



ATTACHMENT 1

Natural Resources 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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Appendices

Appendix 1-A: Natural Resources Impact Location

Foreword

Following the issuance of the Draft Environmental Impact Statement (November 2nd, 2020), revisions have been made to this Technical Report (Attachment 1, “Natural Resources Technical Report”) in preparation of the Final Environmental Impact Statement as follows:

- Section 4.6, Page 43: The following note was added to Table 8, “Species of Special Concern”: “Wild Celery grows in fresh non-tidal and fresh to slightly brackish tidal waters around the world, usually in areas where the water is 2.75 to six feet deep. Wild Celery prefers coarse soil that is silty or sandy, is more tolerant of murky, nutrient-rich waters, and withstands waves better than other bay grasses. If Wild Celery is identified during other survey activity (i.e., as the project advances to preliminary engineering), it will be identified and the location provided.”
- Section 4.6, Page 44: The following text was revised for clarity: “While these species are not yet listed, potential impacts to the species habitat will be considered as part of project refinement in preliminary engineering, and measures to reduce impacts to bat habitat will be implemented as part of the proposed project.”
- Section 6, Page 86: Added Section 6, “References”
- Minor editorial and typographical revisions, as well as formatting adjustments, have been made as appropriate

1 INTRODUCTION

This attachment describes existing natural resources within the study area for the proposed Glassboro-Camden Line (GCL) and describes the environmental consequences of the proposed action. The environmental consequences section includes potential direct and indirect effects of the GCL on resources within and adjacent to the rail corridor and within the vicinity of proposed stations and maintenance vehicle facilities. Measures to mitigate potential impacts are also identified.

2 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 temporally, 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.

3 PRINCIPAL CONCLUSIONS

The detailed analyses of natural resources within ¼ mile of the proposed GCL rail corridor resulted in the determination that there may be impacts to natural resources including plant communities, soils, farmland, threatened and endangered species, and water resources.

The impacts to plant communities include approximately 60 acres of impact to forested areas including deciduous forest, mixed deciduous/ evergreen forest, and deciduous forested wetlands. Impacts to these communities will be addressed in a New Jersey Department of Environmental Protection (NJDEP) Reforestation Plan prepared in accordance with NJDEP and the New Jersey No Net Loss Reforestation Act.

Most of the project corridor within Camden County and the northern portion of Gloucester County lies within acid-producing soil (APS) formations. Approximately 63.74 acres of potential APS would be disturbed during construction. Mitigation measures include the development of an APS management plan in coordination with the Camden and Gloucester County Soil Conservation Districts to contain and remediate APS soils exposed during construction.

Important farmland soils occur within the LOD (primarily at the Mantua Boulevard Station), including soils that have been classified as prime, unique, or of statewide importance according to the United States Department of Agriculture, Natural Resources Conservation Service. This area would be subject to U.S. Department of Agriculture (USDA) review in accordance with the Farmland Protection Policy Act to

address potential for loss of important farmland soils. Therefore, under the Farmland Protection Act, the potential effects of the proposed GCL's impact on farmland soils requires coordination with the USDA.

Table 1, "Potential Threatened and Endangered Species Habitat," shows the threatened and endangered species were found to have suitable habitat within the GCL LOD:

Table 1: Potential Threatened and Endangered Species Habitat

Common Name	Scientific Name	Status
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Federally Threatened
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	Federally Endangered
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Federally Endangered
American Kestrel	<i>Flaco sparverius</i>	State Threatened
Bald Eagle	<i>Haliaeetus leucocephalus</i>	State Endangered (Breeding)
		State Threatened (Non-Breeding)
Peregrine Falcon	<i>Falco peregrinus</i>	State Endangered
Barred Owl	<i>Strix varia</i>	State Threatened
Red-Shouldered Hawk	<i>Buteo lineatus</i>	State Endangered
Shingle Oak	<i>Quercus imbricaria</i>	State Endangered

While efforts have already been made to minimize impacts through design and mitigation measures, the significance of any impacts identified cannot be determined until consultation with the regulating agency.

The primary mitigation measure is anticipated to be seasonal restrictions of tree clearing and in-water work during times that threatened and endangered species are likely to be present. Seasonal restrictions and other mitigation measures will be established during consultation and coordination with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and NJDEP. Therefore, the potential effects of the proposed GCL's impact on the following animal species – Northern Long-Eared Bat, Atlantic Sturgeon, Shortnose Sturgeon, American Kestrel, Bald Eagle, Peregrine Falcon Barred Owl, Red Shouldered Hawk, and Shingle Oak – require further agency coordination.

Impacts that occur within regulated water resources would require multiple permits and agency approvals including:

- US Army Corps of Engineers Section 404 Permit in accordance with the Clean Water Act for construction activities within Waters of the US.
- NJDEP Freshwater Wetlands Permit in accordance with the New Jersey Freshwater Wetlands Protection Act
- NJDEP Flood Hazard Area permit in accordance with the New Jersey Flood Hazard Control Act
- NJDEP Water Front Development Permit in accordance with the New Jersey Coastal Zone Management Rules

- NJDEP Stormwater Management Plan Review and Approval in accordance with the New Jersey Stormwater Management Rules

As part of these approvals compensatory mitigation is likely to be required for impacts to wetlands and riparian zones.

4 AFFECTED ENVIRONMENT

This report is intended to characterize the natural resources that occur within and adjacent to the GCL rail corridor to describe the environmental resources that may be affected by the proposed project. This report includes information obtained through public sources such as U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC), the New Jersey Department of Environmental Protection (NJDEP) Natural Heritage Program, National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) Online Mapper and the Natural Resources Conservation Service (NRCS) Web Soil Survey for Gloucester and Camden counties, as well as, information obtained through field investigation within a study area extending up to ¼ mile from the rail corridor (Figure 1, “Corridor Study Area”).

4.1 Plant Communities

Plant communities that occur within the study area include deciduous forest, evergreen forest, mixed forest, deciduous forested wetlands, emergent wetlands, old-field, agriculture, and maintained land. Plant communities were identified using the most current NJDEP Land Use/Land Cover GIS data (NJDEP Geographic Information Systems, last updated February 17, 2015), and augmented through field investigation. The distribution of different plant communities is shown in Figure 2, “Plant Communities,” and described as follows:

4.1.1 Deciduous Forest

Deciduous forest is the most common plant community type found within the study area totaling approximately 565 acres. Tree species typically associated with deciduous forest include red maple (*Acer rubrum*), black oak (*Quercus velutina*), red oak (*Quercus rubra*), sycamore (*Platanus occidentalis*), sweetgum (*Liquidambar styraciflua*), black walnut (*Juglans nigra*), tulip tree (*Liriodendron tulipifera*), and American beech (*fagus americana*). Understory plants include mountain laurel (*Kalmia latifolia*), high bush blueberry (*Vaccinium corymbosum*), low bush blueberry (*Vaccinium angustifolium*), black huckleberry (*Gaylussacia baccata*), multiflora rose (*Rosa multiflora*), roundleaf greenbrier (*Smilax rotundifolia*), Japanese barberry (*Berberis thunbergii*), arrowwood (*Viburnum dentatum*) and tartatian honeysuckle (*Lonicera tatarica*). Vines such as poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), Japanese honeysuckle (*Lonicera japonica*) and grape (*Vitis spp.*) can also be found.

Deciduous forest within the study area ranges in age class from early successional to mature forest. The majority of the forest within the study area is early to mid-successional forest, typically comprised of 50-100 percent canopy cover and most trees ranging in size from 6 to 12 inches in diameter at breast height (dbh). Most of the deciduous forest that occurs immediately adjacent to the rail corridor are

predominantly early successional forest. Mature forest also occurs within the study area and typically exhibits 100 percent canopy cover with most trees having a dbh of greater than 16 inches. An oak dominant mature deciduous forest occurs in West Deptford associated with a tributary to Big Timber Creek and an oak/sycamore dominated mature deciduous forest occurs in Woodbury near Woodbury Lake. The largest area of mature contiguous forest occurs near Mantua and is associated with the drainage of Mantua Creek and Chestnut Branch.

4.1.2 Evergreen Forest

Evergreen forest consisting of white pine (*Pinus strobus*), pitch pine (*Pinus rigida*), and eastern red cedar (*Juniperus virginiana*) is found in only one portion of the study area accounting for three acres within Pitman.

4.1.3 Mixed Forest

Mixed forest communities contain both the deciduous and evergreen trees described above within the study area. Approximately 96 acres of mixed forest is mapped throughout the study area. This community type is found predominantly within the southern portion of the study area existing in small patches from Wenonah to a large forested complex in Glassboro. Late successional mixed forest can be found in Glassboro along the rail near Rowan University.

4.1.4 Deciduous Forested Wetlands

Deciduous forested wetlands include late successional and mature stands of red maple, sycamore, sweetgum, and black willow (*Salix nigra*). Approximately 183 acres of forested wetlands are found within the study area. The largest contiguous forested wetland exists in Mantua near Mantua Creek to the north and Chestnut Branch to the south. A more detailed discussion of wetlands is provided in Section 4.7.2, "Wetlands."

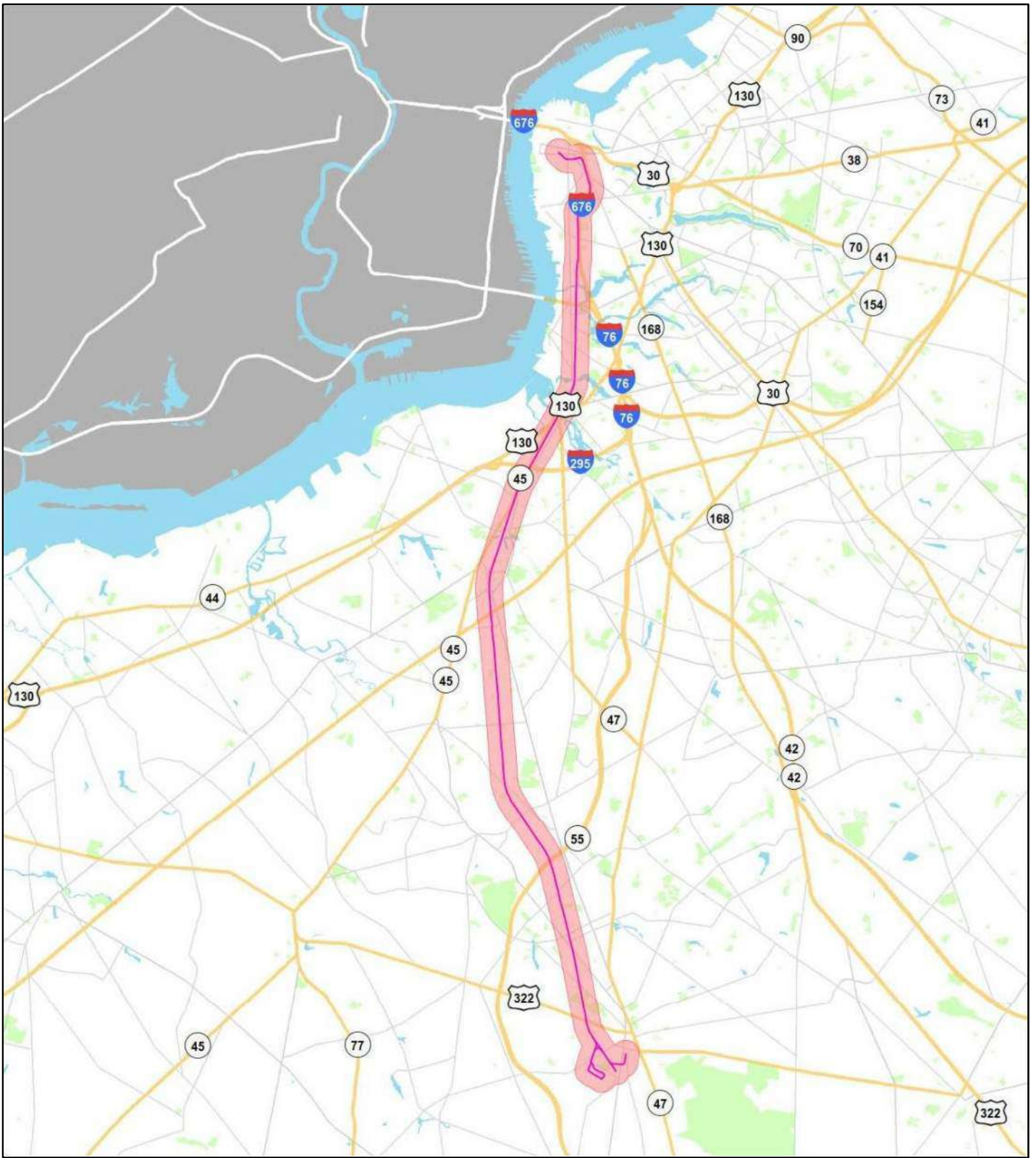
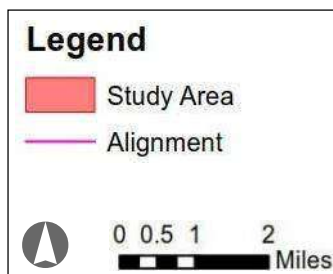
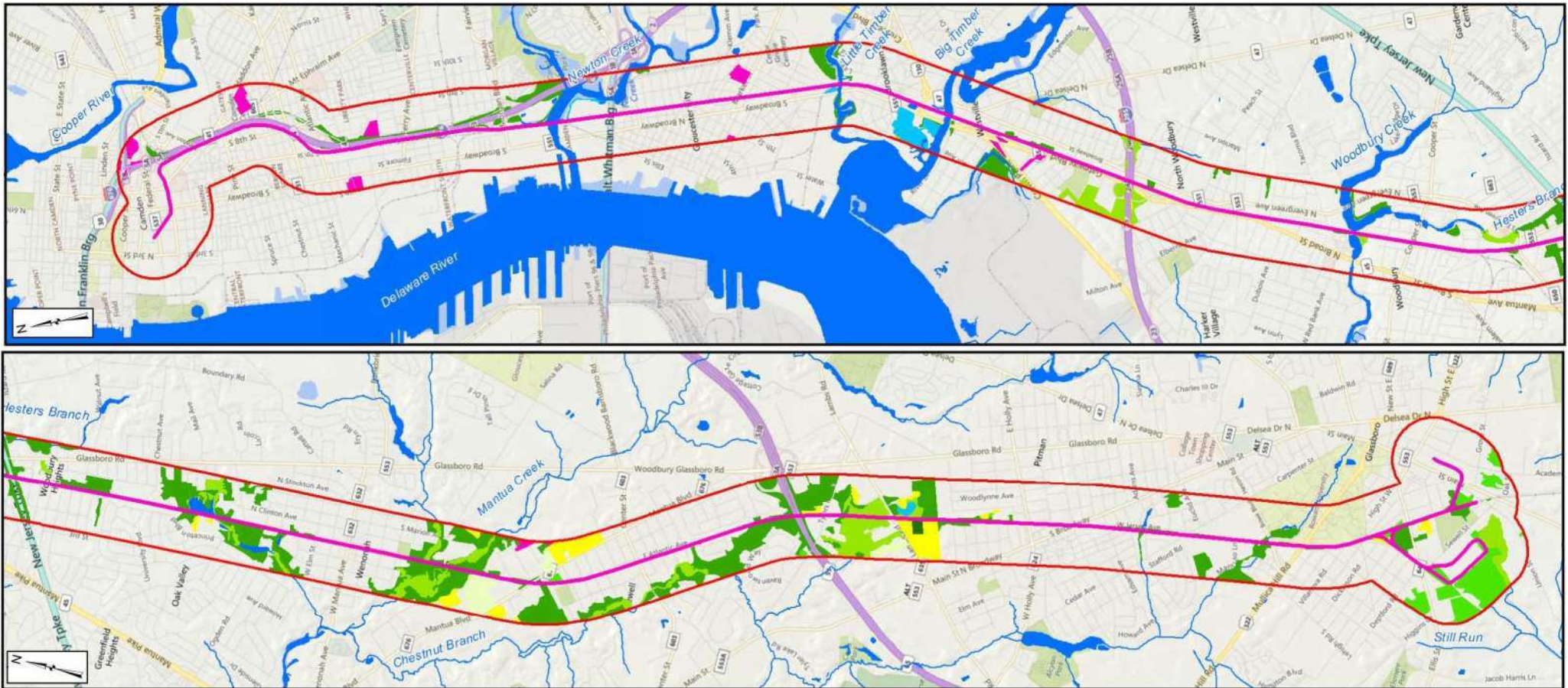


Figure 1: Corridor Study Area

Source: GCL Project Team, 2020.



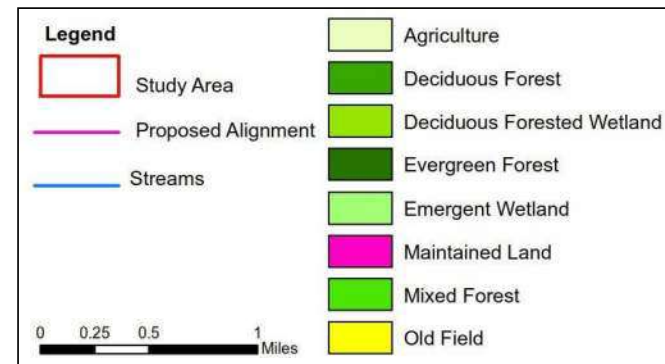


Source: NJDEP Land Use/Land Cover, 2012; GCL Project Team 2020.

Figure 2: Plant Communities



Community Type	Acres
Agriculture	35
Deciduous Forest	565
Deciduous Forested Wetland	183
Evergreen Forest	3
Emergent Wetland	31
Maintained Land	38
Mixed Forest	96
Old Field	78



4.1.5 Emergent Wetlands

Emergent wetlands consist of herbaceous vegetation communities accounting for at least 20 percent vegetative cover. This plant community type accounts for 31 acres and is primarily dominated by common reed (*Phragmites australis*) associated with Newton Creek, Little Timber Creek and Big Timber Creek within the northern portion of the study area.

4.1.6 Old Field

Old-Field plant communities occur at various locations throughout the study area and consist of upland habitats dominated by herbaceous and shrub vegetation that typically occur within abandoned agricultural fields that are transitioning into forest habitat. The study area is comprised of approximately 78 acres of old field. Early successional old fields are almost entirely dominated by grass and herbaceous cover. Late successional fields are also dominated by grass and herbaceous cover but contained larger expanses of shrubs and young trees.

Grasses that occur within old-field communities include little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), indiagrass (*Sorghastrum nutans*), fescue (*Festuca spp.*) and reedgrass (*Calamagrostis spp.*). Herbaceous flowering plants include daisy fleabane (*Erigeron annuus*), boneset (*Eupatorium perfoliatum*), asters (*Symphotrichum spp.*), Canada goldenrod (*Solidago canadensis*), and milkweed (*Asclepias spp.*). Common shrubs and saplings found within the old-field communities include eastern red cedar, black cherry (*Prunus serotina*), and scrub oak (*Quercus ilicifolia*).

4.2 Agriculture

Typical agricultural uses within the study area may include forage such as hay, horticulture uses, or cover crops including corn and soybean. The distribution of agricultural uses throughout the study area is described in greater detail in Section 4.4, “Farmland.”

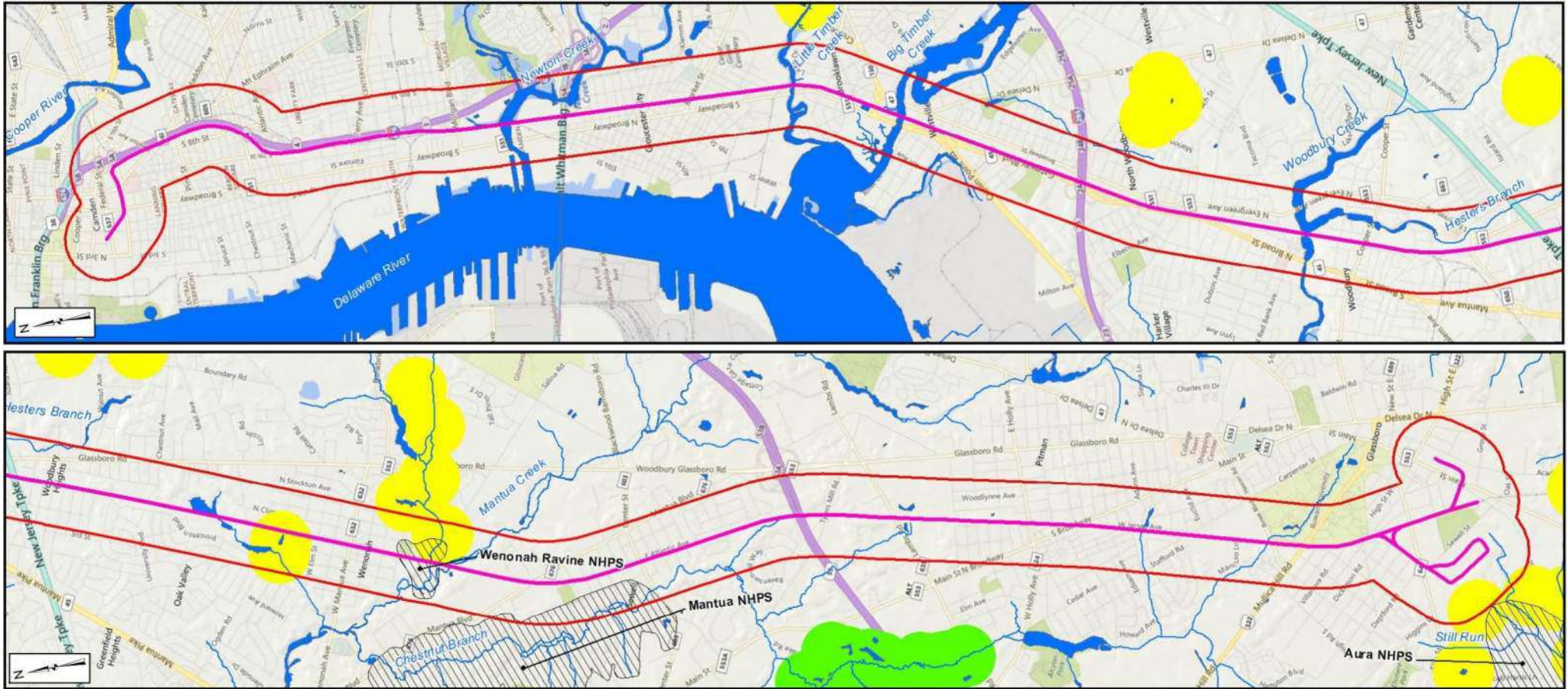
4.2.1 Maintained Land

Maintained Land consists of mowed lawn, maintained roadway right-of-way, parks, and golf courses, and accounts for approximately 38 acres within the study area.

