 0 to 2 percent slopes	Non-hydric
FauB	Fallsington-Urban land complex, 0 to 5 percent slopes	Hydric
USSASB	Urban land-Sassafras complex, 0 to 5 percent slopes	Non-hydric
USAURB	Urban land-Aura complex, 0 to 5 percent slopes	Non-hydric
USWESB	Urban land-Westphalia complex, 0 to 5 percent slopes	Non-hydric

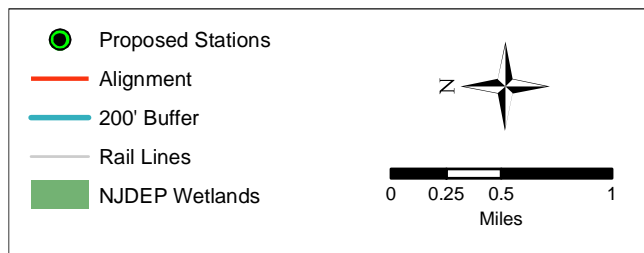
The NJDEP GeoWeb Freshwater Wetland Mapping (Figure 3, “New Jersey Wetlands Map”) was reviewed and sixty-one mapped wetland areas were identified within the project study area. All of the areas were field verified. In some instances, mapped wetlands were not present, as they were previously developed or mapped incorrectly.

Review of the FEMA mapping (Figure 4, “FEMA Floodplain Map”) revealed the project study area crosses fourteen 100-year floodplain areas.

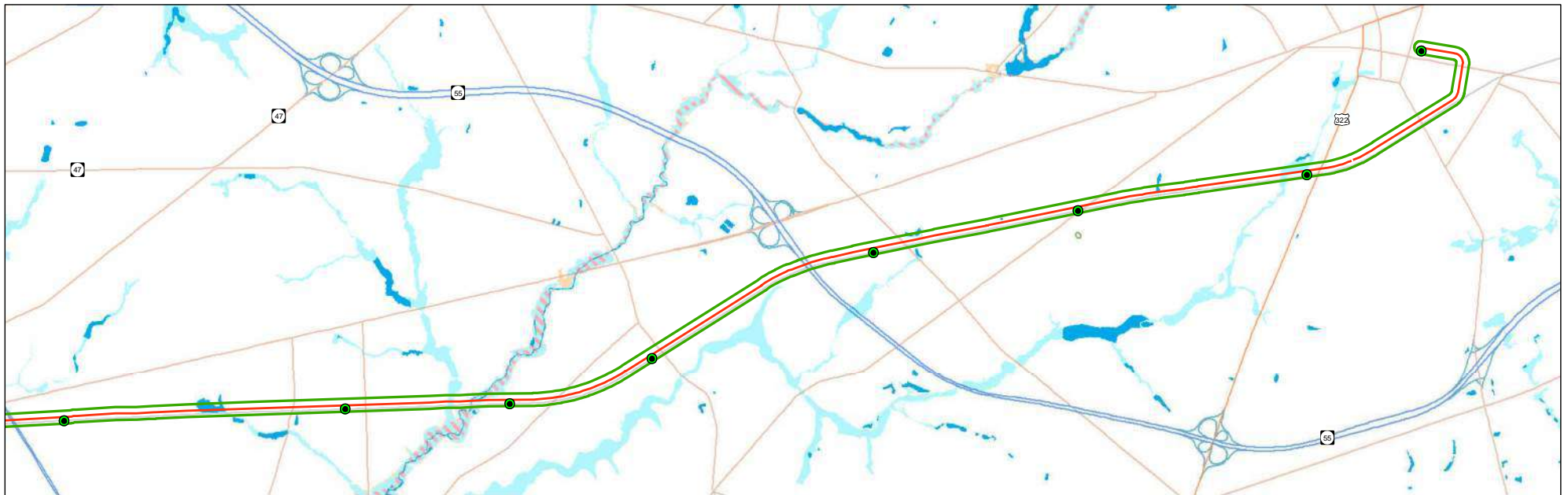
Review of the NWI mapping (Figure 5, “NWI Wetlands Map”) revealed that the project study area contains thirty-five NWI mapped wetland areas. All of the areas were field verified. In some instances, mapped wetlands were not present, as they were previously developed or mapped incorrectly.