4.2.2 Unique and Significant Natural Areas

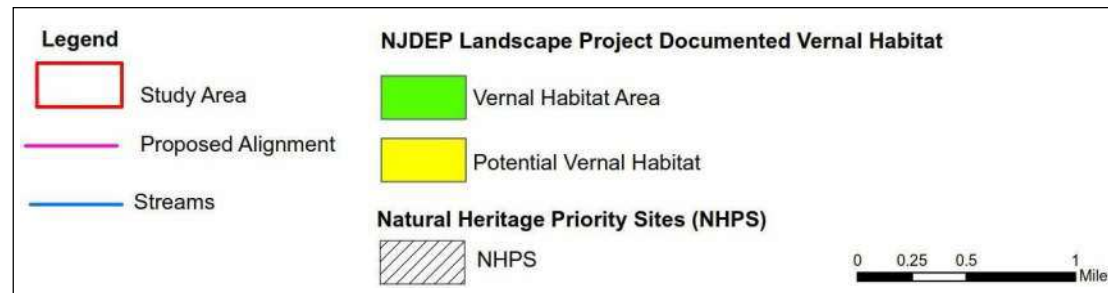
Unique and Significant Natural Areas include unusual and/or ecologically important habitat types. These areas include Natural Heritage Priority Sites and vernal pool habitats (Figure 3, “Unique and Significant Natural Areas”).

The Natural Heritage Priority Sites are areas that have been identified by NJDEP’s Office of Natural Lands Management that are key to the conservation of New Jersey’s biological diversity, with particular emphasis on protection of rare plant species and unusual ecological communities. Within the study area there are three Natural Heritage Priority Sites including Mantua Natural Heritage Priority Site, Wenonah Ravine Natural Heritage Priority Site, and the Aura Natural Heritage Priority Site.



Source: NJDEP Landscape Project Vernal Habitat, NJ Natural Heritage Program Natural Heritage Priority Sites; GCL Project Team, 2020.

Figure 3: Unique and Significant Natural Areas



The Mantua Natural Heritage Priority Site is located in Mantua and includes the Chestnut Branch, tributaries to the Chestnut Branch, and the surrounding uplands and floodplains. The Mantua Natural Heritage Priority Site contains documented occurrences of one federally-listed plant species, two State-endangered plant species and other plant species of concern.

The Wenonah Ravine Natural Heritage Priority Site is located in Wenonah, Deptford, and Mantua. The site is a wooded ravine and contains the only occurrence in New Jersey for the Shingle Oak, a state-listed endangered species.

The Aura Natural Heritage Priority Site is located within Elk Township. The site is an undisturbed forested wetland complex. It contains one federally-listed plant species and one plant species of special concern.

In addition, NJDEP maintains the locations of vernal pool habitats throughout the state. Vernal pool habitat consists of seasonally inundated wetland depressions. These pools are critical to the reproduction of amphibian species because they are isolated from fish populations which prey on amphibian eggs and larvae. Vernal habitats are protected under NJDEP Freshwater Wetland Protection Act. (N.J.A.C. 7:7A).

Vernal habitat locations within the study area included confirmed and potential locations. Potential vernal pool locations have not yet been documented to support breeding populations of targeted amphibian species. Once confirmed the feature is labeled as vernal pool habitat. Vernal pool habitat includes a 300-meter buffer around the vernal pool location. This buffer does not stem from regulation but is used to account for natural variation in the size of the vernal pool and the wetlands surrounding it.

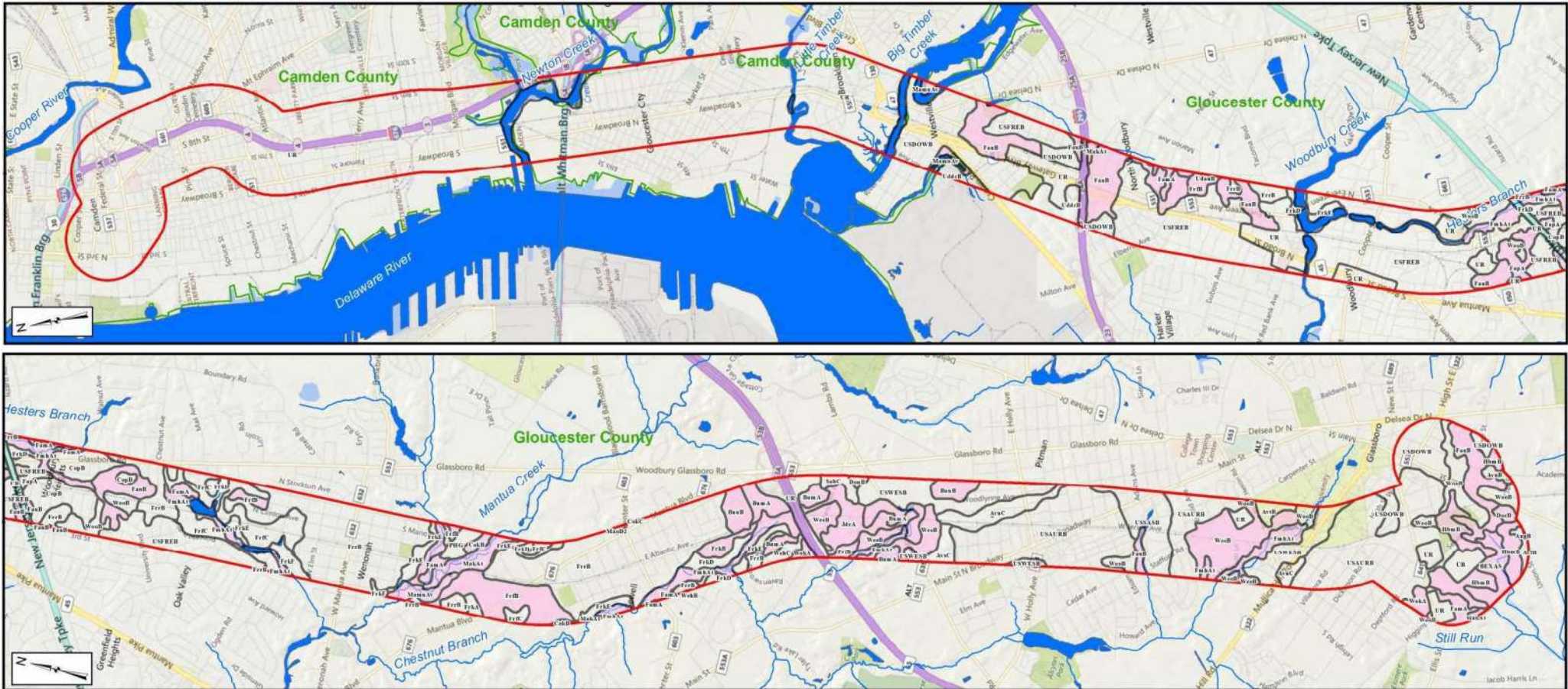
Within the study area, vernal habitat is mapped by NJDEP along the Chestnut Branch of Mantua Creek. In addition, potential vernal habitat is mapped near tributaries to Still Run, Mantua Creek, Woodbury Creek, and Big Timber Creek (see Figure 3, “Unique and Significant Natural Areas”).

4.3 Soils

The proposed Glassboro-Camden Line is within the New Jersey Inner Coastal Plain physiographic province consisting of marine-deposited quartz and glauconite sands, silt, and clay. This region is the emerged portion of the continental shelf of the late Cretaceous period.

Soils in Camden and Gloucester Counties were formed in much the same way and from similar parent material. Unconsolidated geologic strata consisting of sand or clay and containing silt and gravel were laid down during the Cretaceous period in a succession of river and ocean deposits which was then tilted to the southeast increasing the land elevation southeasterly from the Delaware River and declining eastward toward the Atlantic Ocean. While glaciers were not present in either Camden County or Gloucester County, glacial meltwater covered the majority of the area depositing additional sediments from the Delaware River. Water and wind erosion then shaped the deposited materials as the water receded.

Information from the Natural Resources Conservation Service (NRCS) Web Soil Survey website shows 46 soil types; two soil types in Camden County and 44 in Gloucester County, within the study area. The soils series found within the study area are shown on Figure 4, “Soils,” and in Table 2, “Study Area Soil Types.”



Source: NRCS SSURGO Soils for Camden and Gloucester Counties, October 2017; GCL Project Team, 2020.



Gloucester County Soils		
Soil Type	Mapping Unit	Mapping Symbol
Aura	Aura sandy loam, 2-5% slopes	AugB
Aura	Aura-Sassafras loamy sands, 5-10% slopes	AvsC
Aura	Aura-Sassafras sandy loams, 2-5% slopes	AvtB
Aura	Aura-Urban land complex, 0-5% slopes	AvuB
Aura	Aura-Urban land complex, 5-10% slopes	AvuC
Berryland-Mullica	Berryland and Mullica soils, 0 to 2 percent slopes, occasionally flooded	BEXAS
Buddtown	Buddtown-Deptford complex, 0-2% slopes	BumA
Buddtown	Buddtown-Urban land complex, 0-5% slopes	Buub
Collington	Collington sandy loam, 2-5% slopes	CokB
Collington	Collington sandy loam, 5-10% slopes	CokC
Collington	Collington-Urban land complex, 0-5% slopes	CopB
Downer	Downer loamy sand, 0-5% slopes	DocB
Downer	Downer-Urban land complex, 0-5% slopes	DouB
Fallsington	Fallsington sandy loam, 0-2% slopes	FamA
Fallsington	Fallsington loam, 0-2% slopes	FapA
Fallsington	Fallsington-Urban land complex, 0-5% slopes	Faub
Fluvaquents	Fluvaquents, loamy, 0-3% slopes, frequently flooded	FmhAt
Freehold	Freehold loamy sand, 0-5% slopes	FrFB
Freehold	Freehold loamy sand, 5-10% slopes	FrFC
Freehold	Freehold sandy loam, 0-2% slopes	FrKA
Freehold	Freehold sandy loam, 2-5% slopes	FrKB

Soil Type	Mapping Unit	Mapping Symbol
Freehold	Freehold sandy loam, 10-15% slopes	FrkD
Freehold	Freehold sandy loam, 15-25% slopes	FrkE
Freehold	Freehold sandy loam, 25-40% slopes	FrkF
Freehold	Freehold-Urban land complex, 0-5% slopes	FrFB
Hammonton	Hbmb—Hammonton loamy sand, 0 to 5 percent slopes	Hbmb
Jade Run	Jade Run fine sandy loam, 0-2% slopes	JdrA
Manahawkin	Manahawkin muck, 0-2% slopes, frequently flooded	MakAt
Mannington	Mannington-Nanticoke complex, 0-1% slopes, very frequently flooded	MamAv
Mannington	Mannington-Nanticoke-Udorthents complex, 0-1% slopes, very frequently flooded	MamAv
Marlon	Marlon sandy loam, 10-15% slopes, eroded	MaoD2
Pits	Pits, sandy and gravel	PHG
Sassafras	Sassafras loamy sand, 5-10% slopes	SabC
Udorthents	Udorthents-Urban land complex, 0-8% slopes	Udaub
Udorthents	Udorthents, dredged coarse materials, 0-8% slopes	UddcB
Urban land	Urban land	UR
Urban land	Urban land-Aura complex, 0-5% slopes	USAURB
Urban land	Urban land-Downer complex, 0-5% slopes	USDOWB
Urban land	Urban land-Freehold complex, 0-5% slopes	USFREB
Urban land	Urban land-Sassafras complex, 0-5% slopes	USSASB
Urban land	Urban land-Westphalia complex, 0-5% slopes	USWESB
Westphalia	Westphalia fine sandy loam, 2-5% slopes	WeeB

Soil Type	Mapping Unit	Mapping Symbol
Westphalia	Westphalia-Urban land complex, 5-10% slopes	WehC
Woodstown	Woodstown-Glassboro complex, 0-2% slopes	WokA
Woodstown	Woodstown-Urban land complex, 0-5% slopes	WooB

Camden County Soils		
Soil Type	Mapping Unit	Mapping Symbol
Mannington	Mannington-Nanticoke-Udorthents complex, 0-2% slopes, very frequently flooded	MamAv
Urban land	Urban land	UR

Hydric Soils shown in bold.

Figure 4: Soils



Table 2: Study Area Soil Types

Gloucester County Soils			
Soil Type	Mapping Unit	Mapping Symbol	Hydric Soil
Aura	Aura sandy loam, 2-5% slopes	AugB	No
Aura	Aura-Sassafras loamy sands, 5-10% slopes	AvsC	No
Aura	Aura-Sassafras sandy loams, 2-5% slopes	AvtB	No
Aura	Aura-Urban land complex, 0-5% slopes	AvuB	No
Aura	Aura-Urban land complex, 5-10% slopes	AvuC	No
Berryland– Mulica	Berryland and Mulica soils, 0–2 percent slopes, occasionally flooded	BEXAS	Yes
Buddtown	Buddtown-Deptford complex, 0-2% slopes	BumA	Yes
Buddtown	Buddtown-Urban land complex, 0-5% slopes	BuuB	Yes
Collington	Collington sandy loam, 2-5% slopes	CokB	No
Collington	Collington sandy loam, 5-10% slopes	CokC	No
Collington	Collington-Urban land complex, 0-5% slopes	CopB	No
Downer	Downer loamy sand, 0-5% slopes	DocB	Yes
Downer	Downer-Urban land complex, 0-5% slopes	DouB	No
Fallsington	Fallsington sandy loam, 0-2% slopes	FamA	Yes
Fallsington	Fallsington loam, 0-2% slopes	FapA	Yes
Fallsington	Fallsington-Urban land complex, 0-5% slopes	FauB	Yes
Fluvaquents	Fluvaquents, loamy, 0-3% slopes, frequently flooded	FmhAt	Yes
Freehold	Freehold loamy sand, 0-5% slopes	FrFB	Yes
Freehold	Freehold loamy sand, 5-10% slopes	FrFC	No
Freehold	Freehold sandy loam, 0-2% slopes	FrkA	No
Freehold	Freehold sandy loam, 2-5% slopes	FrkB	Yes
Freehold	Freehold sandy loam, 10-15% slopes	FrkD	No
Freehold	Freehold sandy loam, 15-25% slopes	FrkE	No
Freehold	Freehold sandy loam, 25-40% slopes	FrkF	No
Freehold	Freehold-Urban land complex, 0-5% slopes	FrrB	No
Gloucester County Soils			
Hammonton	Hammonton loamy sand, 0-5 % slopes	HbmB	Yes
Jade Run	Jade Run fine sandy loam, 0-2% slopes	JdrA	Yes
Manahawkin	Manahawkin muck, 0-2% slopes, frequently flooded	MakAt	Yes
Mannington	Mannington-Nanticoke complex, 0-1% slopes, very frequently flooded	MamnAv	Yes
Mannington	Mannington-Nanticoke-Udorthents complex, 0-1% slopes, very frequently flooded	MamuAv	Yes
Marlton	Marlton sandy loam, 10-15% slopes, eroded	MaoD2	No
Pits	Pits, sandy and gravel	PHG	No
Sassafras	Sassafras loamy sand, 5-10% slopes	SabC	No
Udorthents	Udorthents-Urban land complex, 0-8% slopes	UdauB	No
Udorthents	Udorthents, dredged coarse materials, 0-8% slopes	UddcB	No
Urban land	Urban land	UR	No
Urban land	Urban land-Aura complex, 0-5% slopes	USAURB	No
Urban land	Urban land-Downer complex, 0-5% slopes	USDOWB	No
Urban land	Urban land-Freehold complex, 0-5% slopes	USFREB	No
Urban land	Urban land-Sassafras complex, 0-5% slopes	USSASB	No
Urban land	Urban land-Westphalia complex, 0-5% slopes	USWESB	No
Westphalia	Westphalia fine sandy loam, 2-5% slopes	WeeB	Yes
Westphalia	Westphalia-Urban land complex, 5-10% slopes	WehC	No
Woodstown	Woodstown-Glassboro complex, 0-2% slopes	WokA	Yes
Woodstown	Woodstown-Urban land complex, 0-5% slopes	WooB	No
Camden County Soils			
Mannington	Mannington-Nanticoke-Udorthents complex, 0-2% slopes, very frequently flooded	MamuAv	Yes
Urban land	Urban land	UR	No

Source: Natural Resource Conservation Service *Web Soil Survey*, <http://websoilsurvey.sc.egov.usda.gov>, SSURGO data, last revised October 2017.

4.3.1 Soil Series Descriptions

4.3.1.1 Aura

The Aura series exists on relic stream terraces and low hills within the coastal plain upland landscape. This series contains soils that are well drained and extremely acid or very strongly acid and are moderately deep to the fragipan (20 to 40 inches) and very deep to the bedrock (greater than 72 inches). Slopes range from 0 to 15 percent and are comprised of loamy and/or gravelly old alluvium parent material. Five soil types from this series are found in the study area that vary by slope and soil inclusions. Aura sandy loam with 2 to 5 percent slopes (AugB) is the typical pedon of this series. Two soils types are associated with urban land (AvuB and AvuC) and two are associated with the Sassafras series that vary by slope and soil texture (AvsC and AvtB). Sassafras soils are well drained and formed from loamy fluviomarine deposits on a coastal plain upland landscape. AugB and AvtB are also classified as prime farmland while AvsC is a farmland of statewide importance.

4.3.1.2 Berryland

The Berryland series exists on flats, drainageways, and depressions within the coastal plain landscape with slopes ranging from 0 to 2 percent. Parent material consists of sandy eolian deposits and/or fluviomarine deposits. The depth to the restrictive feature is greater than 72 inches. This soil type contains very poorly drained, moderately rapid permeability soils with a depth to seasonal high water table between 6 and 10 inches. Berryland soils are extremely acid to strongly acid with low iron content. Berryland soils are within Hydrologic Group B/D. The only soil type from this series within the study area is Berryland and Mullica soils with 0 to 2 percent slopes, occasionally flooded (BEXAS). This soil type is geographically associated with the Mullica series which is also very poorly drained with similar parent material and landscape. BEXAS is classified as a hydric soil and unique farmland.

4.3.1.3 Buddtown

The Buddtown series exist on flats and depressions within the coastal plain landscape. The depth to the restrictive feature is greater than 80 inches. Parent material consists of loamy eolian deposits and/or loamy fluviomarine deposits and slopes range from 0 to 5 percent. Buddtown soils contain moderately well drained, moderately permeability soils with depth to water table between 18 and 42 inches. These soils are extremely acid to strongly acid. Soil types within this series are within Hydrologic Group B. Two soil types from this series exist in the study area varying by inclusions and slope. One soil type is associated with urban land (BuuB) while the other soil type contains inclusions of Deptford series soils (BumA). Deptford soils have a seasonal high water table from 12 to 18 inches and are somewhat poorly drained. Both soil types are classified as hydric soils and only BumA is prime farmland.

4.3.1.4 Collington

The Collington series is well drained and exists on broad interfluves, hills, and ridges within the coastal plain landscape. The depth to the restrictive feature is greater than 72 inches and the depth to the seasonal high water table is also greater than 72 inches. Slopes range from 0 to 80 percent and are comprised of glauconite-bearing loamy fluviomarine deposited parent material. This series is extremely

acid to strongly acid. Three soil types from this series are found in the study area with only one type being associated with urban land (CopB). The remaining two soil types are both Collington sandy loam and vary only by slope (CokB and CokC). CokB is prime farmland and CokC is farmland of statewide importance.

4.3.1.5 Downer

The Downer series exists on broad interfluves, hills, and ridges within the coastal plain landscape. The depth to the restrictive feature is greater than 72 inches. This series contains well-drained, moderately rapid and rapid permeability soils with depth to the water table greater than 80 inches. Downer soils are within Hydrologic Group B. Slopes range from 0 to 30 percent and are comprised of loamy fluviomarine deposited parent material. This series is extremely acid to strongly acid. Two Downer series soil types exist in the study area. DocB is a loamy sand classified as a hydric soil, farmland of statewide importance, and is the typical pedon for this series while DouB is associated with urban land.

4.3.1.6 Fallsington

The Fallsington series exists on flats, swales, drainageways, and depressions within the coastal plain upland landscape with slopes ranging from 0 to 5 percent. The depth to the restrictive feature is greater than 80 inches and the depth to water table is between 0 and 12 inches. This series contains extremely acid to strongly acid, poorly drained, moderate to moderately slow permeability soils with parent material comprised of loamy fluviomarine sediments. Fallsington soils are within Hydrologic Group B/D. Three Fallsington series soil types are found within the study area. One type is associated with urban land (FauB) and the remaining two have slopes from 0 to 2 percent but vary by soil texture. FamA contains sandy loam soils and FapA contain loam. Both FamA and FapA are classified as farmland of statewide importance. All three soil types are hydric soils.

4.3.1.7 Fluvaquents

Fluvaquents exist on floodplains within the coastal plain landscape. The depth to the restrictive feature is greater than 80 inches. Slopes range from 0 to 3 percent and parent material is loamy alluvium. This series is poorly drained, moderate and moderately rapid permeability soils with depth to water table between 6 and 18 inches. Fluvaquents are within Hydrologic Group B/D. This series has only one type within the study area, Fluvaquents, which are loamy, with 0 to 3 percent slopes and frequently flooded (FmhAt) and it is classified as a hydric soil.