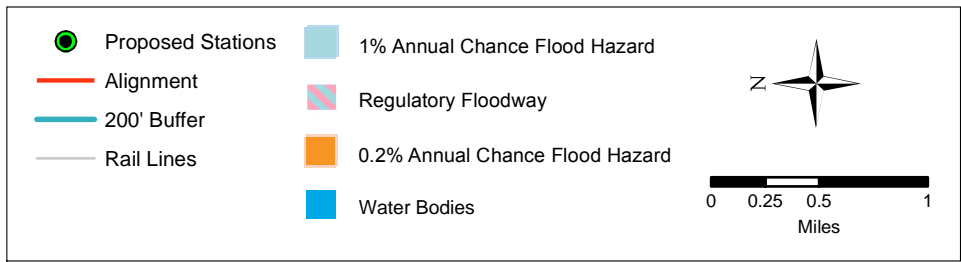
**Figure 3: New Jersey Wetlands Map**



Source: NJDEP Wetlands, New Jersey Department of Environmental Protection (NJDEP), Office of Information Resource Management (OIRM), Bureau of Geographic Information and Analysis (BGA) <http://www.state.nj.us/dep/gis/wetshp.html>. STV Incorporated, 2020.



**Figure 4: FEMA Floodplain Map**



Source: FEMA, National Flood Hazard Layer (NFHL) Database  
<https://hazards.fema.gov/femaportal/NFHL/>  
 STV Incorporated, 2020.

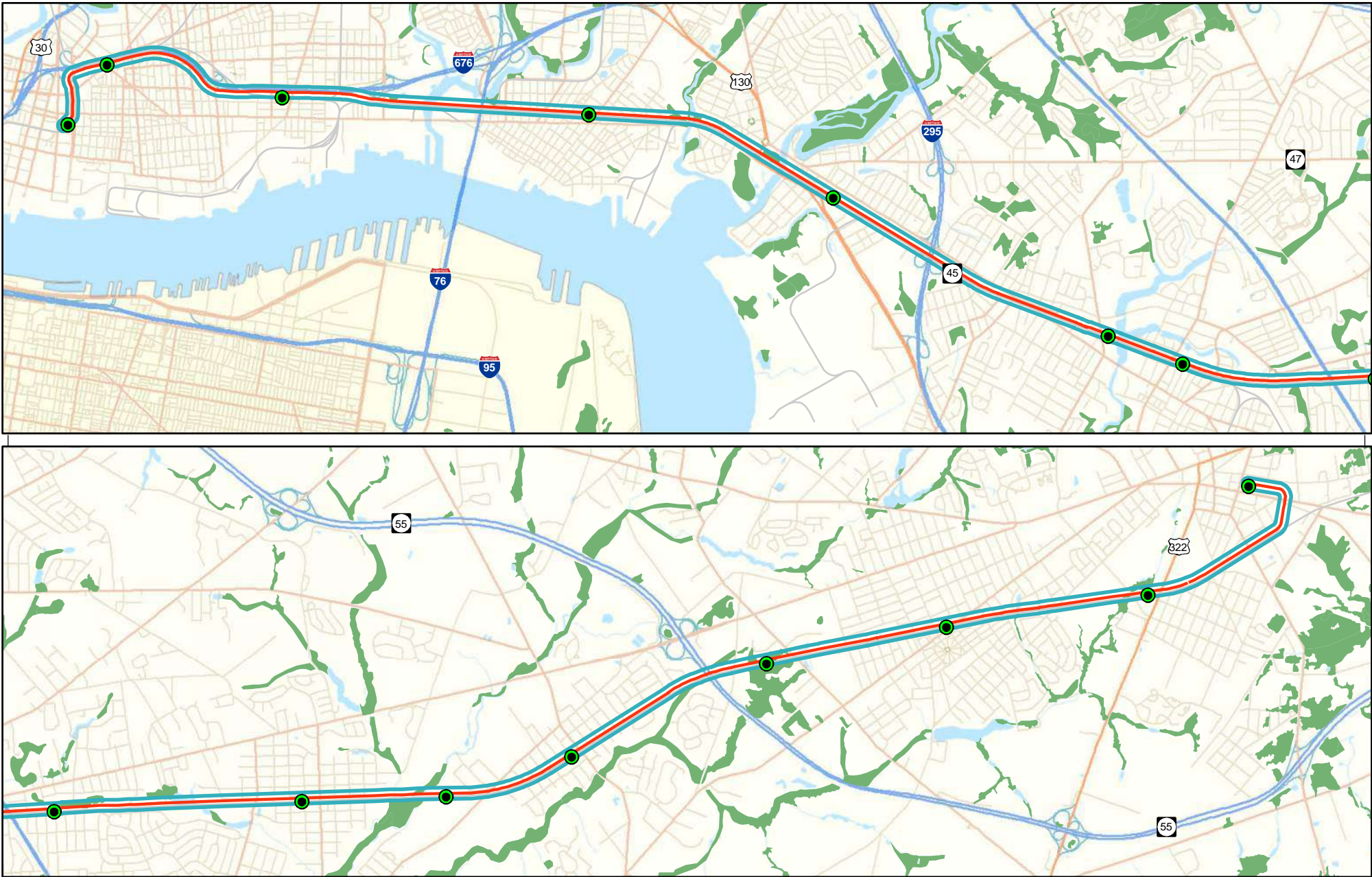
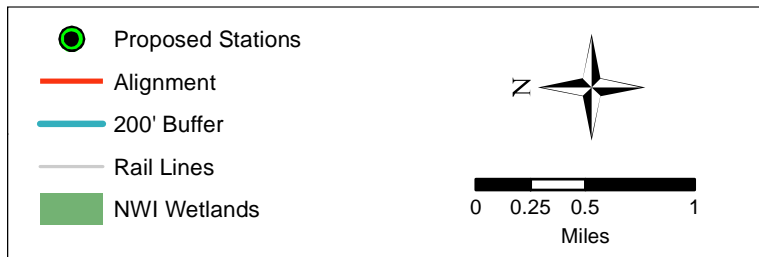


Figure 5: NWI Wetlands Map



Source: National Wetlands Inventory,  
 U.S. Fish and Wildlife Service  
<http://www.fws.gov/wetland/Data/Data-Download.html>  
 STV Incorporated, 2020.



## 4.2 On-Site Findings

Thirty-two jurisdictional water resources were found within the project study area. They are described below:

- Resource 1, WGC-C/WCC-A, is a mapped New Jersey coastal wetland associated with, and includes, Newton Creek located in Gloucester City and Camden. The soil in this wetland is primarily muck. This area would be under the jurisdiction of both the USACE and NJDEP. This area also includes a non-tidal drainage ditch along the eastern side of the railroad in Gloucester City. As this would not be considered Waters of the U.S., the drainage ditch would be under the jurisdiction of the NJDEP only.
- Resource 2, WCC-B, is a non-tidal drainage ditch located along the western side of the railroad in Camden. As this would not be considered a Waters of the U.S., it would be under the jurisdiction of the NJDEP only.
- Resource 3, WGC-A/WBL-C, is a mapped New Jersey coastal wetland associated with, and includes, Little Timber Creek located in Gloucester City and Brooklawn. This area is classified as a NWI palustrine emergent (PEM) wetland. Hydrology in the wetland included surface water, soil saturation and high water table. Soils in the wetland have a redox dark surface. Dominant vegetation includes: purple loosestrife (*Lythrum salicaria*), spotted touch-me-not (*Impatiens capensis*) and Devil's-Darning-Needles (*Clematis virginiana*). This area would be under the jurisdiction of both the USACE and NJDEP.
- Resource 4, WGC-B is a mapped New Jersey coastal wetland in close proximity to Little Timber Creek and is located in Gloucester City. Hydrology in the wetland included surface water, soil saturation and high water table. The soil in this wetland is primarily muck. This area would be under the jurisdiction of both the USACE and NJDEP.
- Resource 5, WWV-A/WBL-A, is a mapped New Jersey coastal wetland associated with, and including, Big Timber Creek located in Westville and Brooklawn. This area is classified as a mapped New Jersey freshwater tidal marsh. Hydrology in this area includes surface water and soil saturation and the soil is muck. Dominant vegetation includes: green ash (*Fraxinus pennsylvanica*), purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*). This area would be under the jurisdiction of both the USACE and NJDEP.
- Resource 6, WWV-B, is a freshwater emergent and scrub-shrub wetland located in Westville. Hydrology in this area includes saturated soils and the soil is primarily muck. Dominant vegetation includes: red osier dogwood (*Cornus alba*), skunk cabbage (*Symplocarpus foetidus*), arrowwood (*Viburnum dentatum*) and horsebrier (*Smilax rotundifolia*). Due to its proximity to tidal waters, this area would be under the jurisdiction of both the USACE and NJDEP.
- Resource 7, WBL-B, is freshwater emergent wetland located in Brooklawn. This area is a mapped NWI palustrine unconsolidated bottom (PUB) wetland. Hydrology includes surface water, saturation and high water table. Soils in the wetland have a dark surface. Dominant vegetation includes: red mulberry (*Morus rubra*), red osier dogwood (*Cornus alba*) and Japanese siltgrass (*Microstegium vimineum*). Due to its proximity to tidal waters, this area would be under the jurisdiction of both the USACE and NJDEP.