4.3.1.8 Freehold

The Freehold series exists on flats, knolls, and hills in the coastal plain upland landscape. The depth to the restrictive feature is greater than 80 inches with a depth to the water table greater than 80 inches. This series is comprised of well-drained, extremely acid to strongly acid, moderately permeable soils. Freehold series soils are within Hydrologic Group B. Slopes range from 0 to 40 percent and parent material consists of glauconite-bearing loamy eolian deposits and/or glauconite-bearing loamy fluviomarine deposits. Eight soil types from the Freehold series can be found within the study area. Two types are Freehold loamy sand that vary by slope (FrFB and FrFC), five contain sandy loam soil and also vary by slope up to 40 percent (FrkA, FrkB, FrkD, FrkE, and FrkF). The remaining soil type is associated with urban land (FrrB). FrFB, FrkA,

and FrkB are classified as prime farmland. FrfB is also a hydric soil. FrfC is a farmland soil of statewide importance.

4.3.1.9 Hammonton

The Hammonton series exists on flats, depressions, and drainageways in the coastal plain upland landscape and were formed in loamy fluviomarine sediments. The depth to the restrictive feature is greater than 72 inches and the depth to water table is between 18 and 42 inches. Hammonton series soils are moderately well-drained, moderately rapid and rapid permeability soils with slopes ranging from 0 to 15 percent. This series is extremely acid to strongly acid. This series is also within Hydrologic Group B. One soil type from this series is found within the study area. Hammonton loamy sand with 0 to 5 percent slopes (HbmB) is the typical pedon for this series as well as a hydric soil and farmland of statewide importance.

4.3.1.10 Jade Run

The Jade Run series exists on flats and depressions within the coastal plain landscape. The depth to the restrictive feature is greater than 72 inches. This series is comprised of poorly drained, moderately slow permeability soils with depth to water table between 0 and 12 inches. Jade Run series soils are within Hydrologic Group B/D. Slopes range from 0 to 2 percent and parent material consists of loamy eolian and/or loamy fluviomarine deposits. This series is extremely acid to strongly acid. One soil type of this series is found in the study area. Jade Run fine sandy loam with 0 to 2 percent slopes (JdrA) is the typical pedon of this series as well as a hydric soil and farmland of statewide importance.

4.3.1.11 Manahawkin

The Manahawkin series exists on lake basins, back swamps, floodplains, and freshwater channels adjacent to tide water within the coastal plain landscape. Manahawkin series soils are very poorly drained, extremely acid or very strongly acid, rapid permeability soils existing on swamps and floodplains with a depth to the seasonal high water table at 0 inches. The depth to the restrictive feature is greater than 60 inches. Slopes range from 0 to 2 percent and parent material consists of organic deposits underlain by sandy fluviomarine sediments. This series is within Hydrologic Group D. Manahawkin muck with 0 to 2 percent slopes and frequently flooded (MakAt) is the only soil of this series within the study area and is also the typical pedon for this series. This soil type is classified as a hydric soil and unique farmland.

4.3.1.12 Mannington

The Mannington series is comprised of silty estuarine deposits over organic, herbaceous materials. Slopes are from 0 to 1 percent and the depth to the restrictive feature is greater than 80 inches. It is moderately acid to neutral. This soil series is very poorly drained with a depth to the water table about 0 to 6 inches. These soils are moderately acid to neutral. Mannington soils are within Hydrologic Group D and experience frequent ponding and very frequent flooding by tidally-influenced fresh water twice daily and by storm surge events. The entire series is characterized as very frequently flooded. There are two soil types from this series within the study area

Mannington-Nanticoke-Udorthents complex with slopes from 0 to 2 percent (MamuAv) and Mannington-Nanticoke complex, 0 to 1 percent slopes (MamnAv). Both types are geographically associated with the Nanticoke series which is associated with tidal marshes and Udorthents described below. In addition, both soil types are classified as hydric soils and unique farmland.

4.3.1.13 Marlton

The Marlton series exists on flats, low hills, and depressions within the coastal plain landscape. The depth to the restrictive feature is greater than 72 inches. Soils in this series are moderately well drained, slowly permeable, and extremely acid to strongly acid with a depth to the water table between 18 and 42 inches. This series is within Hydrologic Group C. Slopes range from 0 to 40 percent and parent material consists of clayey glauconitic marine and/or fluviomarine deposits. One soil type from this series is found in the study area. Marlton sandy loams with slopes ranging from 2 to 15 percent (MaoD2).

4.3.1.14 Pits

This soil type is comprised of sandy material and gravel disturbed by human activity.

4.3.1.15 Sassafras

The Sassafras series comprises well-drained, extremely acid to strongly acid, moderate to moderately slow permeability soils existing on flats and fluviomarine terraces in the coastal plain upland landscape. The depth to the restrictive feature is greater than 80 inches and the depth to the seasonal high water table is greater than 72 inches. Slopes range from 0 to 45 percent and parent material consists of loamy fluviomarine sediments. Sassafras loamy sand with 5 to 10 percent slopes (SabC) is found in the study area. SabC is a farmland of statewide importance.

4.3.1.16 Udorthents

Udorthents are dredged fill or excavated borrow materials derived from river channels, pits, or previously unaltered soils. Udorthents exist on the coastal plain landscape with slow to moderately rapid permeability and slopes between 0 and 8 percent. Because the natural soil properties and qualities have been greatly altered by excavation, extensive grading, or filling typical characteristics of this soil type are not known. The depth to the restrictive feature as well as depth to the water table are both greater than 80 inches. Two soil types from the Udorthents series are found in the study area varying in slope and inclusions. One type is associated with urban land and has 0 to 8 percent slopes (UdauB) and one containing dredged coarse materials also with 0 to 8 percent slopes (UddcB).

4.3.1.17 Urban Land

This soil type is comprised of surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. Six urban land soil types are found within the study area with five of these types existing as complexes with other soil series. These five urban land soil types have 0 to 5 percent slopes but varying associations including Aura, Downer, Freehold, Sassafras, and Westphalia.

4.3.1.18 Westphalia

The Westphalia series exists on knolls and hills in the coastal plain landscape. The depth to the restrictive feature is greater than 80 inches. Soils in this series are well drained, extremely acid to strongly acid, moderate to rapidly permeable soils with a depth to the water table greater than 80 inches. Slopes range from 0 to 50 percent and parent material consists of loamy eolian deposits or loamy fluviomarine deposits. This series is within Hydrologic Group B. Two soil types are in the study area (WeeB and WehC). WeeB is classified as a hydric soil and prime farmland. WehC is associated with urban land and varies in slope.

4.3.1.19 Woodstown

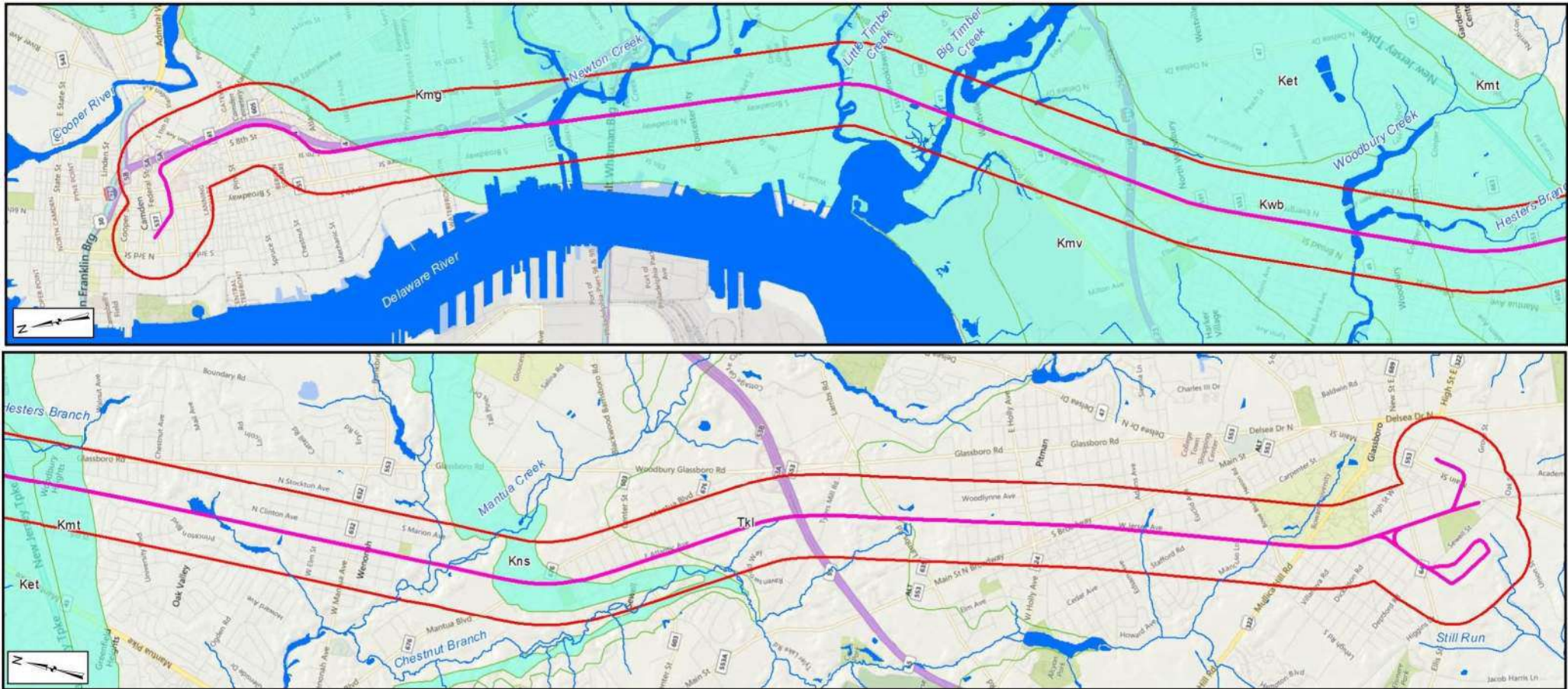
The Woodstown series exists on upland marine terraces and old stream terraces in the coastal plain landscape. Slopes range from 0 to 30 percent and parent material consists of sandy marine and old alluvium sediments. The depth to the restrictive feature is greater than 60 inches with a depth to the water table between 18 and 42 inches. Soils in this series are moderately well drained, moderate to rapid permeability soils that are extremely acid to strongly acid. This series is within Hydrologic Group C. Two Woodstown soil type complexes are found in the study area

Woodstown-Glassboro complex with 0 to 2 percent slopes (WokA) and Woodstown-Urban land complex with 0 to 5 percent slopes (WooB). The Glassboro series contains somewhat poorly drained, moderately rapid permeability soils formed from loamy fluviomarine deposits. WokA is classified as a hydric soil and prime farmland.

4.3.2 Acid-Producing Soils

Acid-producing soils include soil types from geologic formations that if exposed have the potential to release acidic leachate due to the oxidation of iron sulfides. As a result, the Standards for Soil Erosion and Sediment Control in New Jersey provides specific requirements for the management of acid-producing soils during construction including testing, containment, and mitigation. Acid-producing soils include soils with a pH of 4.0 or less and including concentration of iron sulfide minerals such as pyrite or marcasite. When exposed, acidic soils can be harmful to wildlife and vegetation, can degrade water quality if leached into adjacent waterbodies, corrode the metal in construction materials and vehicles, and degrade structures containing calcium such as culverts and sidewalks.

Nine geologic formations within the coastal plain of New Jersey are known to produce high amounts of acid-producing soils. According to New Jersey Geological Survey the study area traverses 12 geologic formations, six of these formations contain acid-producing soil deposits as shown on Figure 5, "Acid-Producing Soils," and summarized in Table 3, "Acid-Producing Soils."



Source: NJDEP Coastal Plain Sediments with Potential to Form Acid Soils; GCL Project Team, 2020.

Figure 5: Acid-Producing Soils



Geologic Formation	
Tch	Cohansey Formation
Tht	Homerstown Formation
Tkl	Lower Member
Ket	Englishtown Formation
Kmg	Magothy Formation
Kml	Mount Laurel Formation
Kmt	Marshalltown Formation
Kmv	Merchantville Formation
Kns	Navesink Formation
Kp	Potomac Formation
Kw	Wenonah Formation
Kwb	Woodbury Formation

Legend			
	Study Area		Acid Producing Formation
	Proposed Alignment		Geologic Formation Boundary
	Streams		

0 0.25 0.5 1 Miles

Table 3: Acid-Producing Soils

Geologic Formation	Acid-Producing
Potomac Formation	
Magothy Formation	X
Merchantville Formation	X
Woodbury Formation	X
Englishtown Formation	X
Marshalltown Formation	X
Wenonah Formation	
Mount Laurel Formation	
Navesink Formation	X
Hornerstown Formation	
Lower Member	
Cohansey Formation	

Source: Coastal Plain Sediments with Potential to Form Acid (Sulfate) Soils, 2015; <http://state.nj.us/dep/njgs/geodata/dgs09-2.htm>

4.4 Farmland

Federally-regulated farmland preservation is mandated under the U.S. Farmland Protection Policy Act (7 CFR Part 658). The U.S. Farmland Protection Policy Act regulates prime farmland, unique farmland, and farmland of local importance which are defined as:

- Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber. It does not include land already in or committed to urban development or water storage;
- Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops, as determined by the Secretary of Agriculture. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables; and
- Farmland of local importance is land other than prime or unique farmland, that is of statewide or local importance for the production of food feed, fiber, forage, or oilseed crops, as determined by the appropriate State or unit of local government agency or agencies, and that the Secretary of Agriculture determines should be considered as farmland for the purposes of this subtitle.
- In the State of New Jersey, there are three (3) Acts that protect farmlands. They are the New Jersey Farmland Assessment Act of 1964 (N.J.S.A. 54:4-23.1 et seq.), New Jersey Agriculture Retention and Development Act of 1983 (N.J.S.A. 4:1C-11 et seq.) and the New Jersey Right to Farm Act of 1983 (with amendment in 1998) (N.J.S.A. 4:1C-1 et seq.).
- The New Jersey Farmland Assessment Act of 1964 regulates land that is devoted to agricultural or horticultural uses for at least two (2) years prior to the tax year, consists of at least five contiguous

(adjoining) acres being farmed and/or under a woodlot management plan and has gross sales of products from the land averaging at least \$500 per year for the first five acres, plus has an average of \$5 per acre for each acre over five, except in the case of woodland or wetland where the income requirement is \$0.50 per acre for any acreage over five.

- The New Jersey Agriculture Retention and Development Act of 1983 allows for the State, under the New Jersey Farmland Preservation Program, to purchase development rights for farms that are threatened with sale to residential and commercial developers. Permanent deed restrictions are placed on state farms so that they must remain as farms and cannot be sold for housing or non-farm commercial development. This Act also provides the framework for the New Jersey Farmlands Preservation Program, described above. The New Jersey State Agricultural Development Committee (SADC) administers the state farmland preservation program, and the County Farmland Preservation Program assists in the implementation and coordination of the program.
- The New Jersey Right to Farm Act of 1983 (with amendment in 1998) is designed to provide a proper balance among the varied and sometimes conflicting interests of land use, this act is a tool for sorting out the respective rights of farmers, their neighbors and municipalities. It protects farming activities and farmers against municipal regulations that attempt to constrain farming and against public and private nuisance actions. In order to qualify for protection under this law, the farm must meet the requirements of a “commercial farm” as defined:

“Greater than 5 acres, annual agricultural or horticultural production worth \$2,500; or if less than 5 acres, production worth \$50,000 annually.”

- The Gloucester County Agriculture Development Board has regulatory oversight for the County Farmland Preservation Program and hears County Right-to-Farm cases. The County Farmland Preservation Program purpose is to buy development rights on farms so that the land is permanently preserved. The County Farmland Preservation Program also coordinates all acquisitions in accordance with the regulations set by the New Jersey SADC.

Types of farmland uses within the study area are summarized in Table 4, “Farmland Uses in the Study Area,” and illustrated in Figure 6, “Farmlands.” Table 5, “Farmland Parcels in the Study Area,” identifies the location of individual parcels of land that contain agricultural use within the study area. All farmland parcels identified are located in Mantua. One of these parcels is listed as being preserved by the New Jersey/Gloucester County Farmland Preservation Program consisting of a 28 acre farm identified as Block 253.01, Lot 21.01 of the Township of Mantua. This farm is permanently preserved and is located approximately 500 feet southwest of the rail corridor.

Table 4: Farmland Uses in the Study Area

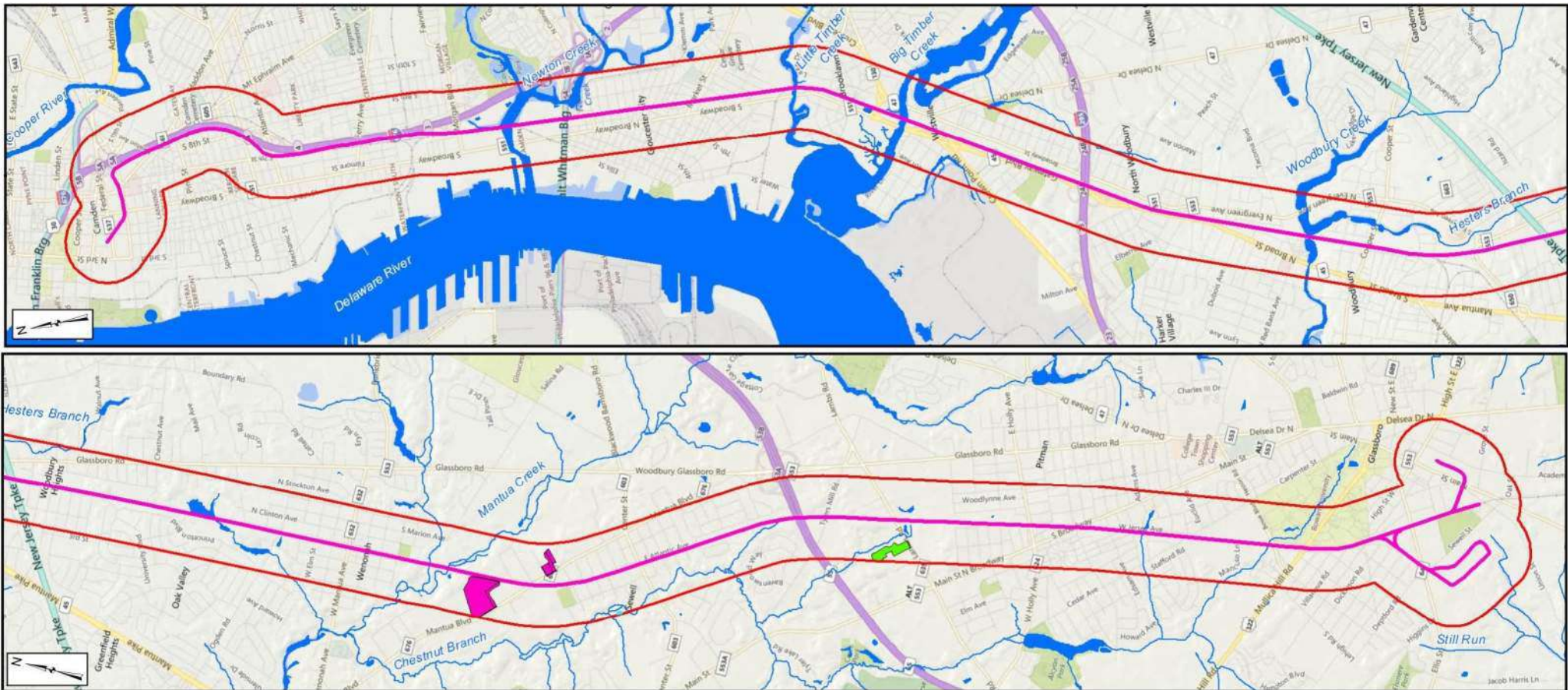
Farmland Uses	Area (acres)
Cropland and Pastureland	27.6
Other Agriculture	7.7
Total	35.3

Source: GCL Plant Community Map and NJDEP Land Use/Land Cover GIS Data, 2012.

Table 5: Farmland Parcels in the Study Area

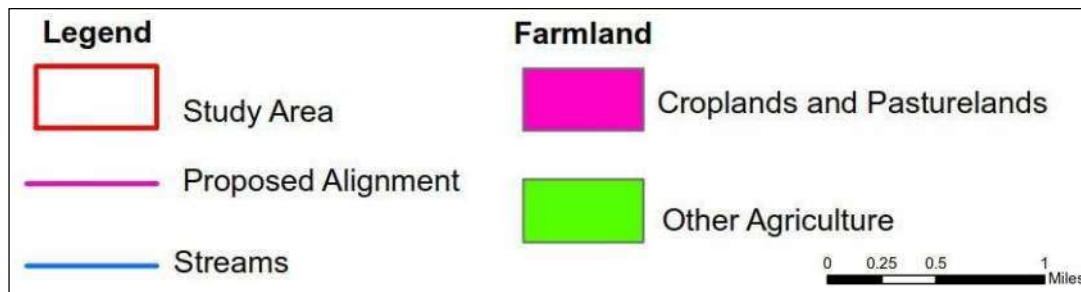
County	Municipality	Block	Lot(s)
Gloucester	Mantua Township	158	4
Gloucester	Mantua Township	170	3.01, 3
Gloucester	Mantua Township	175	4-6
Gloucester	Mantua Township	195	1
Gloucester	Mantua Township	253.01	21,21.01,24
Gloucester	Mantua Township	278	1.01,1.03

Source: Gloucester County Parcel Data, 2017.



Source: GCL Plant Community Map, NJDEP Land Use/Land Cover, 2012, Updated 2015; GCL Project Team, 2020.