- Resource 8, WDP-D, is a freshwater scrub-shrub wetland located in Deptford Township. This area is classified as a mapped New Jersey deciduous scrub/shrub wetland. Hydrology in the wetland is soil saturation and the soil has a depleted matrix. Dominant vegetation includes: red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), Japanese knotweed (*Fallopia japonica*), black cherry (*Prunus serotina*), umbrella flatsedge (*Cyperus diandrus*) and pinkweed (*Persicaria pennsylvanica*). As this area is more than 1,000-feet from tidally-influenced waters, it would be under the jurisdiction of the NJDEP only.
- Resource 9, WWY-A, is Hunter Street Lake/Woodbury Creek, a state open water with a freshwater forested wetland fringe. It is located in Woodbury. Hydrology in the wetland is oxidized rhizospheres along living roots and the soil in the wetland has a redox dark surface. The dominant vegetation includes: black willow (*Salix nigra*), purple loosestrife (*Lythrium salicaria*) and common reed (*Phragmites australis*). As this area is more than 1,000-feet from tidally-influenced waters, it would be under the jurisdiction of the NJDEP only.
- Resource 10, WWH-A, is freshwater forested wetland located in Woodbury Heights and includes the area considered for a proposed Vehicle Maintenance Facility. The wetland is classified as a NWI palustrine forested (PFO) wetland and a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland is oxidized rhizospheres along living roots and the soil in the wetland is a depleted matrix. Dominant vegetation includes: tuliptree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), multiflora rose (*Rosa multiflora*), spicebush (*Lindera benzoin*), Japanese honeysuckle (*Lonicera japonica*) and Virginia creeper (*Parthenocissus quinquefolia*). This area would be under the jurisdiction of the NJDEP only.
- Resource 11, WWH-B, is a non-tidal stormwater drainage ditch located in Woodbury Heights. This area would be under the jurisdiction of the NJDEP only.
- Resource 12, WDP-A, is a forested freshwater wetland associated with, and includes, an unnamed tributary to Mantua Creek located in Deptford Township. It is classified as a mapped New Jersey deciduous scrub/shrub wetland. Hydrology in this wetland includes soil saturation, water marks and oxidized rhizospheres along living roots and the soil has a depleted matrix. Dominant vegetation in the wetland includes: black willow (*Salix nigra*), brookside alder (*Alnus serrulata*), American elm (*Ulmus americana*) and swamp smartweed (*Persicaria hydropiperoides*). This area would be under the jurisdiction of the NJDEP only.
- Resource 13, WDP-B, is a forested freshwater wetland and non-tidal drainage ditch located in Deptford Township. Hydrology includes surface water and soil saturation and the soil has a dark redox surface. Dominant vegetation includes pin oak (*Quercus palustris*), tuliptree (*Liriodendron tulipifera*), white fringe tree (*Chionanthus virginicus*), sweet pepperbush (*Clethra alnifolia*) and low bush blueberry (*Vaccinium angustifolium*). This area would be under the jurisdiction of the NJDEP only.
- Resource 14, WDP-C, is Marlton Lake, a state open water with a freshwater forested wetland fringe. It is located in Deptford Township. This area is classified as a NWI PUB wetland and a mapped New Jersey deciduous scrub/shrub wetland. Hydrology in the wetland includes surface water, soil saturation and high water table. The soil in the wetland has a depleted matrix. Dominant vegetation

includes: red maple (*Acer rubrum*), sweet pepperbush (*Clethra alnifolia*) and marginal wood fern (*Dryopteris marginalis*). This area would be under the jurisdiction of the NJDEP only.

- Resource 15, WWN-C, is a pond and considered a state open water with an emergent freshwater wetland fringe located in Wenonah Borough. The area is classified as a NWI PUB wetland. Hydrology in the wetland includes saturation and surface water and the soil has a depleted matrix. Dominant vegetation includes: red maple (*Acer rubrum*), sweet pepperbush (*Clethra alnifolia*), arrowwood (*Viburnum dentatum*), Japanese siltgrass (*Microstegium vimineum*) and pinkweed (*Persicaria pensylvanica*). This area would be under the jurisdiction of the NJDEP only.
- Resource 16, WMT-G/WWN-A, is a freshwater forested/scrub-shrub wetland located in Mantua Township and Deptford Township. The wetland is associated with, and includes, Mantua Creek. It is classified as a NWI PFO/PEM wetland and a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland includes surface water, high water table, saturation, oxidized rhizospheres along living roots and drainage patterns. Dominant vegetation in the wetland includes: red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), arrowwood (*Viburnum dentatum*), eastern poison ivy (*Toxicodendron radicans*), horsebrier (*Smilax rotundifolia*) and swamp smartweed (*Persicaria hydropiperoides*). Soil in the wetland has a redox dark surface and depleted matrix. This area would be under the jurisdiction of the NJDEP only.
- Resource 17, WWN-B, is a freshwater forested wetland and a non-tidal drainage ditch located in Wenonah Borough and Deptford Township. The wetland is associated with, and includes, Monongahela Brook. It is classified as a NWI PFO/PEM wetland and a mapped New Jersey deciduous wooded wetland. Soil in the wetland has a dark redox surface and hydrology includes soil saturation. Vegetation in the wetland includes: red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*) and Virginia creeper (*Parthenocissus quinquefolia*). This area would be under the jurisdiction of the NJDEP only.
- Resource 18, WMT-E, is a non-tidal drainage ditch located in Mantua Township. This area would be under the jurisdiction of the NJDEP only.
- Resource 19, WMT-F, is a forested freshwater wetland located in Mantua Township. The wetland is associated with, and includes a tributary of Chestnut Branch and is a NWI PFO wetland. Hydrology in the wetland includes surface water, soil saturation and high water table and the soil within the wetland has a redox dark surface and muck. Dominant vegetation includes: red maple (*Acer rubrum*), tuliptree (*Liriodendron tulipifera*), common reed (*Phragmites australis*), stinging nettle (*Urtica dioica*), arrowwood (*Viburnum dentatum*), common winterberry (*Ilex verticillata*), swamp smartweed (*Persicaria hydropiperoides*) and Virginia creeper (*Parthenocissus quinquefolia*). This area would be under the jurisdiction of the NJDEP only.
- Resource 20, WMT-A, is a forested freshwater wetland located in Mantua Township. This wetland is classified as a NWI PFO wetland and a mapped New Jersey deciduous wooded wetland. Hydrology within the wetland includes oxidized rhizospheres along living roots and the presence of reduced iron. Dominant vegetation includes: red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), American holly (*Ilex opaca*), devil's-pitchfork (*Bidens frondosa*) and sensitive fern (*Onoclea sensibilis*).