Figure 6: Farmlands



4.5 Threatened and Endangered Species

4.5.1 Federal

The United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) administer the Endangered Species Act of 1973 to prevent the extinction of fish, wildlife, and plant species, as well as the ecosystems that they depend upon. An endangered species is defined as one in danger of extinction throughout all or a significant portion of its range, while a threatened species is one likely to become endangered within the foreseeable future. This Act prohibits the take, possession, transportation, import, export, purchase, sale, trade, or barter of a listed species. Any action taken that may affect a listed species must be coordinated with the implementing agency to ensure protection of the species.

The Migratory Bird Treaty Act is implemented by the USFWS and affords protection to migratory bird species native to the United States or its territories but does not apply to non-native species that occur as a result of intentional or unintentional human-assisted introduction (70 FR 12710). Bald eagles and golden eagles are afforded additional protection under the Bald and Golden Eagle Protection Act, which prohibits the take, possession, transportation, import, export, purchase, sale, trade, or barter of bald and golden eagles or their parts, nests, or eggs.

In addition, the Magnuson-Stevens Act requires federal agencies to consult with NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have adverse effects on designated Essential Fish Habitat (EFH). An adverse effect is defined as “any impact which reduces quality and/or quantity of EFH. [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species’ fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.”

Information on the potential presence of federal listed species within the study area was initially obtained through review of the USFWS Information for Planning and Consultation tool (IPaC), NJDEP Natural Heritage Program, NJDEP Landscape data (Version 3.3) and NOAA EFH Online Mapper.

USFWS IPaC is a web based application that generates a list of federally-listed species that are protected under the Endangered Species Act and may occur within or adjacent to the rail corridor.

The New Jersey Natural Heritage Program is an inventory of known occurrences of rare plant, animal and invertebrate species that is maintained by the NJDEP Office of Natural Lands Management.

The NJDEP Landscape Project (Version 3.3) is a Geographic Information Systems based wildlife habitat conservation tool that identifies habitat important to the survival of a rare or listed species of amphibians, fish, birds, invertebrates, and mammals. The habitat mapping is created through a combination land use, habitat requirements, and records of known occurrences of a species.

The EFH online mapper shows essential fish habitat or those habitats that NMFS and regional fishery management councils have identified as necessary to fish for spawning, breeding, feeding or growth to maturity.

Based on the above sources there are six (6) federally-listed species identified that may occur within the study area (Table 6, “Federally-Listed Species Potentially Occurring within the Study Area”). Per the NOAA EFH Online Mapper, no EFH occurs within the study area.

Table 6: Federally-Listed Species Potentially Occurring within the Study Area

Common Name (<i>Latin Name</i>)	Federal Status
Swamp Pink (<i>Helonias bullata</i>)	Threatened
Bog Turtle (<i>Clemmys muhlenbergii</i>)	Threatened
Northern Long-Eared Bat (<i>Myotis septentrionalis</i>)	Threatened
Red Knot (<i>Calidris canutus rufa</i>)	Threatened
Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>)	Endangered
Shortnose sturgeon (<i>Acipenser brevirostrum</i>)	Endangered

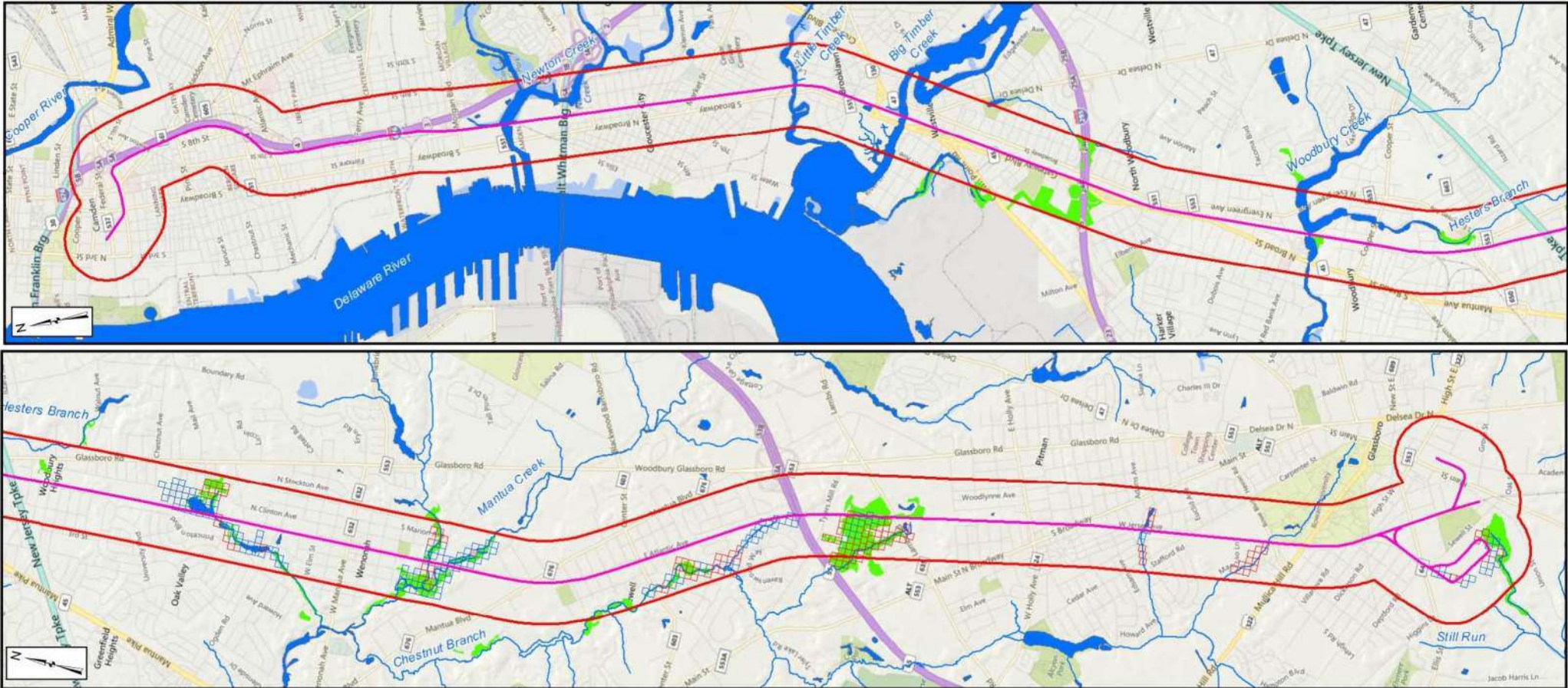
Source: USFWS IPaC - Information, Planning, and Conservation System (<http://ecos.fws.gov/ipac/>); NJDEP Bureau of Non-game species, Landscape rail corridor Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017

4.5.1.1 Swamp Pink (*Helonias bullata*)

State/Federal Status: State Endangered/Federally Threatened

Habitat Requirements: Swamp pink is found only in wetlands and requires organic soils that are saturated but not flooded. Swamp pink is typically found in closed canopy forested wetlands driven by the slow lateral flow of groundwater that remains constant year-round.

Status in Study Area: The New Jersey Natural Heritage identifies swamp pink as occurring along a tributary to the Chestnut Branch of Mantua Creek in the immediate vicinity of the rail corridor. Initially a habitat suitability assessment was conducted to determine if suitable habitat occurred within study area. The assessment was conducted in March 2014 within all mature forested wetland habitat within 1,000 feet of the rail corridor along Mantua Creek, Chestnut Branch, Still Run, and their tributaries. The habitat assessment consisted of a field evaluation of 313 one-acre survey grids to determine if suitable habitat was present. Suitable habitat was determined based on the quality of the available habitat including soil and hydrologic characteristics. Within the study area, suitable habitat consists of mature forested wetlands consisting of thick organic soils along streams and ground water seeps in areas that exhibit a persistent and stable water table at or near the surface that are not subject to seasonal flooding. Suitable habitat was found to be present within 175 of the initial 313 one-acre survey grids (Figure 7, “Swamp Pink Habitat”). Subsequent visual field surveys were conducted on three separate occasions within areas of suitable habitat during March and April of 2014 to determine if swamp pink was present. The results of the survey show that swamp pink does not currently exist within or adjacent to the rail corridor.



Source: GCL Plant Community, WSP Swamp Pink Habitat Grids; GCL Project Team, 2020.

Figure 7: Swamp Pink Habitat



4.5.1.2 Bog Turtle (*Glyptemys muhlenbergii*)

State/Federal Status: State Endangered/Federally Threatened

Habitat Requirements: Bog Turtles inhabit open, spring fed emergent and scrub/shrub wetlands characterized by deep soft muddy bottoms, dominated by low grasses and sedges, and partially inundated with slow-moving water.

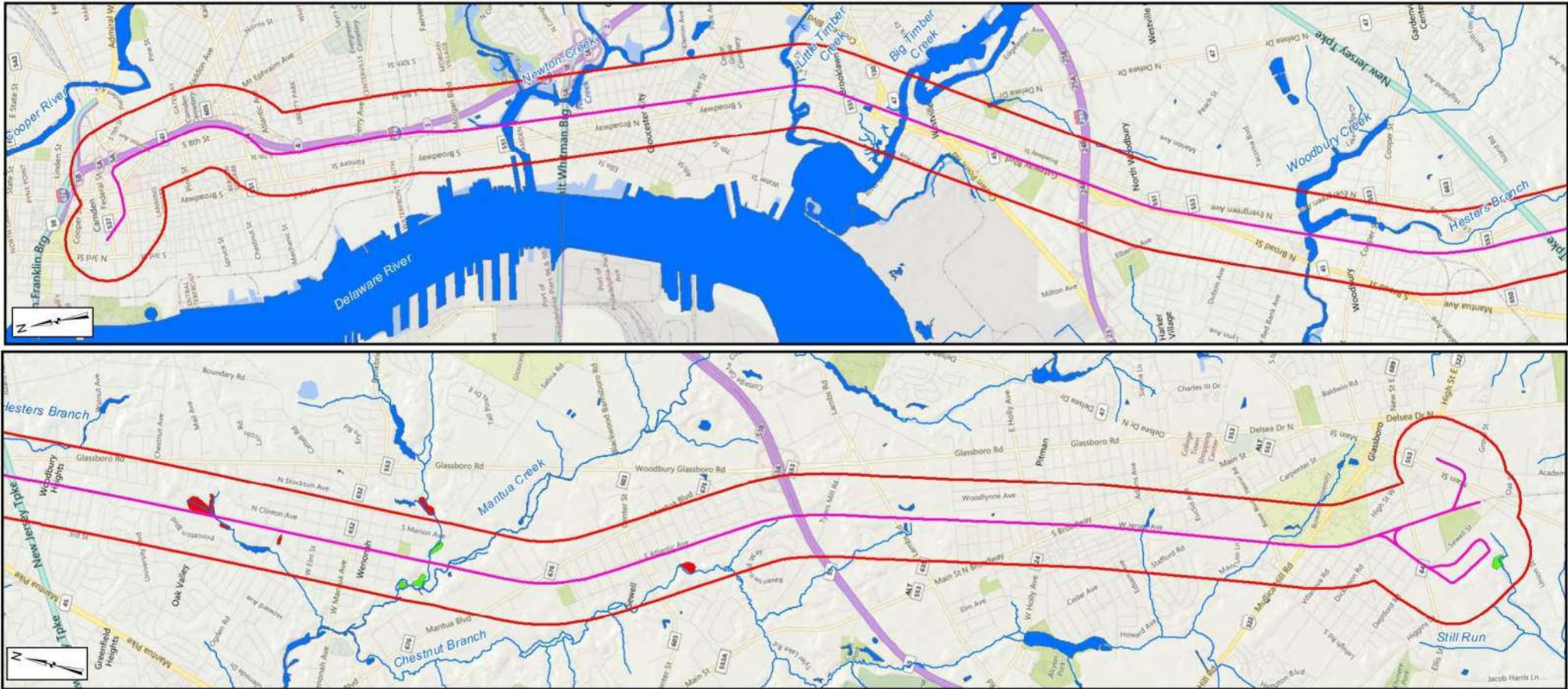
Status in Study Area: The USFWS IPaC identifies the bog turtle as potentially affected by the project. No records of bog turtle within or adjacent to the rail corridor were reported by the New Jersey Natural Heritage Program. However, potentially suitable habitat exists in isolated emergent wetlands associated with the Mantua Creek, Chestnut Branch, and Still Run stream corridors. A habitat suitability assessment was conducted for eight wetland areas in the vicinity of the rail corridor identified during an initial field inspection (Figure 8, “Bog Turtle Habitat”). Three areas, totaling 3.7 acres, associated with the Mantua Creek drainage were initially determined as exhibiting vegetation, soil and hydrologic characteristics deemed suitable for bog turtle. Subsequent visual surveys were conducted within suitable habitat areas on four separate occasions in May 2014. In June 2017, an additional 2.66-acre site located along Still Run in the vicinity of the proposed Glassboro Vehicle Maintenance Facility (VMF) was also surveyed. Due to the time of year, surveys conducted at this location consisted of 40 Fahey or H Traps deployed for 21 consecutive days in June 2017. No bog turtles were observed during either survey. The results of these surveys determined the species does not occur within or adjacent to the proposed rail corridor.

4.5.1.3 Northern long-eared bat (*Myotis septentrionalis*)

State/Federal Status: State Endangered/Federally Threatened

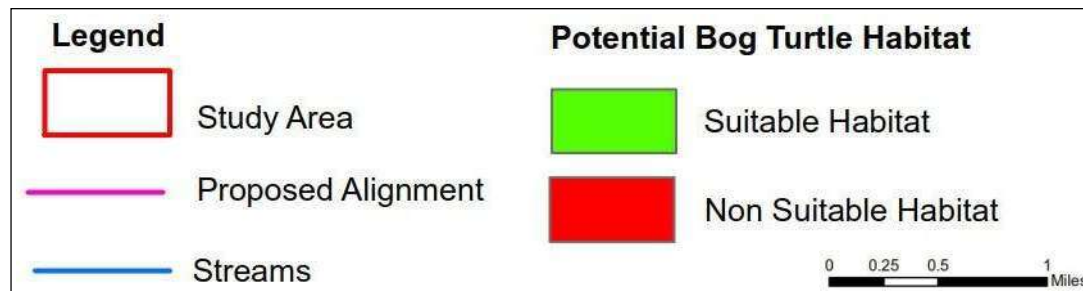
Habitat Requirements: Northern long-eared bat can be found in forests throughout New Jersey. The bats hibernate in caves or mines, called hibernacula, during the winter and roost within cavities in both live and dead trees, as well as man-made structures during the maternity season.

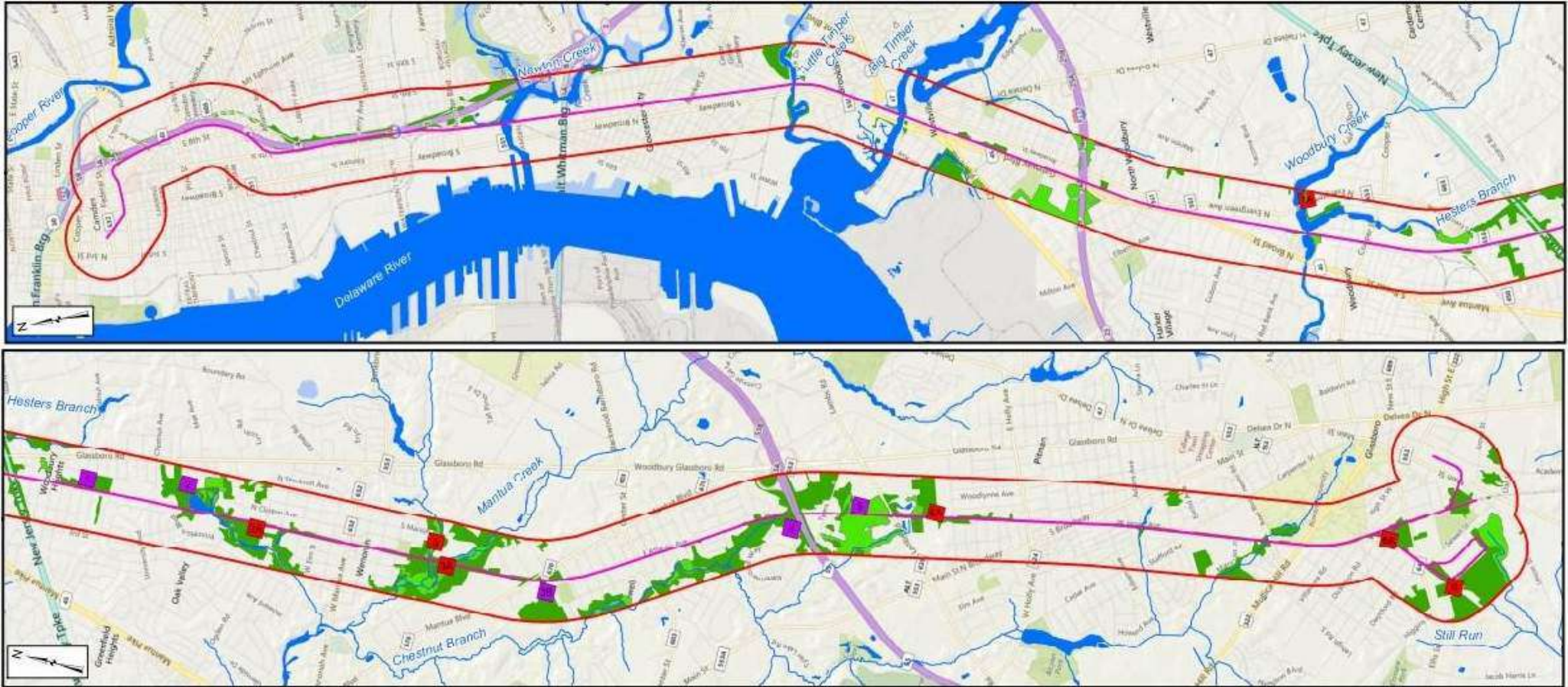
Status in Study Area: The USFWS IPaC identifies the northern long-eared bat as present within the study area. No records of northern long-eared bat within or adjacent to the proposed rail corridor were reported by the New Jersey Natural Heritage Program. While forest habitat occurs throughout the study area there are no known maternity sites or hibernacula within any of the municipalities traversed by the rail corridor. In August 2017, an acoustic bat survey was conducted at 12 monitoring locations within the study area (Figure 9, “Northern Long-Eared Bat Habitat”). Each monitoring location was established within areas of contiguous forest adjoining the rail corridor. At each location, a full spectrum bat recorder was used to record bat calls over a two-night period. The recordings were processed and analyzed using Kaleidoscope echolocation identification software. A total of 6,663 echo location calls were recorded and identified several species of bat, including the northern long-eared bat, which were identified at five monitoring locations. Based on these results, the forest habitat within the study area, especially contiguous forest associated with the Mantua Creek drainage, supports northern long-eared bat.



Source: Debois Environmental Consultants Bog Turtle Habitat; GCL Project Team, 2020.

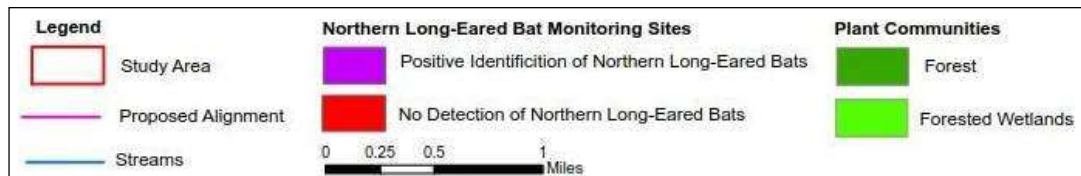
Figure 8: Bog Turtle Habitat





Source: GCL Plant Communities; GCL Project Team, 2020.

Figure 9: Northern Long-Eared Bat Habitat



4.5.1.4 Red Knot (*Calidris canutus rufa*)

State/Federal Status: State Endangered/Federally Threatened

Habitat Requirements: Atlantic and Delaware Bay beaches and mudflats

Status in Study Area: The USFWS IPAC identifies the red knot as potentially affected by the project. No records of red knot within or adjacent to the rail corridor were reported by the New Jersey Natural Heritage Program. This species is a migratory shore bird that may overwinter in New Jersey. During their annual migration, large numbers pause in the mid-Atlantic to feed on horseshoe crab eggs before resuming their migration. The coastal habitat that red knots tend to be found in does not exist within or adjacent to the rail corridor. Transient Red knots may pass through the study area during their migration.

4.5.1.5 Shortnose Sturgeon (*Acipenser brevirostrum*)

State/Federal Status: State Endangered/Federally Threatened

Habitat Requirements: Shortnose sturgeons are an anadromous fish species inhabiting rivers, estuaries, and bays. In New Jersey, shortnose sturgeon reside in the Delaware River and its tributaries.