The soil within the wetland has a redox dark surface. This area would be under the jurisdiction of the NJDEP only.

- Resource 21, WMT-B, is a forested freshwater wetland located in Mantua Township. This wetland is classified as a NWI PFO wetland. Hydrology within the wetland includes saturation and oxidized rhizospheres along living roots. Dominant vegetation includes: red maple (*Acer rubrum*), American holly (*Ilex opaca*), spicebush (*Lindera benzoin*) and arrowwood (*Viburnum dentatum*), Virginia creeper (*Parthenocissus quinquefolia*), Asian bittersweet (*Celastrus orbiculatus*) and fox grape (*Vitis labrusca*). The soil within the wetland has a redox dark surface. This area would be under the jurisdiction of the NJDEP only.
- Resource 22, WMT-C, is a forested freshwater wetland located in Mantua Township. This wetland is classified as a NWI PFO wetland and a mapped New Jersey deciduous wooded wetland. Hydrology within the wetland includes oxidized rhizospheres along living roots and the soil has a redox dark surface. Dominant vegetation includes: red maple (*Acer rubrum*), American sycamore (*Platanus occidentalis*), pin oak (*Quercus palustris*), red osier dogwood (*Cornus alba*), pinkweed (*Persicaria pensylvanica*) and uptight sedge (*Carex stricta*). This area would be under the jurisdiction of the NJDEP only.
- Resource 23, WMT-D, is a forested freshwater wetland located in Mantua Township. The wetland is classified as a NWI palustrine forest/scrub shrub (PFO/SS) wetland and a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland includes saturated soils and the soil has a dark redox surface. Dominant vegetation includes: red maple (*Acer rubrum*), marsh primrose-willow (*Ludwigia palustris*) and swamp smartweed (*Persicaria hydropiperoides*). This area would be under the jurisdiction of the NJDEP only.
- Resource 24, WPT-C, is a freshwater forested/scrub-shrub wetland located in Pitman. It is classified as a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland includes surface water, saturation and drift deposits. The soil within the wetland is muck. Dominant vegetation includes: sweet-gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), great bladder sedge (*Carex intumescens*) and uptight sedge (*Carex stricta*). This area would be under the jurisdiction of the NJDEP only.
- Resource 25, WPT-D, is a forested freshwater wetland located in Pitman. The wetland is associated with, and includes, an unnamed tributary of Chestnut Branch. It is classified as a NWI PFO wetland and a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland is surface water and the soil has a depleted matrix. Dominant vegetation includes: red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), common reed (*Phragmites australis*) and lamp rush (*Juncus effuses*). This area would be under the jurisdiction of the NJDEP only.
- Resource 26, WPT-A, is Glen Lake, a state open water located in Pitman. This area would be under the jurisdiction of the NJDEP only.
- Resource 27, WPT-B, is a forested freshwater wetland located in Pitman. The wetland is associated with a tributary of Chestnut Branch. It is classified as a NWI PFO wetland and a mapped New Jersey deciduous wooded/herbaceous/phragmites dominant wetland. Hydrology in the wetland includes

surface water and saturation. The soil within the wetland has a redox dark surface. Dominant vegetation includes: Red maple (*Acer rubrum*), multiflora rose (*Rosa multiflora*), common winterberry (*Ilex verticillata*), skunk cabbage (*Symplocarpus foetidus*), spotted forget-me-not (*Impatiens capensis*) and eastern poison ivy (*Toxicodendron radicans*). This area would be under the jurisdiction of the NJDEP only.