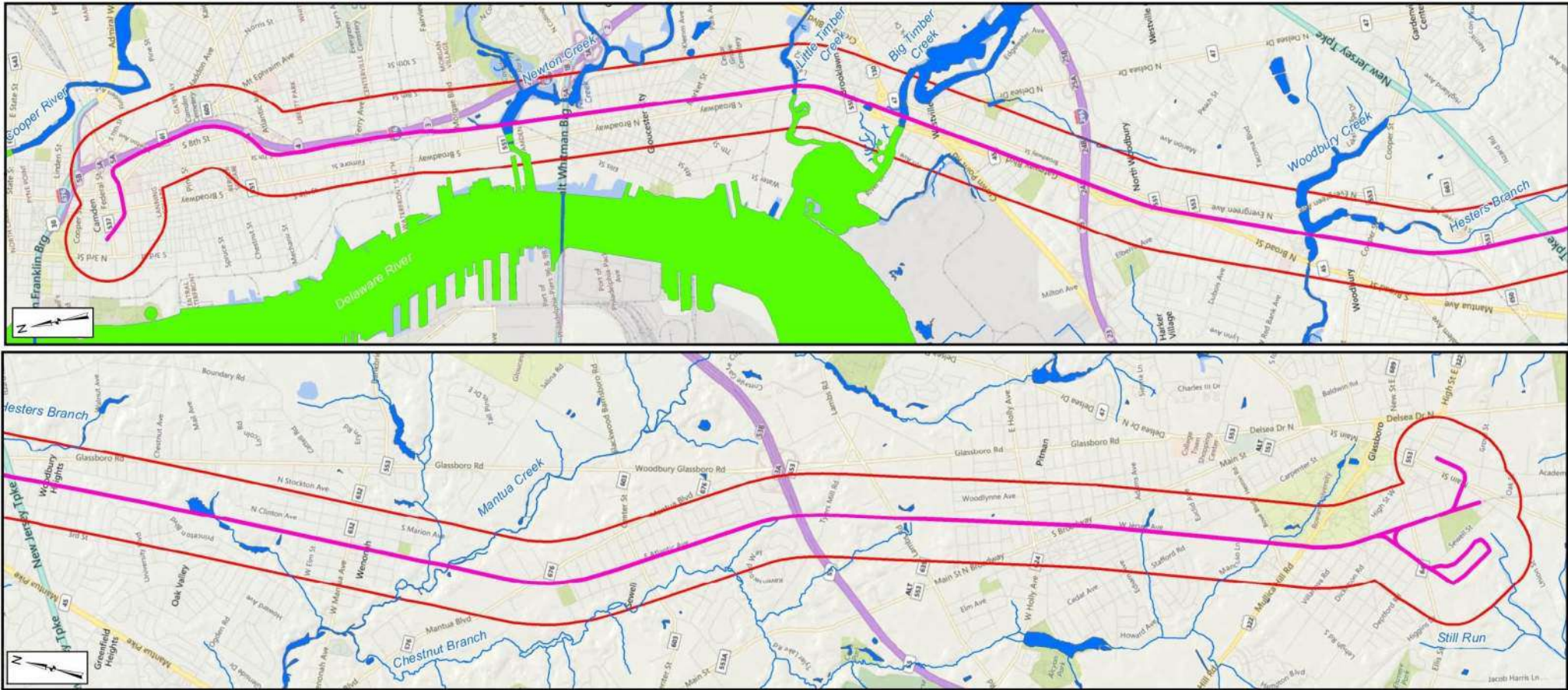
Status in Study Area: The New Jersey Natural Heritage program identifies shortnose sturgeon as a migratory and summer resident in the immediate vicinity of the rail corridor. The New Jersey Landscape project identifies habitat for this species extending within the study area associated with the lower reaches of Newton Creek, Big Timber Creek, and Little Timber Creek (Figure 10, “Atlantic and Shortnose Sturgeon Habitat”).

4.5.1.6 Atlantic Sturgeon (*Acipenser oxyrhynchus*)

State/Federal Status: State Endangered /Federally Endangered

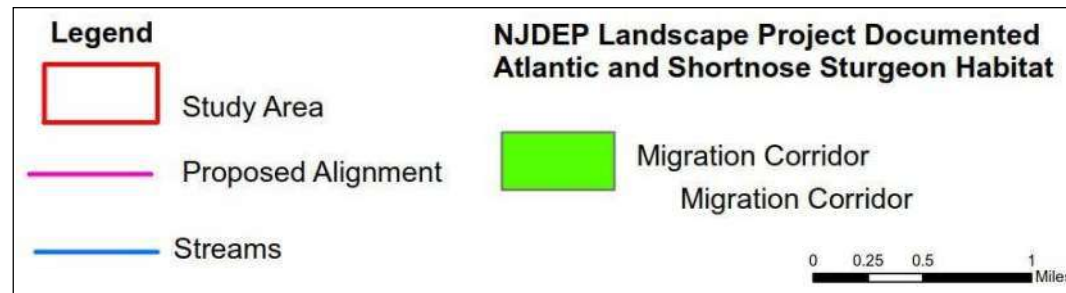
Habitat Requirements: Atlantic sturgeons are an anadromous fish species residing in the Delaware River, Delaware Bay, and Atlantic Ocean within New Jersey.

Status in Study Area: The New Jersey Natural Heritage program identifies Atlantic sturgeon as a migratory species in the immediate vicinity of the rail corridor. The New Jersey Landscape project identifies habitat for this species extending within the study area associated with the lower reaches of Newton Creek, Big Timber Creek, and Little Timber Creek (Figure 10, “Atlantic and Shortnose Sturgeon Habitat”).



Source: NJDEP Landscape Project; GCL Project Team, 2020.

Figure 10: Atlantic and Shortnose Sturgeon Habitat



4.5.2 New Jersey

In addition to the federally-listed species referenced above, NJDEP Endangered and Non-Game Species and Natural Lands Program also regulates activities that may adversely affect species that are listed as threatened or endangered in New Jersey. Information available through NJDEP Natural Heritage Program and Landscape Project (version 3.3) were reviewed to identify state-listed threatened and endangered species that may occur within the study area.

Table 7, “State-Listed Threatened and Endangered Species Potentially Occurring within the Study Area,” shows State threatened and endangered species that may occur within the study area.

Table 7: State-Listed Threatened and Endangered Species Potentially Occurring within the Study Area

Type	Common Name	Scientific Name	State Status
Birds	American Kestrel	<i>Flaco sparverius</i>	Threatened
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Endangered (Breeding) Threatened (Non-Breeding)
	Barred Owl	<i>Strix varia</i>	Threatened
	Peregrine Falcon	<i>Falco peregrinus</i>	Endangered
	Red-Shouldered Hawk	<i>Buteo lineatus</i>	Endangered
Plants	Pale Indian Plantain	<i>Arnoglossum atrilicifolium</i>	Endangered
	Putty Root	<i>Aplectrum hyemale</i>	Endangered
	Hairy Wood-Rush	<i>Luzula acuminata var. acuminata</i>	Endangered
	Broad-leaf Ironweed	<i>Vernonia glauca</i>	Endangered
	Shingle Oak	<i>Quercus imbricaria</i>	Endangered
Freshwater Mussels	Eastern Pondmussel	<i>Ligumia nasuta</i>	Threatened
	Tidewater Mucket	<i>Leptodea ochrcea</i>	Threatened
	Yellow Lampmussel	<i>Lampsilis cariosa</i>	Threatened

Source: NJDEP Bureau of Non-game species, Landscape Project Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017.

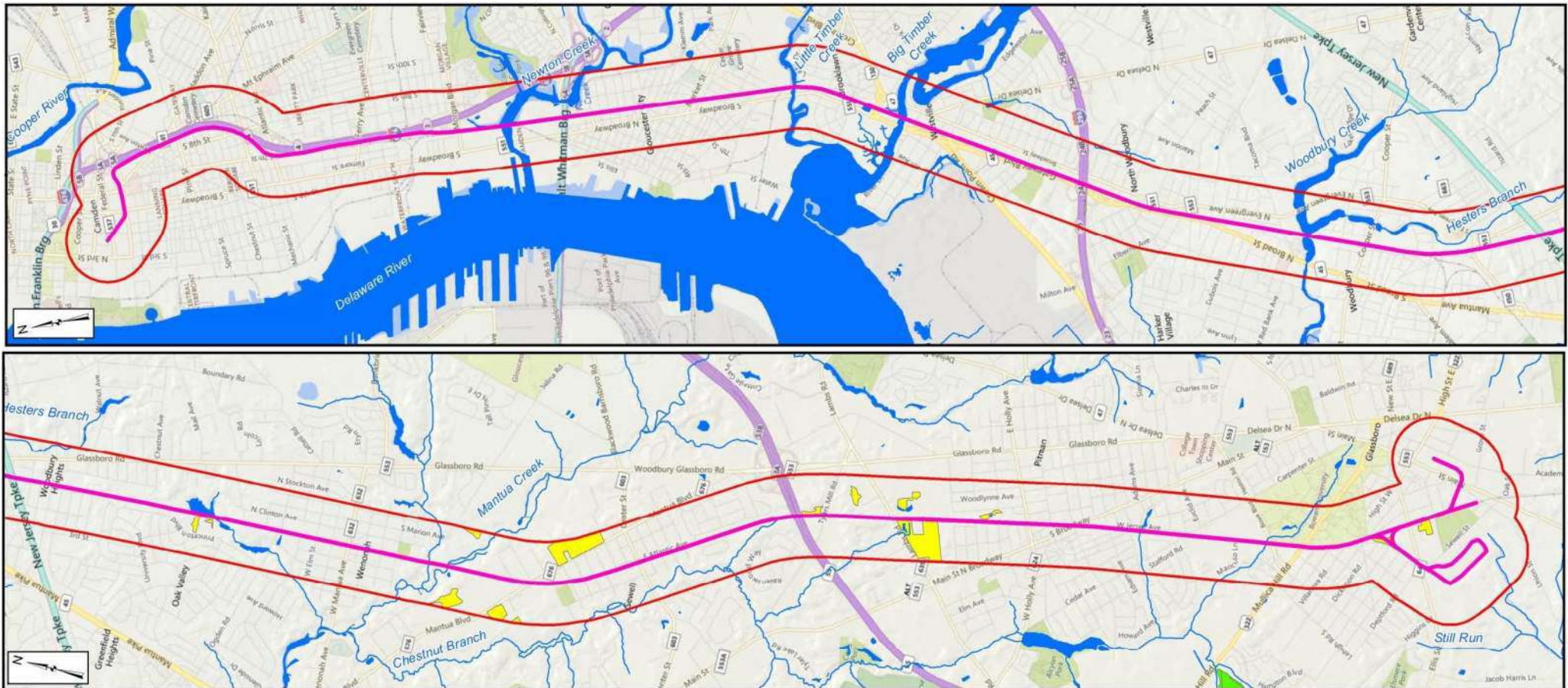
4.5.2.1 Birds

American Kestrel (*Flaco sparverius*)

State Status: Threatened

Habitat Requirements: Kestrels occupy open, grassy habitats with perches for hunting and trees for nesting, characteristic of old-field habitats within the study area.

Status in Study Area: The New Jersey Natural Heritage Program identifies a breeding record within the immediate vicinity of the rail corridor. The New Jersey Landscape Project identified an area of breeding habitat to the west of the study area. Within the study area, several areas of suitable old field based on the plant community survey occur in the vicinity of Route 55 in Mantua Township (Figure 11, “American Kestrel Habitat”).



Source: NJDEP Landscape Project, NJDEP Land Use/Land Cover 2012; GCL Project Team, 2020.

Figure 11: American Kestrel Habitat



Bald Eagle (*Haliaeetus leucocephalus*)

State Status: Endangered (Breeding), Threatened (Non-Breeding)

Habitat Requirements: Bald eagles nest in tall trees near water, such as along the shores of the Delaware River. Wintering and foraging habitat includes forested riparian corridors along open water areas associated with lakes, rivers and larger streams.

Status in Study Area: The Natural Heritage Program identifies a nesting record approximately one mile from the rail corridor. The New Jersey Landscape Project includes foraging and wintering habitat within the study area associated with Big Timber and Little Timber Creek, Woodbury Creek, and Mantua Creek. No records of nesting activity occur from within the study area (Figure 12, “Bald Eagle Habitat”).

Red-Shouldered Hawk (*Buteo lineatus*)

State Status: Endangered

Habitat Requirements: Red-shouldered hawks nest in larger contiguous stands of mature deciduous or mixed forested wetlands. The red-shouldered hawk is a forest interior species meaning it prefers large patches of forest habitat.

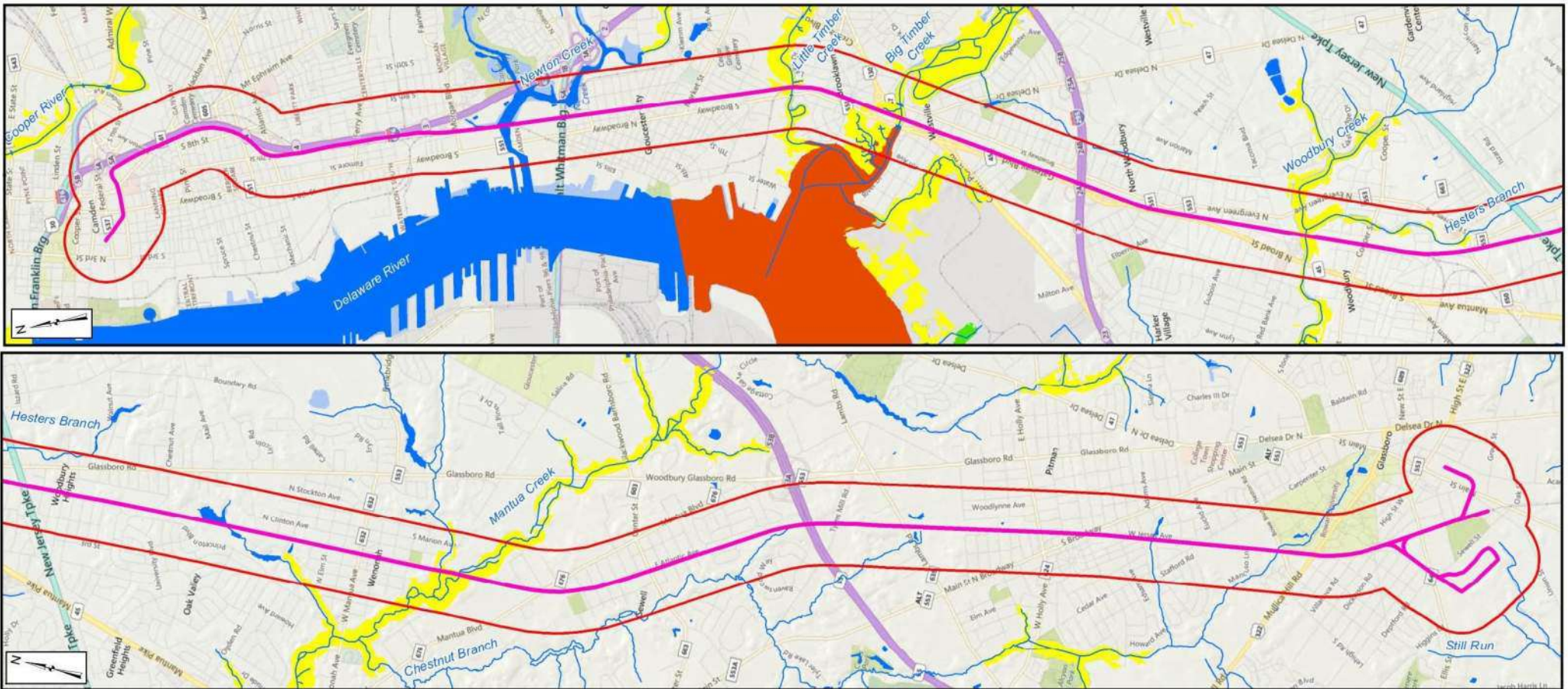
Status in Study Area: The Natural Heritage program identifies red-shouldered hawk as a breeding species within the immediate vicinity of the rail corridor. New Jersey Landscape Program identifies habitat for the red-shouldered hawk associated with the forested riparian corridors along the Mantua Creek and Chestnut Branch in Gloucester County. Based on a review of available habitat suitable nesting habitat occurs within mature forest associated with the Mantua Creek drainage (Figure 13, “Red-Shouldered Hawk Habitat”).

Peregrine Falcon (*Falco peregrinus*)

State Status: Endangered

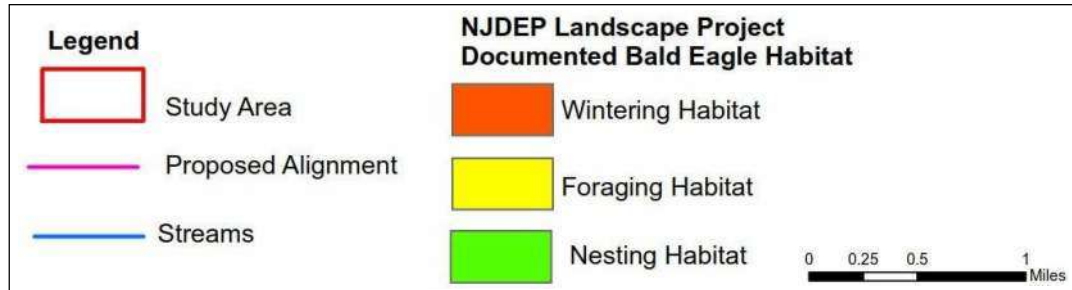
Habitat Requirements: Peregrine falcon nest on cliffs and man-made structures such as bridges and buildings typically near or above open water.

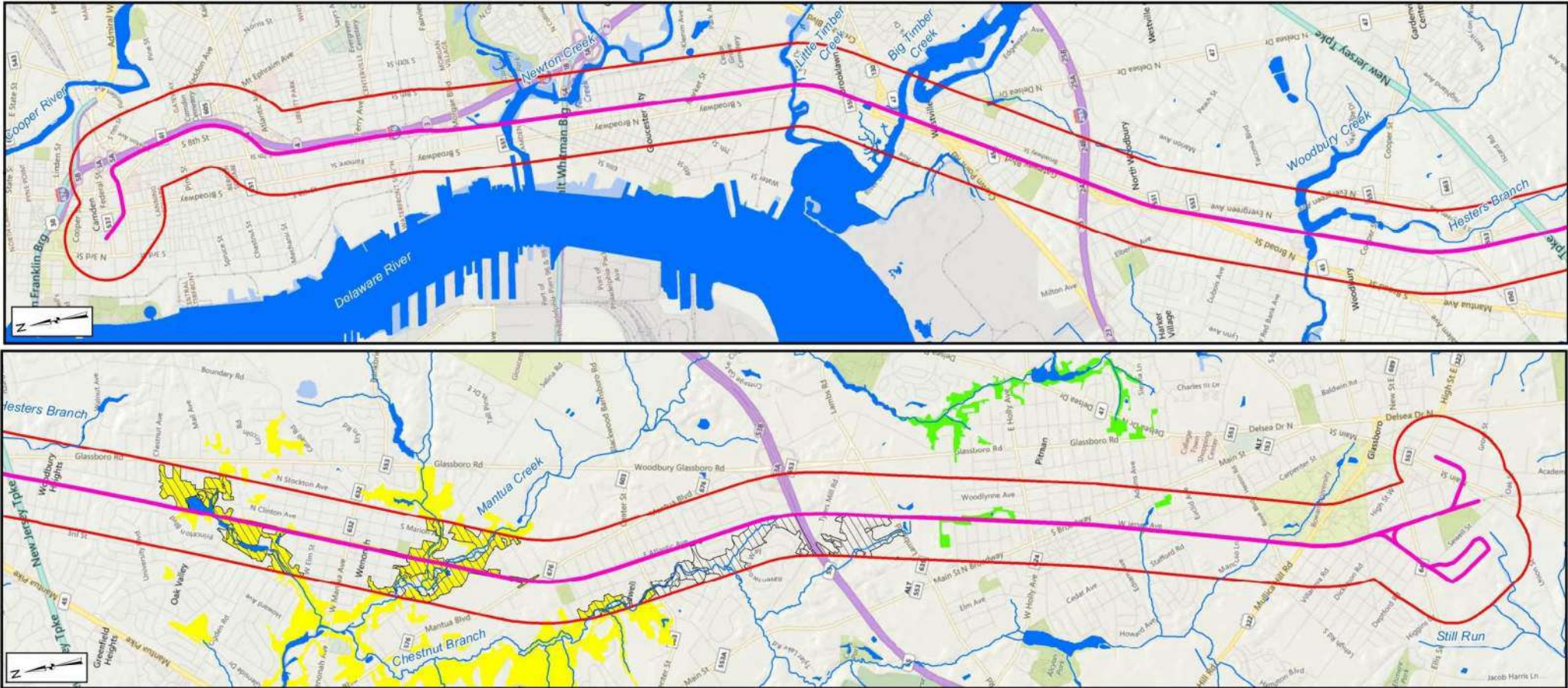
Status in Study Area: The New Jersey Natural Heritage Program and Landscape Project identify nesting records from the Walt Whitman Bridge and the Benjamin Franklin Bridge over the Delaware River, which are both outside of the study area (Figure 14, “Peregrine Falcon Habitat”). This species would not be expected to occur as a nesting species within the study area.



Source: NJDEP Landscape Project, NJDEP Land Use/Land Cover, 2012; GCL Project Team, 2020.

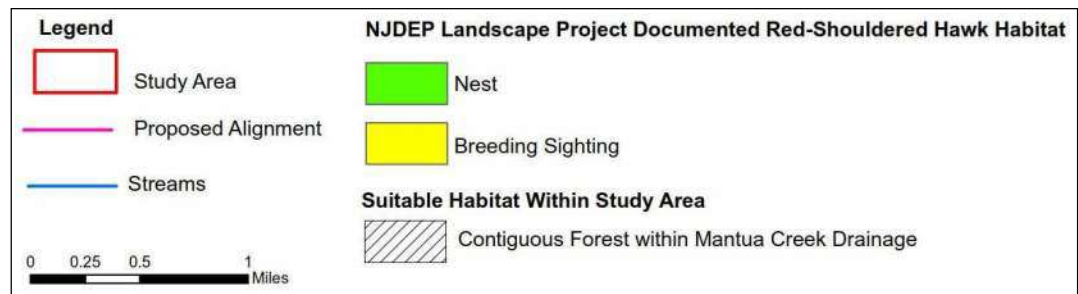
Figure 12: Bald Eagle Habitat

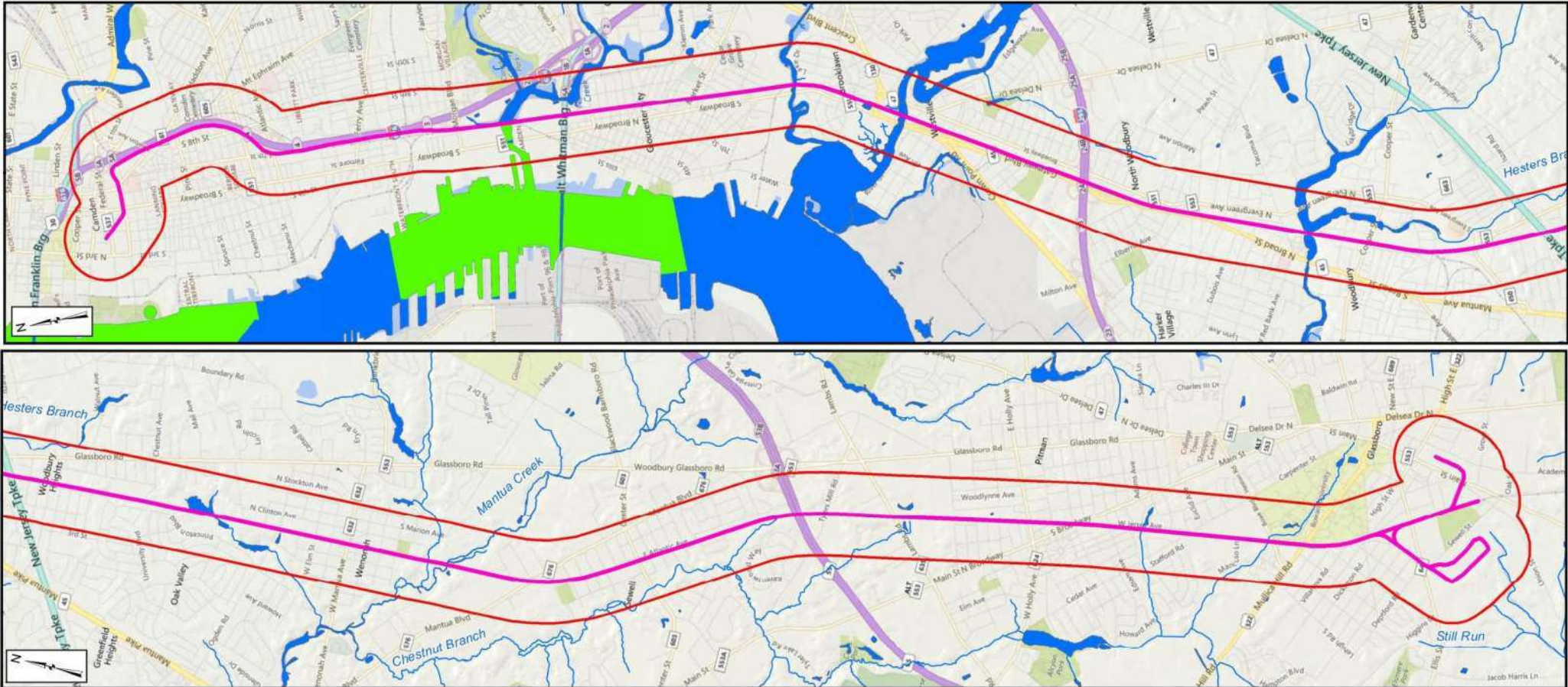




Source: NJDEP Landscape Project; NJDEP Land Use/Land Cover, 2012; GCL Project Team, 2020.

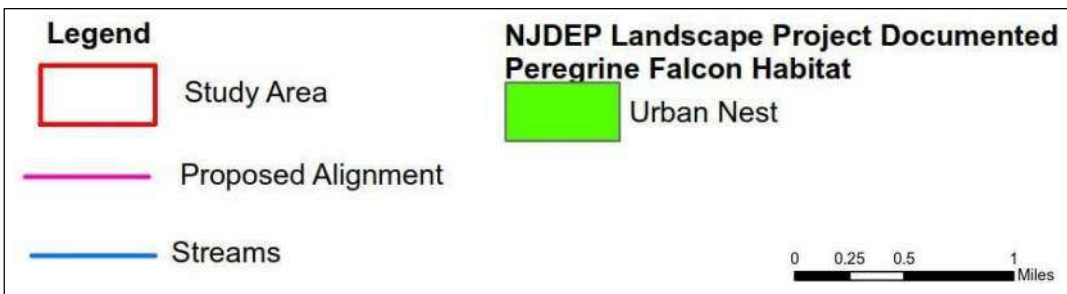
Figure 13: Red Shouldered Hawk Habitat





Source: NJDEP Landscape Project; NJDEP Land Use/Land Cover, 2012; GCL Project Team, 2020.

Figure 14: Peregrine Falcon Habitat



Barred Owl (*Strix varia*)

State Status: Threatened

Habitat Requirements: Barred owl have similar habitat requirements to that of the red-shouldered hawk, preferring to nest in larger contiguous stands of mature deciduous or mixed forested wetlands. The barred owl is a forest interior species, meaning it prefers large patches of forest habitat.

Status in Study Area: The Natural Heritage Program identifies barred owl as a breeding species within the immediate vicinity of the rail corridor. New Jersey Landscape Program does not identify barred owl habitat within the study area. However, in March of 2014 a territorial barred owl was observed within a forested area along a tributary to Mantua Creek. Based on a review of available habitat, suitable nesting habitat occurs within mature forest associated with the Mantua Creek drainage (Figure 15, “Barred Owl Habitat”).

4.5.2.2 Plants

The New Jersey Natural Heritage Program identified five State-listed plant species occurring in the vicinity of the rail corridor. These species occur primarily along forested riparian corridors of the Chestnut Branch and Mantua Creek from within the Mantua and Wenonah Ravine Natural Heritage Priority Sites as shown on Figure 16, “State-Listed Plant Species.” Two species occur outside the study area.

Shingle Oak (*Quercus imbricaria*)

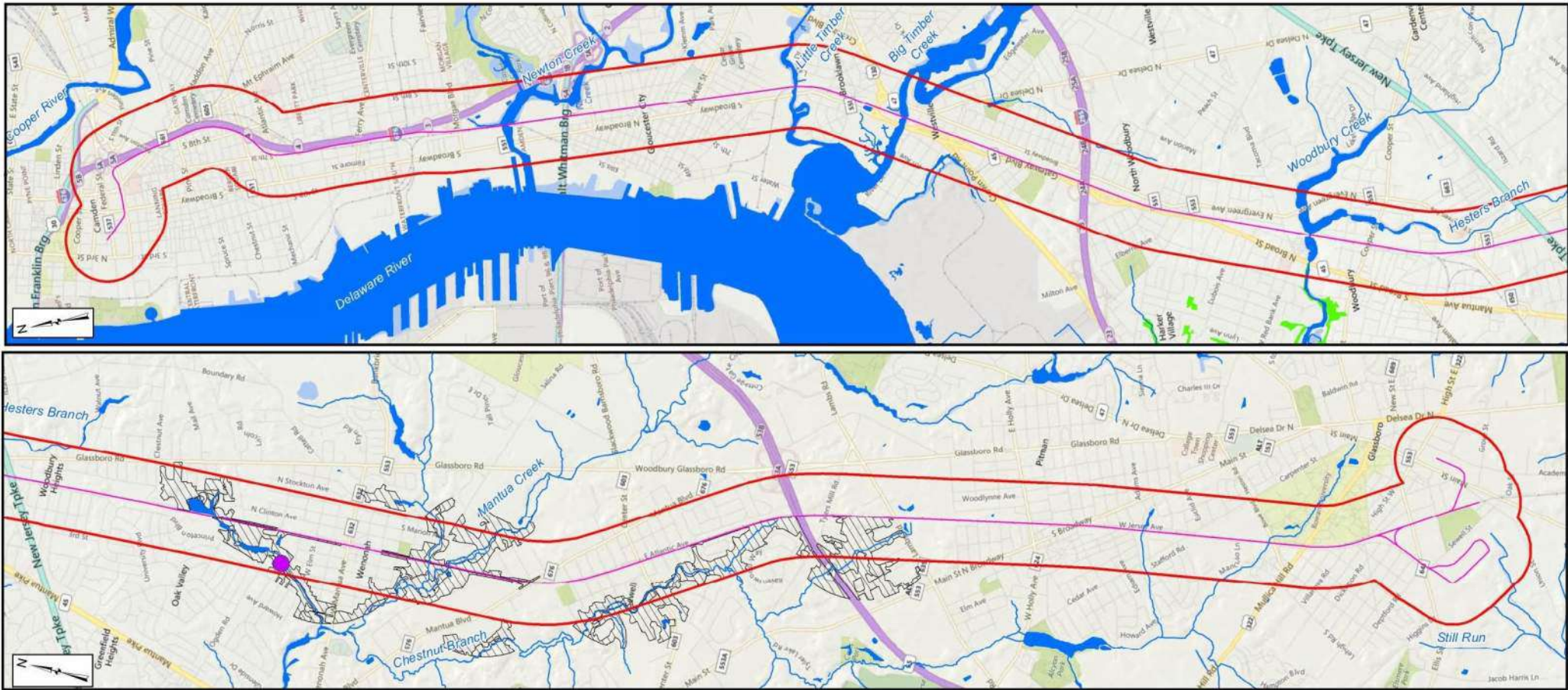
State Status: Endangered

Status in Study Area: Shingle oak is known to occur within the Wenonah Ravine Natural Heritage Priority Site. Field surveys were conducted in July 2014 and two shingle oaks were identified growing within and adjacent to the rail corridor. One tree is located on the western side of the track. The mature tree exhibits a full canopy and has a diameter breast height (dbh) of 16 inch. The second oak is a small tree measuring eight inch dbh. Both specimens are growing within the historic rail embankment. The location of these trees is shown on Figure 16, “State-Listed Plant Species.”

Broad-leaf Ironweed (*Vernonia glauca*)

State Status: Endangered

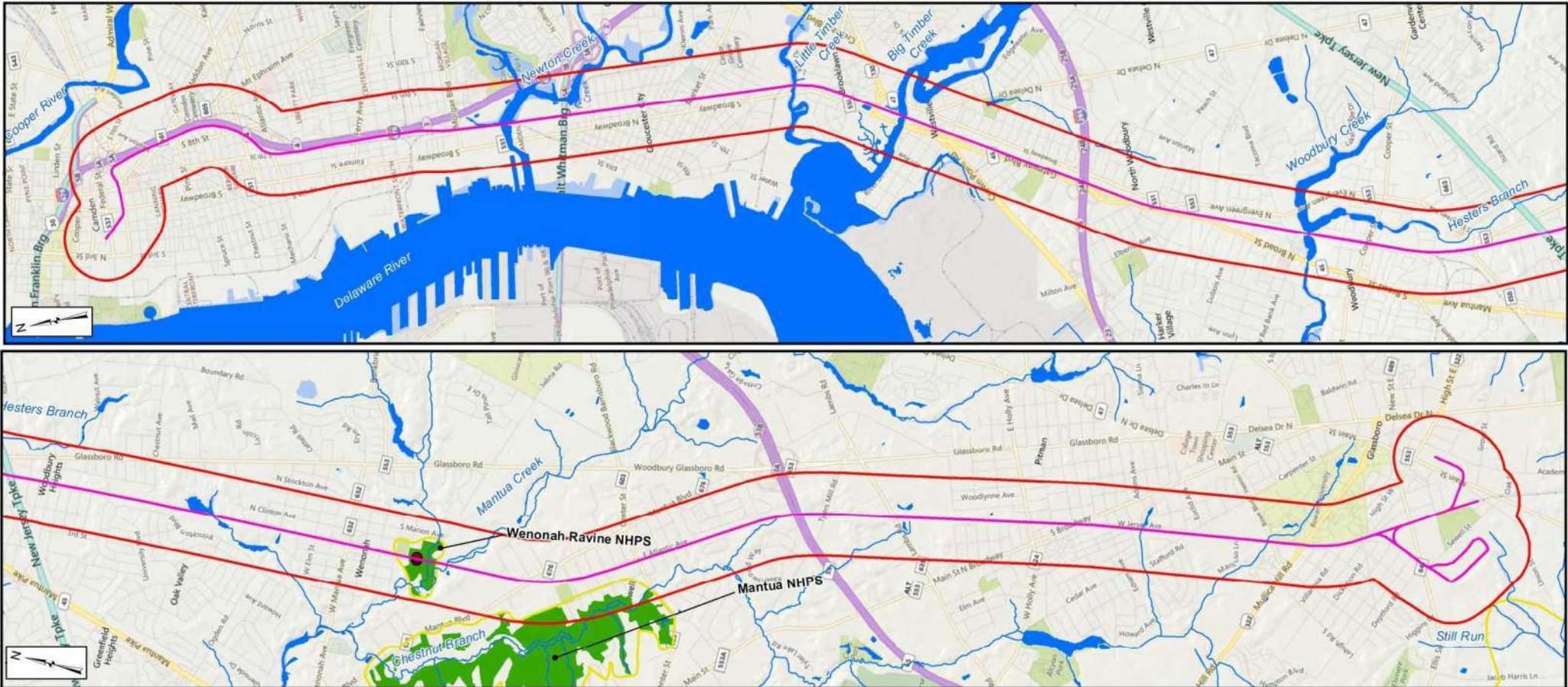
Status in Study Area: Broad-leaf ironweed typically inhabits meadows, fields, and disturbed areas. The Natural Heritage Program documented this species from the Mantua Natural Heritage Priority Site along the Chestnut Branch west of Sewell. Suitable habitat may exist within disturbed areas in fields and along the railroad right-of-way in proximity to the Wenonah Natural Heritage Priority Sites. Visual surveys conducted in the summer of 2014 along the rail corridor within and adjacent to the Wenonah Ravine Natural Heritage Priority site did not identify this species as occurring in the immediate vicinity of the rail corridor.



Source: NJDEP Landscape Project; NJDEP Land Use/Land Cover, 2012; GCL Project Team, 2020.

Figure 15: Barred Owl Habitat





Source: NJDEP Landscape Project; NJDEP Natural Heritage Program Correspondence Dated Dec. 5, 2017; GCL Project Team, 2020.

Figure 16: State-Listed Plant Species



Pale Indian Plantain (*Cacalia atriplicifolia*)

State Status: Endangered

Status in Study Area: Suitable habitat for pale Indian plantain consists of dry, open wooded areas and thickets. It is known to occur from the Mantua Natural Heritage Priority Site along Mantua Creek and Chestnut Branch stream corridors. Visual surveys conducted in the summer of 2014 along the rail corridor within and adjacent to the Wenonah Ravine Natural Heritage Priority site did not identify this species as occurring in the immediate vicinity of the proposed rail corridor.

Putty Root (*Aplectum hyemale*)

State Status: Endangered

Status in Study Area: Putty root occupies deciduous forests with rich damp soils typically located above streams and in damp depressions. The only known record of putty root is outside the study area from the Natural Heritage Program is from a forested ravine draining to the Chestnut Branch located approximately 0.4 miles west of the rail corridor.

Hairy Wood-Rush (*Luzula acuminata* var. *acuminata*)

State Status: Endangered

Status in Study Area: Hairy wood-rush may be found in rich deciduous forests along streams. The only record of this species reported by the Natural Heritage Program is from outside the study area along the Mantua Creek approximately one mile upstream of the rail corridor.

4.5.2.3 Freshwater Mussels

The New Jersey Natural Heritage Program identified three species of state-listed freshwater mussels occurring in the vicinity of the rail corridor. Based on the available records none of the species occurrences are from within the study area (Figure 17, “Freshwater Mussels Habitat”).

Eastern Pond Mussel (*Ligumia nasuta*)

State Status: Threatened

Status in Study Area: Eastern Pond Mussels are found in the Cooper River, and an unnamed tributary to the Delaware River located approximately 1.5 miles south west of Big Timber Creek. These waterbodies occur to the north and west of the study area.

Tidewater Mucket (*Leptodea ochracea*)

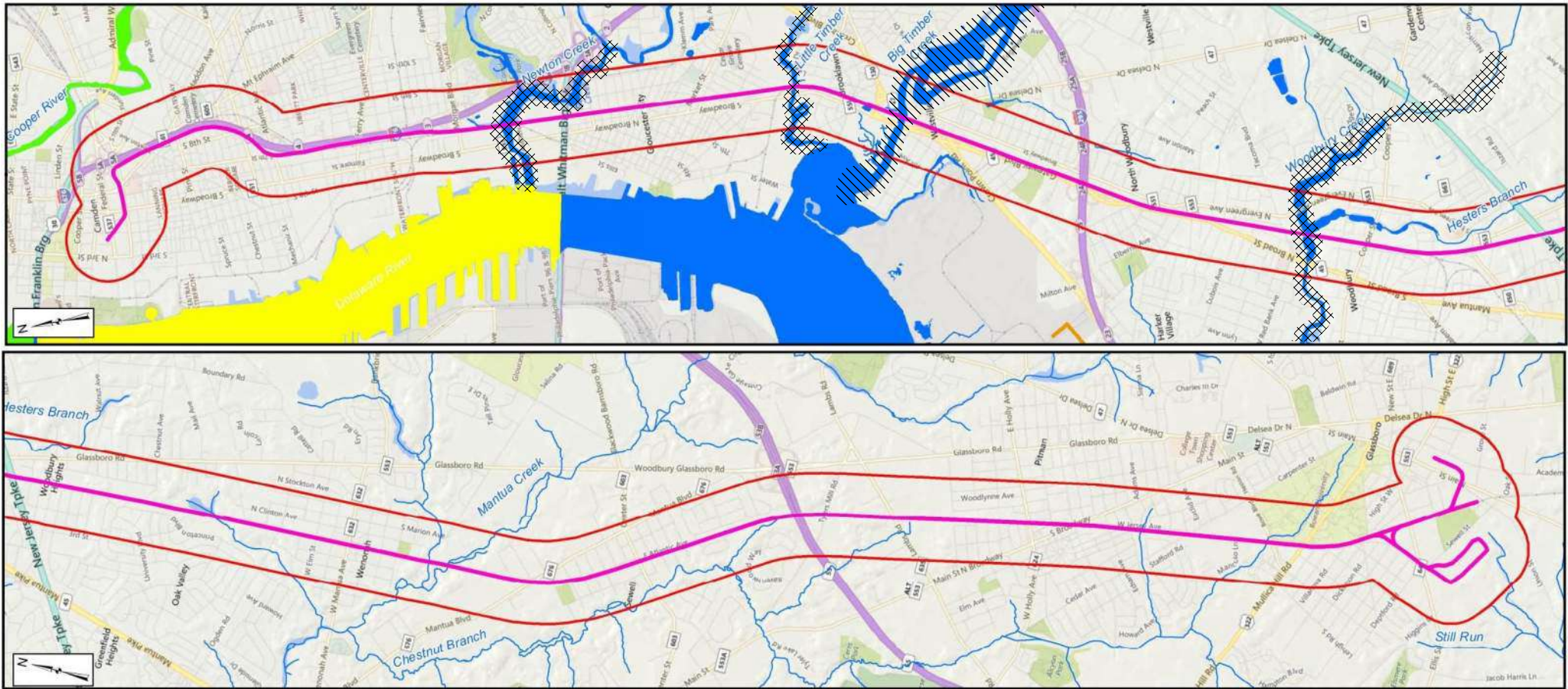
State Status: Threatened

Status in Study Area: The Tidewater Mucket has been observed in the Delaware River and the Cooper River. These water bodies are located north and west of the study area.

Yellow Lampmussel (*Lampsilis cariosa*)

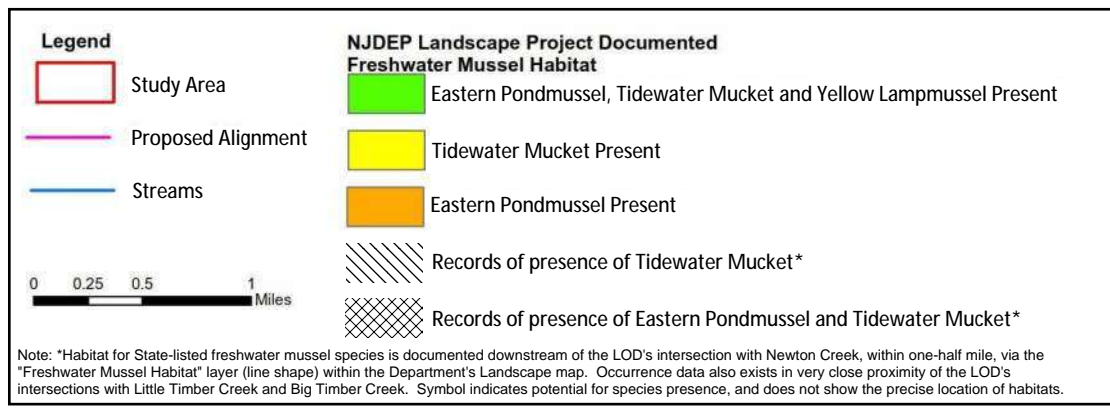
State Status: Threatened

Status in Study Area: Yellow Lampmussel is documented to occur in the Cooper River. This waterbody is to the north of the study area.



Source: NJDEP Landscape Project Freshwater Mussel Habitat; NJDEP Consultation, September 2020; GCL Project Team, 2020.

Figure 17: Freshwater Mussels Habitat



4.6 Species of Special Concern

Based on information provided by the Natural Heritage Program there are 17 species of special concern that may also occur within the study area. These are not state or federally-listed endangered or threatened species but have been designated by the Natural Heritage Program State Rank of either rare or imperiled. The Natural Heritage Program State Rank is assigned based on a system developed by the Nature Conservancy so that conservation efforts are targeted toward species under the greatest threat, including:

- **S1** - indicates the species is **critically imperiled** in New Jersey with five or fewer known occurrences within the state.
- **S2** - species are **imperiled** within the state and are known from 6-20 occurrences.
- **S3** - **rare** in the state and known from only 21-50 occurrences for plants and 21-100 occurrences for other species

The following species of special concern and their habitat requirements and locations within the study area are documented in Table 8, “Species of Special Concern.”