- Resource 28, WGO-A, is Chestnut Branch, a state open water located in Glassboro. This area would be under the jurisdiction of the NJDEP only.
- Resource 29, WGO-B, is a non-tidal drainage ditch along the south side of the railroad located in Glassboro. This area would be under the jurisdiction of the NJDEP only.
- Resource 30, WGO-C, is a forested freshwater wetland with associated drainage ditches located in the area considered as a Vehicle Maintenance Facility in Glassboro. It is classified as a NWI PFO wetland and a mapped New Jersey deciduous wooded wetland. Hydrology in the wetland includes surface water, soil saturation, oxidized rhizospheres, drainage patterns and sphagnum moss. Dominant vegetation includes: red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), ash-leaf maple (*Acer negundo*), horsebrier (*Smilax rotundifolia*), twinsisters (*Lonicera tatarica*) red osier (*Cornus sericea*), lamp rush (*Juncus effusus*) and Japanese honeysuckle (*Lonicera japonica*). This area would be under the jurisdiction of the NJDEP only.
- Resource 31, WGO-D, is a forested freshwater wetland located in the area considered as a Vehicle Maintenance Facility in Glassboro. It is classified as a New Jersey mapped deciduous wooded wetland. Hydrology in the wetland includes surface water, high water table, saturated soil, moss trim lines and sphagnum moss. Dominant vegetation includes: red maple (*Acer rubrum*), pin oak (*Quercus palustris*), American holly (*Ilex opaca*), red osier (*Cornus sericea*), Northern spicebush (*Lindera benzoin*) and cinnamon fern (*Osmundastrum cinnamomeum*). This area would be under the jurisdiction of the NJDEP only.
- Resource 32, WGO-E, is an emergent freshwater wetland located in the area considered for the proposed Vehicle Maintenance Facility in Glassboro. Hydrology in the wetland includes surface water, high water table and saturated soil. Dominant vegetation includes: ash-leaf maple (*Acer negundo*), red maple (*Acer rubrum*), Allegheny blackberry (*Rubus allegheniensis*), common reed (*Phragmites australis*), spreading dogbane (*Apocynum androsaemifolium*) and lamp rush (*Juncus effuses*). This area would be under the jurisdiction of the NJDEP only.

Table 3, “Water Resources Summary,” contains a detailed summary of each of the thirty-two resources identified within the project study area. Locations of the wetlands can be found in Appendix 2-A, “Water Resource Location Map.” Datasheets for the wetland and upland points can be found in Appendix 2-B, “Wetland Data Forms.” Photographs of the resources are located in Appendix 2-C, “Photographs.”

**Table 3: Water Resources Summary**

Resource No.	Resource Name	Resource Type	Primary Hydric Soil Indicator	Hydrologic Indicators	Dominant Vegetation	Resource Size (within study area)
1	WGC-C/ WCC-A	Mapped Coastal Wetlands and Drainage Ditch	Muck	Newton Creek	N/A	7.00 acres
2	WCC-B	Drainage Ditch	N/A	N/A	N/A	0.15 acre
3	WGC-A\ WBL-C	Mapped Coastal Wetlands	Redox Dark Surface	Little Timber Creek Surface water, saturation, high water table	<i>Lythrium salicaria</i> <i>Impatiens capensis</i> <i>Clematis virginiana</i>	3.34 acre
4	WGC-B	Mapped Coastal Wetlands	Muck	Little Timber Creek	N/A	1.89 acres
5	WWV-A/ WBL-A	Mapped Coastal Wetlands	Muck	Big Timber Creek Surface Water, Soil Saturation	<i>Fraxinus pennsylvanica</i> <i>Lythrium salicaria</i> <i>Phragmites australis</i>	5.77 acres
6	WWV-B	Freshwater Wetland (Emergent/Scrub-Shrub)	Muck	Soil Saturation	<i>Cornus alba</i> <i>Symplocarpus foetidus</i> <i>Viburnum dentatum</i> <i>Smilax rotundifolia</i>	0.94 acres
7	WBL-B	Freshwater Wetland (Emergent)	Dark Surface	Surface water, saturation, high water table	<i>Morus rubra</i> <i>Cornus alba</i> <i>Microstegium vimineum</i>	0.97 acres
8	WDP-D	Freshwater Wetland (Scrub-Shrub)	Depleted Matrix	Soil Saturation	<i>Acer rubrum</i> <i>Liquidambar styraciflua</i> <i>Fallopia japonica</i> <i>Prunus serotina</i> <i>Cyperus diandrus</i> <i>Persicaria pensylvanica</i>	1.08 acre
9	WWY-A	State Open Water (Lake/Stream) with Freshwater Wetland Fringe (Forested)	Redox Dark Surface	Hunter Street Lake/Woodbury Creek Oxidized Rhizospheres along Living Roots	<i>Salix nigra</i> <i>Lythrium salicaria</i> <i>Phragmites australis</i>	3.81 acres
10	WWH-A	Freshwater Wetland (Forested)	Depleted matrix	Oxidized Rhizospheres along Living Roots	<i>Liriodendron tulipifera</i> <i>Acer rubrum</i> <i>Rosa multiflora</i> <i>Lindera benzoin</i>	4.60 acres