Table 8: Species of Special Concern

Type	Common Name (NHP Rank)	Scientific Name	Habitat Requirements
Birds	Cooper’s Hawk (S3)	<i>Accipiter cooperii</i>	Inhabits mature deciduous or mixed forests and forested wetlands with closed canopy. Suitable breeding habitat in the study area for Cooper’s Hawk would consist of forested patches throughout the study area and heavily wooded residential areas.
	Great Blue Heron (S3)	<i>Ardea herodias</i>	Wading bird that nests colonially in tall trees near water. Suitable breeding habitat for great blue heron may exist along the Newton Creek, Little Timber Creek, and Big Timber Creek due to proximity to open water for feeding and trees for nesting.
	Wood Thrush (S3)	<i>Hylocichla mustelina</i>	A migratory songbird that inhabits, scrubby fields, dense early successional forest and nests in forest edges. Suitable habitat for this species occurs throughout the forested and old-field communities within the study area.
Reptiles	Eastern Box Turtle (S3)	<i>Terrapene carolina</i>	A terrestrial turtle species mainly found within deciduous forests with a moist forest floor, but with good drainage. They can also be found in open grasslands and pastures. Suitable habitat for this species occurs throughout the forested and old-field communities within the study area.
Plants	Smooth Tick-trefoil (S1)	<i>Desmodium laevigatum</i>	Herbaceous plant found in rocky, open woods. NJ Natural Heritage Program documented habitat exists along the Chestnut Branch approximately 1.6 miles southeast of Mantua.
	Curtiss’ Three-awn Grass (S3)	<i>Aristida dichotoma var. curtissii</i>	Grass species found in disturbed areas and early successional old-field communities. NJ Natural Heritage Program documented habitat exists southeast of Mantua along Mantua Creek but there have been no reported sightings since 1919.

Table 8: Species of Special Concern (Continued)

Type	Common Name (NHP Rank)	Scientific Name	Habitat Requirements
Plants	White Milkweed (S1)	<i>Asclepias variegata</i>	A wildflower found in dry or rocky forest and thickets. NJ Natural Heritage Program documented habitat within the study area found along the Chestnut Branch west in Sewell. The last reported sighting occurred in 1923.
	Wild Kidney Bean (S2)	<i>Phaseolus polystachios</i> var. <i>polystachios</i>	Native bean species inhabiting forest. Habitat for this species documented by the NJ Natural Heritage Program in forested areas associated with Mantua Creek southeast of Mantua.
	Spotted Phlox (S2)	<i>Phlox maculata</i> var. <i>maculate</i>	Herbaceous plant existing in old-field communities as well as disturbed sites. Habitat for this species has been documented by the NJ Natural Heritage Program along Mantua Creek east of Sewell and along a tributary to Woodbury Creek near the railroad station in Woodbury Heights. The last reported sighting occurred in 1919.
	Swamp Oats (S2)	<i>Sphenopholis pensylvanica</i>	Grass species found in wetlands and along the shores of rivers and lakes. Habitat for this species has been documented by the NJ Natural Heritage Program along the Chestnut Branch west of Sewell, but may also be found within any wetland areas adjacent to a waterway or waterbody. The last reported sighting occurred in 1923.
	Marsh Water-starwort (S2)	<i>Callitriche palustris</i>	An aquatic species found in water bodies such as lakes with still or slow-moving water, but may also be found on the shores of rivers. Documented by the NJ Natural Heritage Program along a tributary of the Big Timber Creek in Westville.
	Awl-leaf arrowhead (S2)	<i>Sagittaria subulate</i>	A herbaceous perennial plant typically found in brackish and tidal fresh waters, intertidal mudflats, and regularly flooded marshes. Historically found by the NJ Natural Heritage Program along the Delaware River at the mouth of the Big Timber Creek northwest of Westville. The last reported sighting occurred in 1923.
	Smooth Hedge-nettle (S3)	<i>Stachys tenuifolia</i>	A native plant species typically inhabiting wetlands, wet meadows, and floodplain forests. NJ Natural Heritage Program documented habitat exists along the banks of Newton Creek south of Collings Road in Camden, at the border of a tidal marsh in Yorkship, and within a margin of thicket bordering a beach at the mouth of the Big Timber Creek northwest of Westville. The last reported sighting occurred in 1923.
	Downey Willowherb (S2)	<i>Equolobium strictum</i>	A native plant species that grows in wetlands. NJ Natural Heritage Program has documented this species along Mantua Creek ¼ mile southwest of Hurffville. The last recorded sighting occurred in 1923.
Insects	Pink Streak (S3)	<i>Faronta rubripennis</i>	Moth inhabiting early successional old-field communities and grassland habitat. May also be found in emergent wetland areas. Suitable habitat may occur throughout the study area.
	A Noctuid Moth (S2)	<i>Macrochilo Louisiana</i>	Species of moth inhabiting emergent wetlands and wet grasslands. Suitable habitat may occur throughout the Mantua Creek drainage.
	A Noctuid Moth (S1)	<i>Macrochilo santerivalis</i>	Species of moth inhabiting emergent wetlands and wet grasslands. Suitable habitat may occur throughout the Mantua Creek drainage.
<p>Note: Wild Celery grows in fresh non-tidal and fresh to slightly brackish tidal waters around the world, usually in areas where the water is 2.75 to six feet deep. Wild Celery prefers coarse soil that is silty or sandy, is more tolerant of murky, nutrient-rich waters, and withstands waves better than other bay grasses. If Wild Celery is identified during other survey activity (i.e., as the project advances to preliminary engineering), it will be identified and the location provided.</p>			

Source: New Jersey Natural Heritage Program Correspondence, December 5, 2017

In addition to the species outlined above, as a result of the NJDEP Bat Conservation plans, two “candidate species” whose habitat could be affected by the project, the Little Brown Bat and the Tricolored Bat, have

been identified. While these species are not yet listed, potential impacts to the species habitat will be considered as part of project refinement in preliminary engineering, and measures to reduce impacts to bat habitat will be implemented as part of the proposed project.

4.7 Water Resources

This section describes existing water resources within the study area for the project, including surface waters, wetlands, flood hazard areas, groundwater and New Jersey Coastal Zone Special Areas. The analysis is conducted relative to the State and Federal regulations intended to maintain and promote surface and groundwater quality.

4.7.1 Surface Waters

Surface waters include rivers, lakes, streams, wetlands, estuaries, and near shore coastal waters. Pursuant to a 1993 Memorandum of Agreement between the State of New Jersey and the U.S. Army Corps of Engineers (USACE), with few exceptions, NJDEP has assumed jurisdiction over all waters regulated under Section 404 of the Clean Water Act, including freshwater wetlands. This agreement grants NJDEP the regulatory permitting authority over construction projects with wetland impacts that, in other states, are regulated by the USACE. In addition, NJDEP has enacted the following regulations to maintain and promote surface and groundwater quality with respect to surface waters:

- The Waterfront Development Law and implementing rules found at N.J.A.C. 7:7, is intended to limit problems and environmental impacts that new development could cause for existing navigation channels, marinas, moorings, and other existing uses.
- The Coastal Zone Management Rules found at N.J.A.C. 7:7E identify the policies and guidance relative to Special Areas, General Water Areas, General Land Areas, General Location Rules, Use Rules and Resource Rules that are addressed in a NJDEP Waterfront Development Permit application. Of significant importance are the Special Areas and Resource Rules, which are environmentally-sensitive resources that need to be addressed and impacts minimized.
- The Surface Water Quality Standards found at N.J.A.C. 7:9B, establish the designated uses and anti-degradation categories of New Jersey's surface waters, classify surface waters based on those uses (i.e., stream classifications), and specify the water quality criteria and other policies and provisions necessary to attain designated uses such as drinking water supply, fish consumption, shellfish resources, propagation of fish and wildlife, recreation, and agricultural and industrial water supplies.
- The Freshwater Wetlands Protection Act and implementing rules found at N.J.A.C. 7:7A provide the requirements for wetland identification and permitting. Both freshwater wetlands and freshwater wetland transition areas (buffers) are included in this regulation.
- The Flood Hazard Area Control Act and implementing rules found at N.J.A.C. 7:13 is intended to control development within floodplains for the purpose of minimizing potential on- and off-site flood damage to public and private property and to avoid or mitigate the detrimental effects of development. In addition to the floodway, flood fringe and 100-year floodplain, cumulatively referred

to as the flood hazard area, these rules address stormwater management and riparian zone/riparian buffer protection.

Surface waters are classified based on the type and designated use of a waterbody. New Jersey has both fresh and saline waters. Within the study area, freshwaters are classified as FW1 (freshwaters not subject to any man-made wastewater discharges) and FW2 waters (all other freshwaters except Pinelands waters). It is noted that Pinelands waters are those located within the designated Pinelands National Reserve and are not present within the study area. Freshwaters are further classified based on trout status, trout production (FW2-TP), trout maintenance (FW2-TM), and non-trout (FW2-NT). In addition to freshwaters, SE2 waters are waters connected to saline waters of estuaries. The following surface waterbodies were identified within the project study area, see Table 9, “Surface Waters within Project Study Area.”

Table 9: Surface Waters within Project Study Area

Waterbody	Location	Classification	Jurisdiction
Newton Creek	City of Camden/ City of Gloucester City	FW2-NT	USACE, NJDEP, USCG
Little Timber Creek	City of Gloucester City Borough of Brooklawn	FW2-NT	USACE, NJDEP, USCG
Big Timber Creek	Borough of Brooklawn/ Borough of Westville	FW2-NT	USACE, NJDEP, USCG
Woodbury Creek/ Hunter Street Lake	City of Woodbury	FW2-NT/SE2	NJDEP
Marlton Lake	Township of Deptford	FW2-NT/SE2	NJDEP
Unnamed tributary to Mantua Creek	Township of Deptford	FW2-NT/SE2	NJDEP
Monongahela Brook	Borough of Wenonah/ Township of Deptford	FW2-NT	NJDEP
Mantua Creek	Township of Deptford/ Township of Mantua	FW2-NT	NJDEP
Unnamed tributary to Chestnut Branch	Township of Mantua	FW2-NT	NJDEP
Unnamed tributary to Chestnut Branch	Borough of Pitman	FW2-NT	NJDEP
Glen Lake	Borough of Pitman	FW2-NT	NJDEP
Chestnut Branch	Borough of Glassboro	FW2-NT	NJDEP

Source: NJDEP Surface Water Quality Standards GIS Data, 2010.

4.7.2 Wetlands

Following Presidential Executive Order 11990 entitled “Protection of Wetlands,” the United States Department of Transportation (USDOT) developed a policy (USDOT Order 5660.1A, Preservation of the Nation’s Wetlands, dated August 24, 1978), requiring all federally-funded railroad projects to protect wetlands to the fullest extent possible. Wetlands are defined by the USACE and the U.S. Environmental Protection Agency (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. Pursuant to a 1993 MOA between the State of New Jersey and the USACE, with few exceptions, the NJDEP has assumed jurisdiction over all waters regulated under Section 404 of the Clean Water Act, including freshwater wetlands. It is noted here that those exceptions include wetlands and waters associated with tidal waterways. These wetlands and waters remain under the jurisdiction of both USACE and NJDEP. The New Jersey Freshwater Wetlands Protection Act and implementing rules found at N.J.A.C. 7:7A provide the requirements for wetland identification and permitting. The NJDEP has adopted the January 1989 *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* 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, freshwater wetlands transition areas, coastal wetlands and drainage ditches. A description of each resource category is provided below.

4.7.2.1 State Open Waters

"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 U.S.";
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.

4.7.2.2 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.).

4.7.2.3 Freshwater Wetland Transition Areas

Freshwater wetland transition areas are buffers that are related to and similar to wetland areas themselves under the Freshwater Wetlands Protection Act and implementing rules found at N.J.A.C. 7:7A. Transition Areas are established by NJDEP based on ecological resource value of the wetlands. Exceptional resource value wetlands are those wetlands associated with trout production waters (FW2-TP) or documented threatened and endangered species breeding habitat. For exceptional resource value wetlands, the resultant transition area is 150 feet. Ordinary ecological resource value wetlands are those wetlands of lower ecological value or importance and include those features such as man-made drainage ditches, swales, isolated wetland areas less than 500 square feet in size, and stormwater basins and facilities. Ordinary resource value wetlands do not have transition areas associated with them. All other wetland areas are considered intermediate ecological resource value wetlands. For intermediate resource value wetlands, the resultant transition area is 50 feet and are the most common wetlands in the State.

4.7.2.4 Coastal Wetlands

A “coastal wetland” is defined by NJDEP 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 coastal 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.” Coastal wetlands shown on promulgated mapping pursuant to the Wetlands Act of 1970 (N.J.S.A. 13:9A-1 et seq.) and are regulated under the Coastal Permit Program rules found at N.J.A.C. 7:7.

4.7.2.5 Drainage Ditches

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.

Wetlands and water resource areas were initially identified with the project study area by using the Woodbury, Pittman West, Pittman East, New Jersey United States Geological Survey, County Soil Surveys, NJDEP GeoWeb, and the U.S. Fish and Wildlife Service’s National Wetland Inventory Mapping.

Comprehensive wetland delineation for the study area was completed between August and December 2013. Thirty-two water resources were identified within the project corridor and include those watercourses identified in Table 9, “Surface Waters within Project Study Area.” These identified and delineated resources include five state open waters (three with a freshwater wetland fringe), nineteen freshwater wetlands, four coastal wetlands and four ditches. The water resources within the study area

are located within the Lower Delaware River Basin watershed. They are described below and shown on Figure 18, “Water Resources”:

- 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 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 a Waters of the U.S., the drainage ditch would be under the jurisdiction of 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 NJDEP.
- 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 National Wetland Inventory (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*). As this is associated with a tidal waterway, this area would be under the jurisdiction of both 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. The soil in this wetland is primarily muck. This area would be under the jurisdiction of both USACE and NJDEP.
- Resource 5, WWV-A/WBL-A, is a mapped New Jersey coastal wetland associated with, and includes, 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 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 USACE and NJDEP.

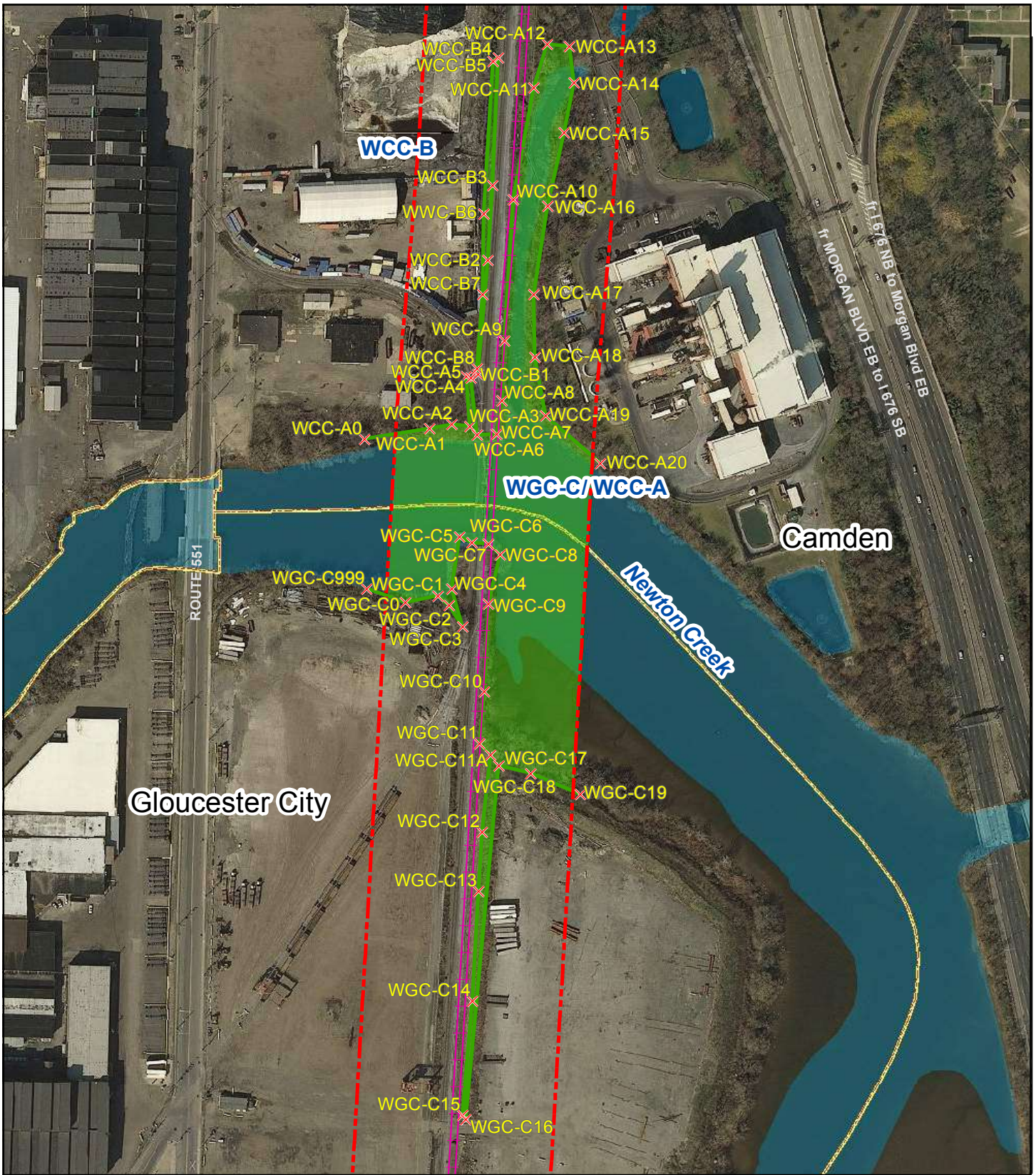
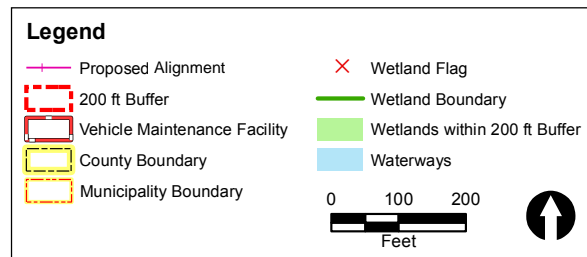


Figure 18a: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



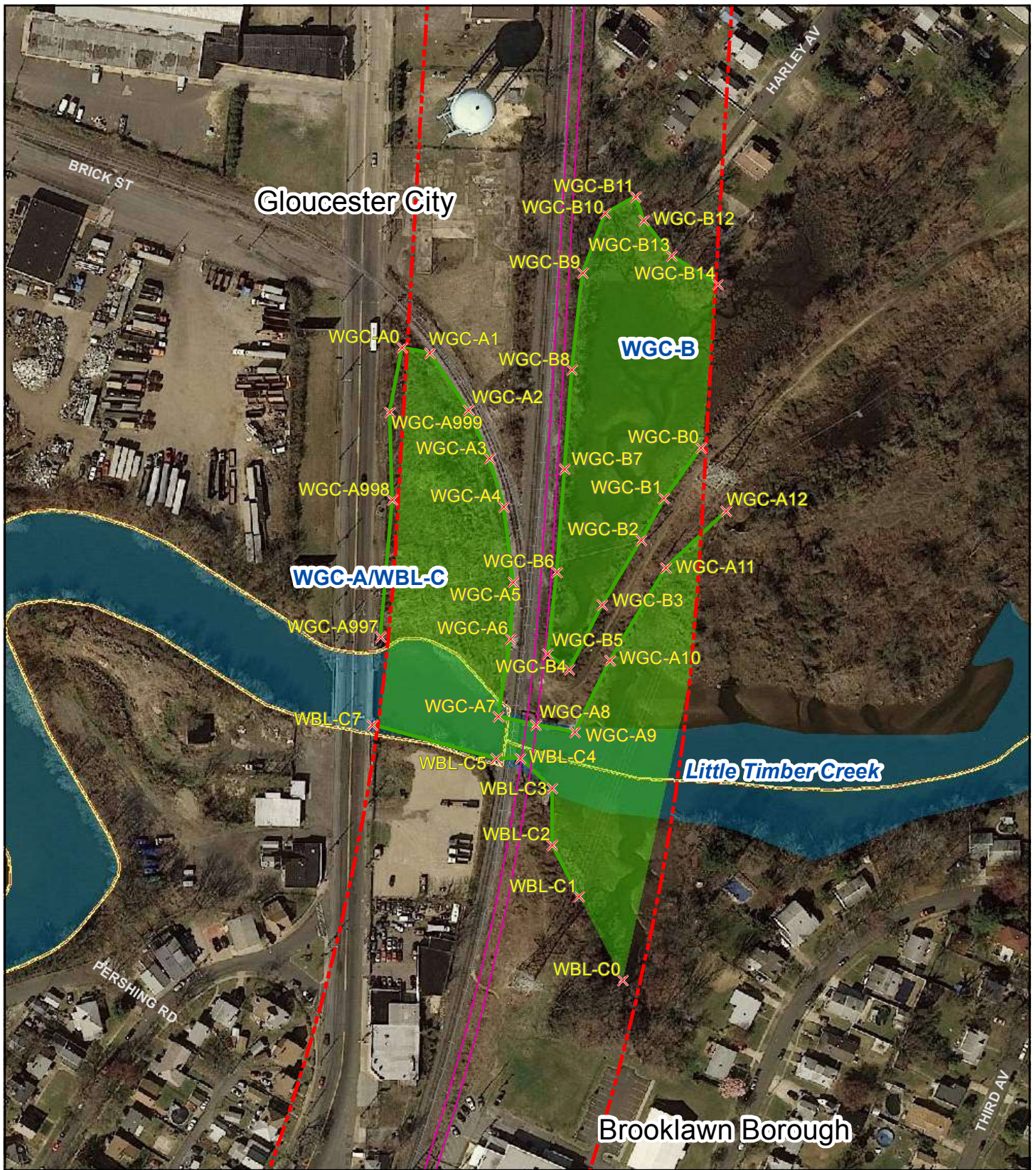
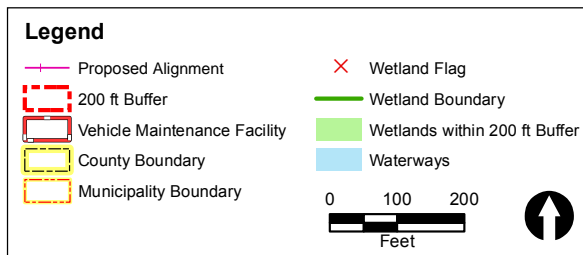