Table 3: Wetland Resources Summary (continued)

Resource No.	Resource Name	Resource Type	Primary Hydric Soil Indicator	Hydrologic Indicators	Dominant Vegetation	Resource Size (within study area)
11	WWH-B	Drainage Ditch	N/A	N/A	N/A	0.06 acre
12	WDP-A	Freshwater Wetland (Forested)	Depleted matrix	Tributary of Mantua Creek High water table, Soil Saturation, Water Marks, Oxidized Rhizospheres along Living Roots	<i>Salix nigra</i> <i>Alnus serrulata</i> <i>Ulmus americana</i> <i>Persicaria hydropiperoides</i>	2.36 acres
13	WDP-B	Freshwater Wetland/Drainage ditch (Forested)	Redox Dark Surface	Surface Water, Soil Saturation	<i>Quercus palustris</i> <i>Liriodendron tulipifera</i> <i>Chionanthus virginicus</i> <i>Clethra alnifolia</i> <i>Vaccinium angustifolium</i>	0.06 acre
14	WDP-C	State Open Water (Lake) with Freshwater Wetland Fringe (Forested)	Depleted Matrix	Marlton Lake Surface Water, Soil Saturation, High Water Table	<i>Acer rubrum</i> <i>Clethra alnifolia</i> <i>Dryopteris marginalis</i>	5.37 acres
15	WWN-C	State Open Water (Pond) with Freshwater Wetland Fringe (Emergent)	Depleted Matrix	Surface Water, Soil Saturation	<i>Acer rubrum</i> <i>Clethra alnifolia</i> <i>Viburnum dentatum</i> <i>Microstegium vimineum</i> <i>Persicaria pennsylvanica</i>	0.07 acre
16	WMT-G/ WWN-A	Freshwater Wetland (Forested/Scrub-Shrub)	Redox Dark Surface, Depleted Matrix	Mantua Creek High Water Table, Surface Water, Soil Saturation, Oxidized Rhizospheres along Living Roots, Drainage Patterns	<i>Acer rubrum</i> <i>Fraxinus pennsylvanica</i> <i>Viburnum dentatum</i> <i>Toxicodendron radicans</i> <i>Smilax rotundifolia</i> <i>Persicaria hydropiperoides</i>	3.78 acres
17	WWN-B	Freshwater Wetland (Forested) and Drainage Ditch	Redox Dark Surface	Monongahela Brook Soil Saturation	<i>Acer rubrum</i> <i>Fraxinus pennsylvanica</i> <i>Parthenocissus quinquefolia</i>	1.41 acres
18	WMT-E	Drainage Ditch	N/A	N/A	N/A	0.02 acre

**Table 3: Wetland Resources Summary (continued)**

Resource No.	Resource Name	Resource Type	Primary Hydric Soil Indicator	Hydrologic Indicators	Dominant Vegetation	Resource Size (within study area)
19	WMT-F	Freshwater Wetland (Forested)	Redox Dark Surface/muck	Chestnut Branch Tributary Surface Water, Soil Saturation, High Water Table	<i>Acer rubrum</i> <i>Liriodendron tulipifera</i> <i>Phragmites australis</i> <i>Urtica dioica</i> <i>Viburnum dentatum</i> <i>Ilex verticillata</i> <i>Persicaria hydropiperoides</i> <i>Parthenocissus quinquefolia</i>	1.83 acres
20	WMT-A	Freshwater Wetland (Forested)	Redox Dark Surface	Oxidized Rhizospheres along Living Roots, Presence of Reduced Iron	<i>Acer rubrum</i> <i>Liquidambar styraciflua</i> <i>Ilex opaca</i> <i>Bidens frondosa</i> <i>Onoclea sensibilis</i>	3.02 acres
21	WMT-B	Freshwater Wetland (Forested)	Redox Dark Surface	Soil Saturation, Oxidized Rhizospheres along Living Roots	<i>Acer rubrum</i> <i>Ilex opaca</i> <i>Lindera benzoin</i> <i>Viburnum dentatum</i> <i>Parthenocissus quinquefolia</i> <i>Celastrus orbiculatus</i> <i>Vitis labrusca</i>	0.22 acre
22	WMT-C	Freshwater Wetland (Forested)	Redox Dark Surface	Oxidized Rhizospheres along Living Roots	<i>Acer rubrum</i> <i>Platanus occidentalis</i> <i>Quercus palustris</i> <i>Cornus alba</i> <i>Persicaria pensylvanica</i> <i>Carex stricta</i>	0.86 acre



Table 3: Wetland Resources Summary (continued)

Resource No.	Resource Name	Resource Type	Primary Hydric Soil Indicator	Hydrologic Indicators	Dominant Vegetation	Resource Size (within study area)
23	WMT-D	Freshwater Wetland (Forested)	Redox Dark Surface	Soil Saturation	<i>Acer rubrum</i> <i>Ludwigia palustris</i> <i>Persicaria hydropiperoides</i>	1.51 acres
24	WPT-C	Freshwater Wetland (Forested/Scrub-shrub)	Muck	Surface Water, Soil Saturation, Drift Deposits	<i>Liquidambar styraciflua</i> <i>Acer rubrum</i> <i>Carex intumescens</i> <i>Carex stricta</i>	0.71 acres
25	WPT-D	Freshwater Wetland (Forested/Scrub-Shrub)	Muck	Tributary of Chestnut Branch	<i>Acer rubrum</i> <i>Liquidambar styraciflua</i> <i>Phragmites australis</i> <i>Juncus effusus</i>	1.21 acre
26	WPT-A	State Open Water (Lake)	N/A	Glen Lake	N/A	0.25 acre
27	WPT-B	Freshwater Wetland (Forested)	Redox Dark Surface	Tributary of Chestnut Branch Surface Water, Soil Saturation	<i>Acer rubrum</i> <i>Rosa multiflora</i> <i>Ilex verticillata</i> <i>Symplocarpus foetidus</i> <i>Impatiens capensis</i> <i>Toxicodendron radicans</i>	0.25 acre
28	WGO-A	State Open Water (Stream)	N/A	Chestnut Branch	N/A	0.38 acre
29	WGO-B	Drainage Ditch	N/A	N/A	N/A	0.58 acre
30	WGO-C	Freshwater Forested Wetland	Redox Dark Surface	Surface Water, Saturation, Oxidized Rhizospheres, Drainage Patterns, Sphagnum Moss	<i>Acer rubrum</i> <i>Liquidambar styraciflua</i> <i>Acer negundo</i> <i>Smilax rotundifolia</i> <i>Lonicera tatarica</i> <i>Cornus sericea</i> <i>Juncus effuses</i> <i>Lonicera japonica</i>	2.88 acres

**Table 3: Wetland Resources Summary (continued)**

Resource No.	Resource Name	Resource Type	Primary Hydric Soil Indicator	Hydrologic Indicators	Dominant Vegetation	Resource Size (within study area)
31	WGO-D	Freshwater Forested Wetland	Dark Surface	Surface Water, High Water Table, Saturation, Moss Trim Lines, Sphagnum Moss	<i>Acer rubrum</i> <i>Quercus palustris</i> <i>Ilex opaca</i> <i>Cornus sericea</i> <i>Lindera benzoin</i> <i>Osmundastrum cinnamomeum</i>	0.63 acre
32	WGO-E	Freshwater Emergent Wetland	Dark Surface	Surface Water, High Water Table, Saturation	<i>Acer negundo</i> <i>Acer rubrum</i> <i>Rubus allegheniensis</i> <i>Phragmites australis</i> <i>Apocynum androsaemifolium</i> <i>Juncus effuses</i>	0.29 acre

## 5 QUALIFICATION STATEMENT

STV has prepared this wetland delineation report in accordance with applicable regulations and guidance documents. The wetland delineation was performed in accordance with the *Federal Manual* currently used by NJDEP and recognized by USACE. The wetland delineation and report were primarily completed by Michael Francis and Dorothy Daly with STV.

Dr. Francis is a Senior Environmental Project Manager with over 34 years of experience in environmental consulting and is experienced in managing a wide variety of environmental issues while working with environmental and engineering consulting firms, public entities and regulatory agencies. He has directed and supervised over 1,000 freshwater/coastal wetland delineations and preparation of Wetland Delineation Reports and multiple land use permit applications for submission to State and Federal agencies for public and private projects in New Jersey, New York, Pennsylvania, Delaware, Connecticut, Illinois, Tennessee and Texas.

Ms. Daly has 23 years of planning, design and natural resources expertise garnered throughout the Mid-Atlantic area. Ms. Daly has completed the U.S. Army Corps of Engineers Wetland Delineation Training (1987 Manual) and has conducted wetland studies, prepared wetland reports and mitigation plans for resources in both the public and private sectors. She has prepared NEPA documentation and state and federal permits for pipeline and utility corridors, roadway widening, and bridge replacement projects. She has designed wetland replacement sites, roadside development plans and streetscapes, as well as prepared evaluations of forest species and impact mitigation and planting plans.

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