Figure 18b: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



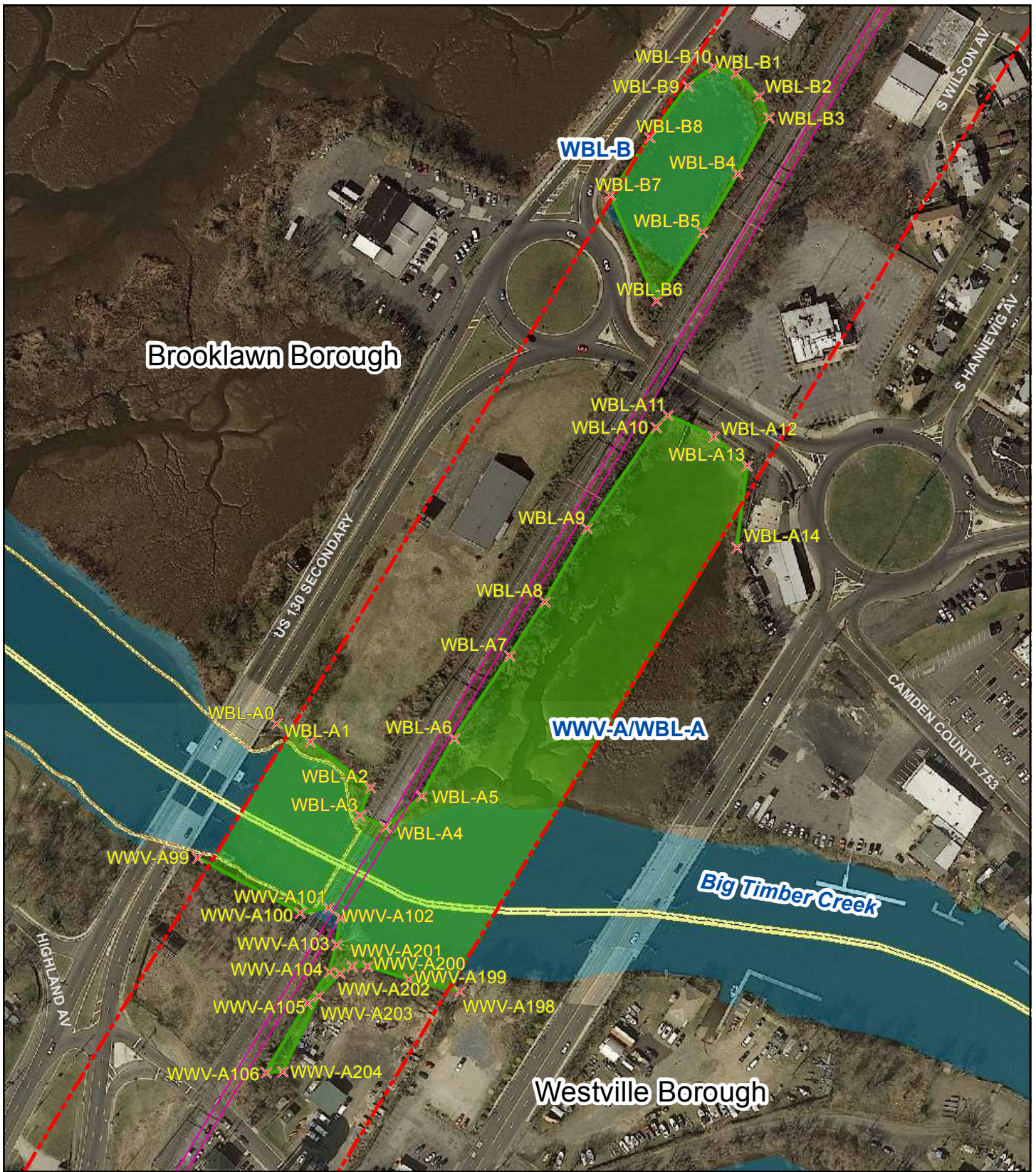
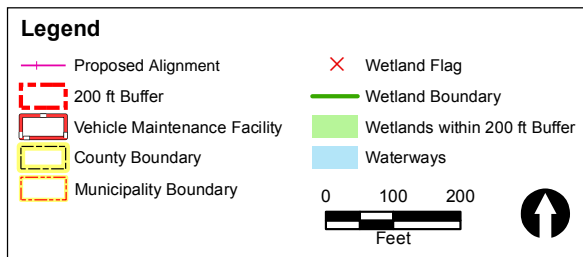


Figure 18c: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



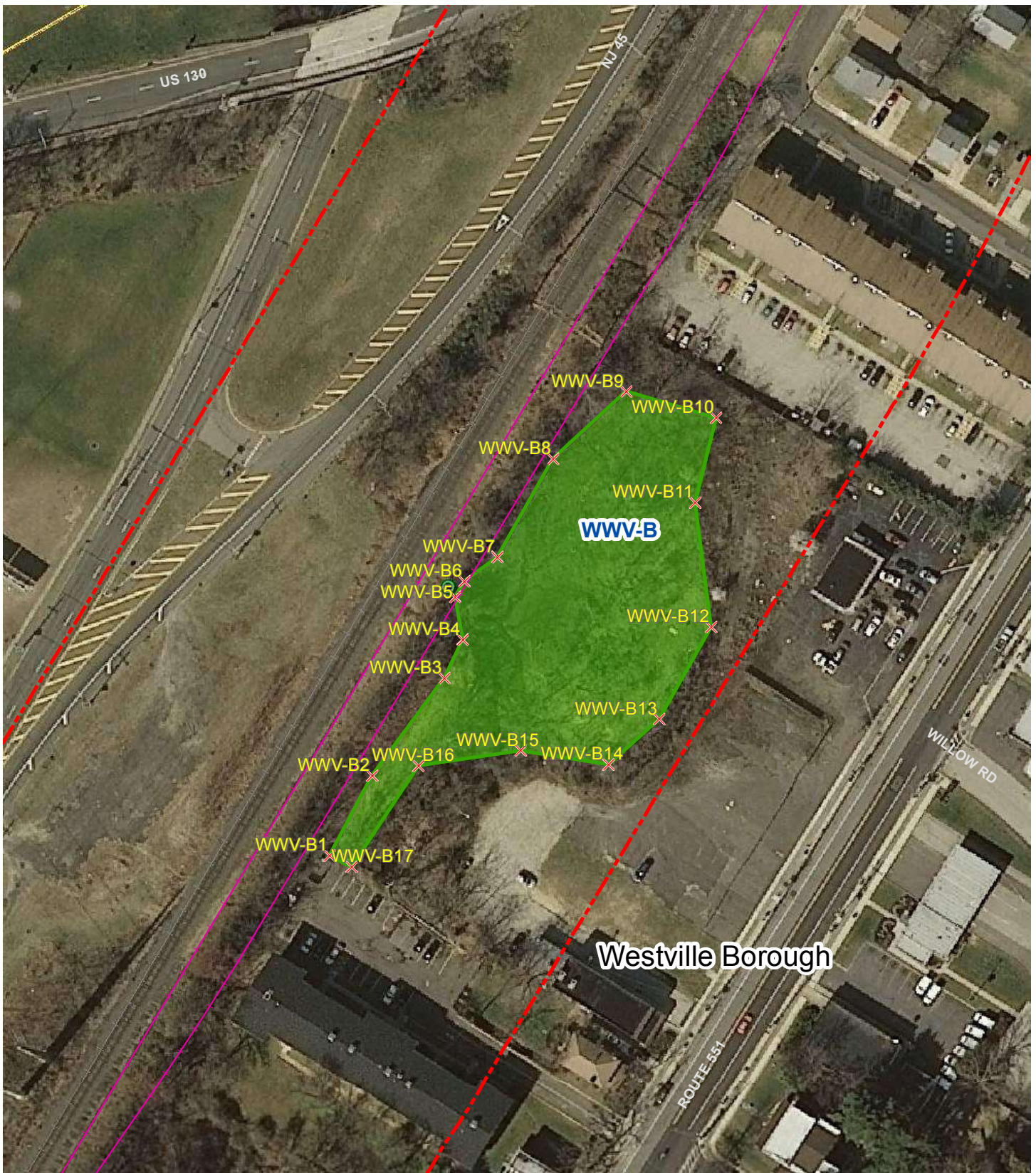
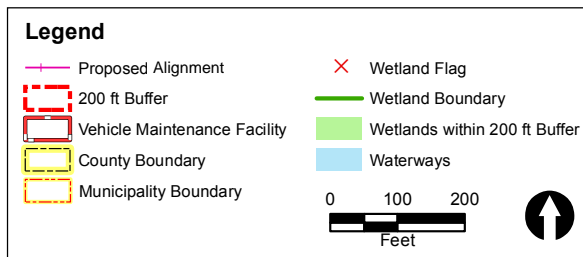


Figure 18d: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



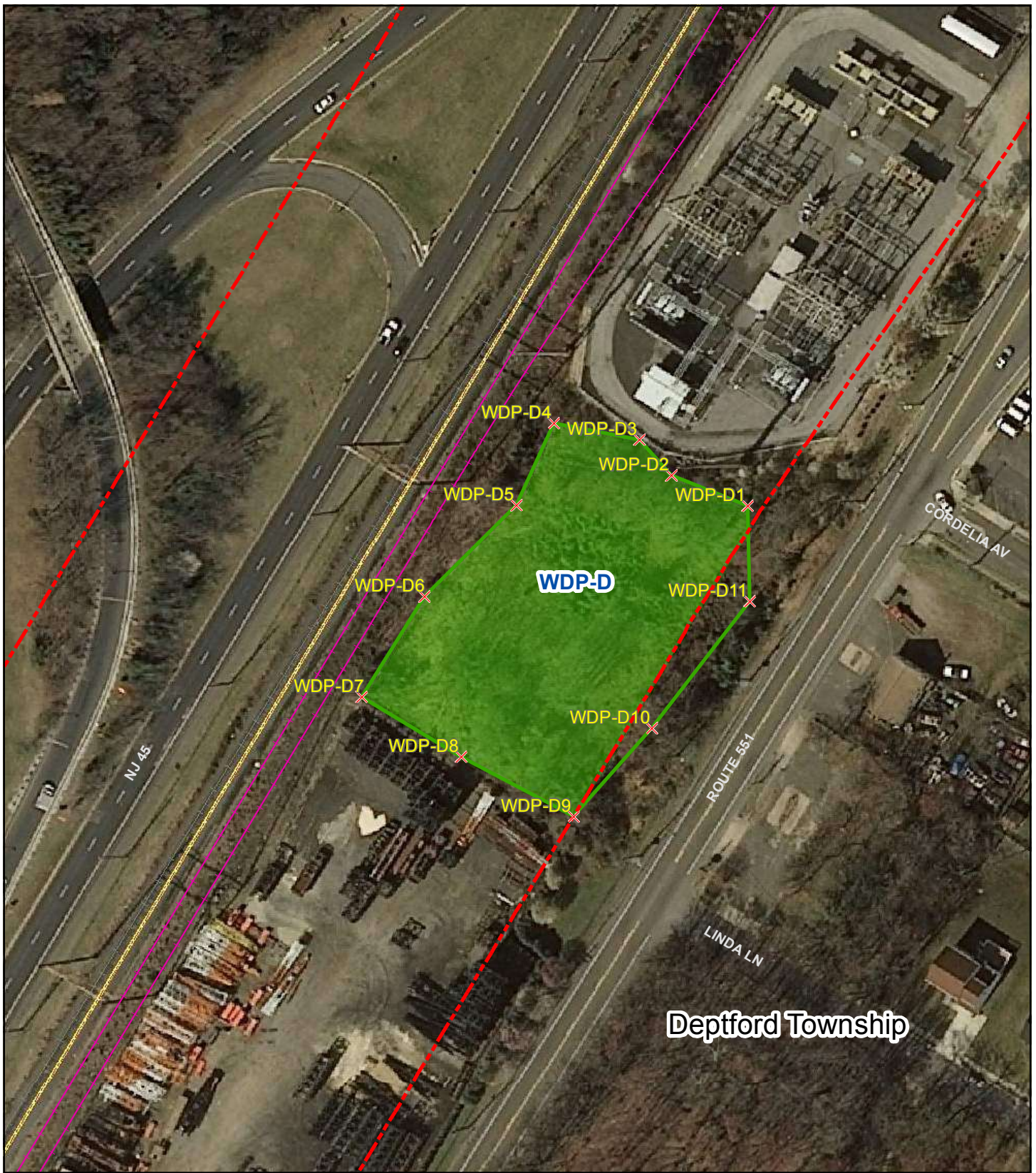
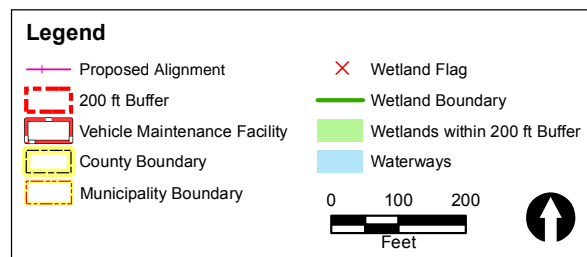


Figure 18e: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



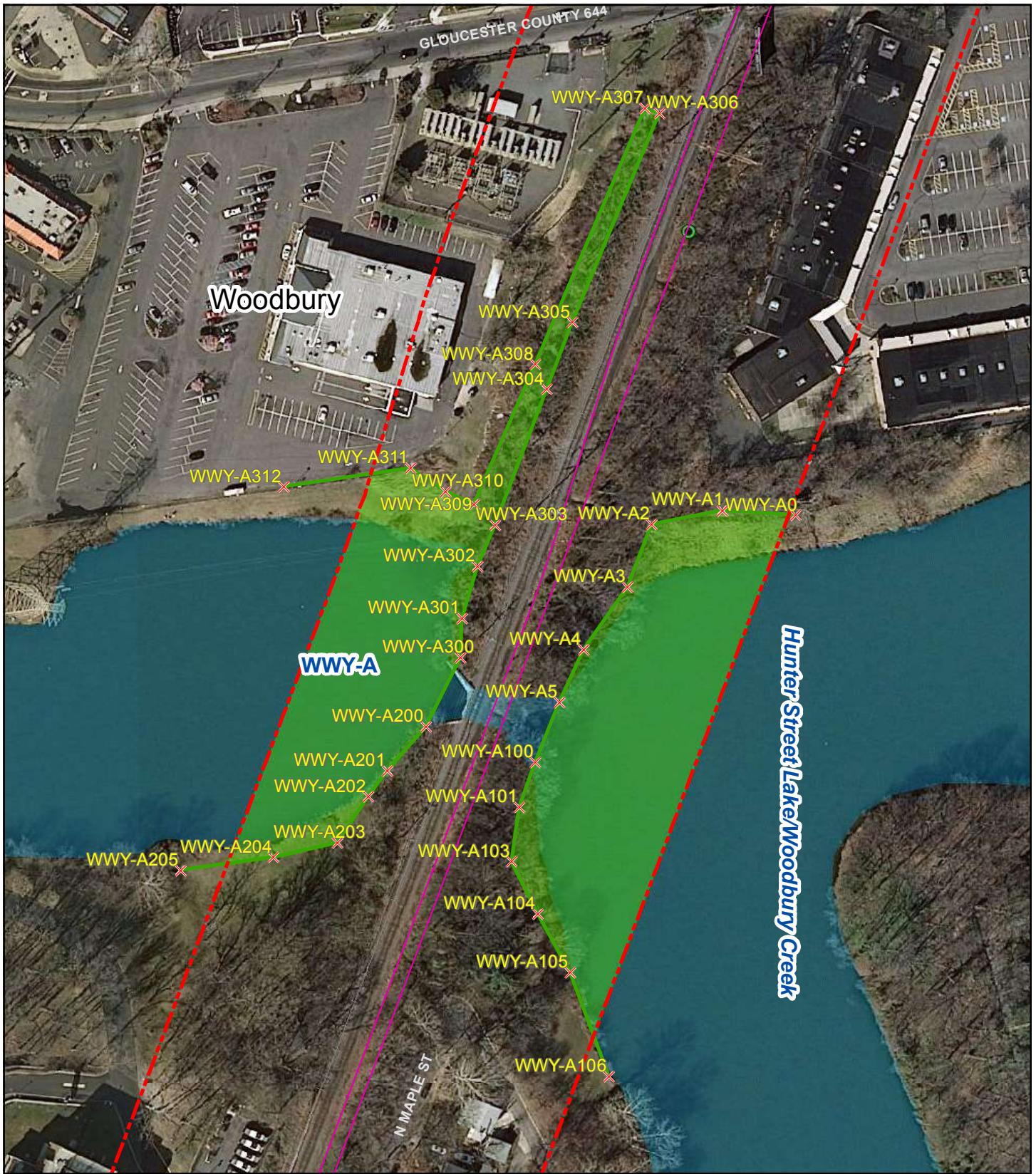


Figure 18f: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



Legend

Proposed Alignment	Wetland Flag
200 ft Buffer	Wetland Boundary
Vehicle Maintenance Facility	Wetlands within 200 ft Buffer
County Boundary	Waterways
Municipality Boundary	

0 100 200
Feet

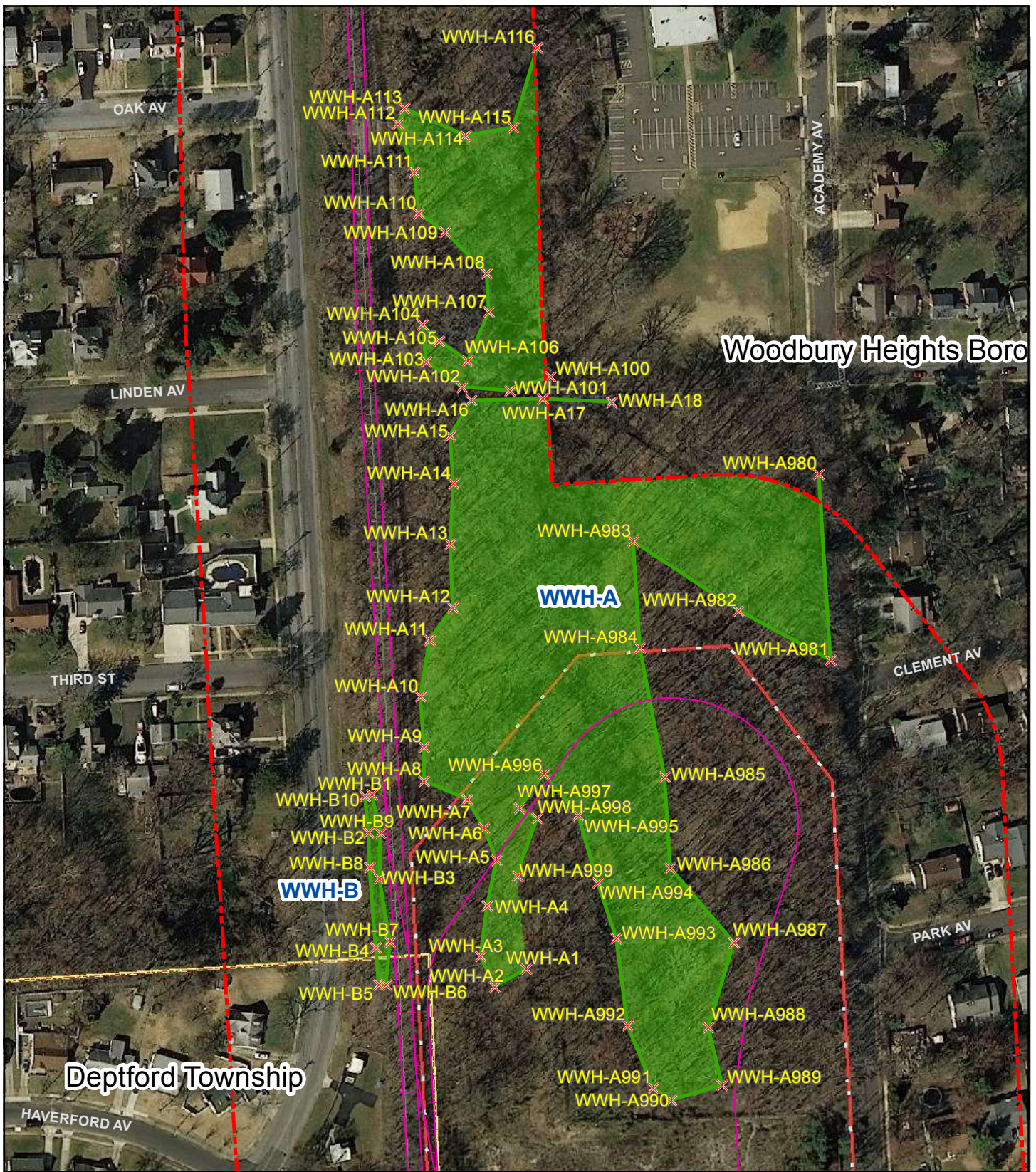
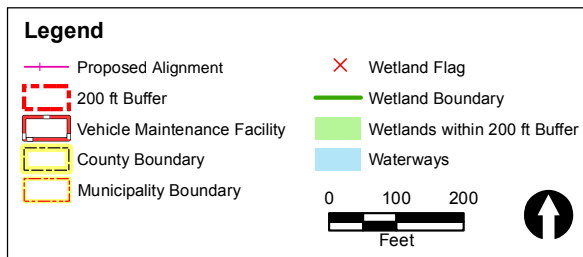


Figure 18g: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



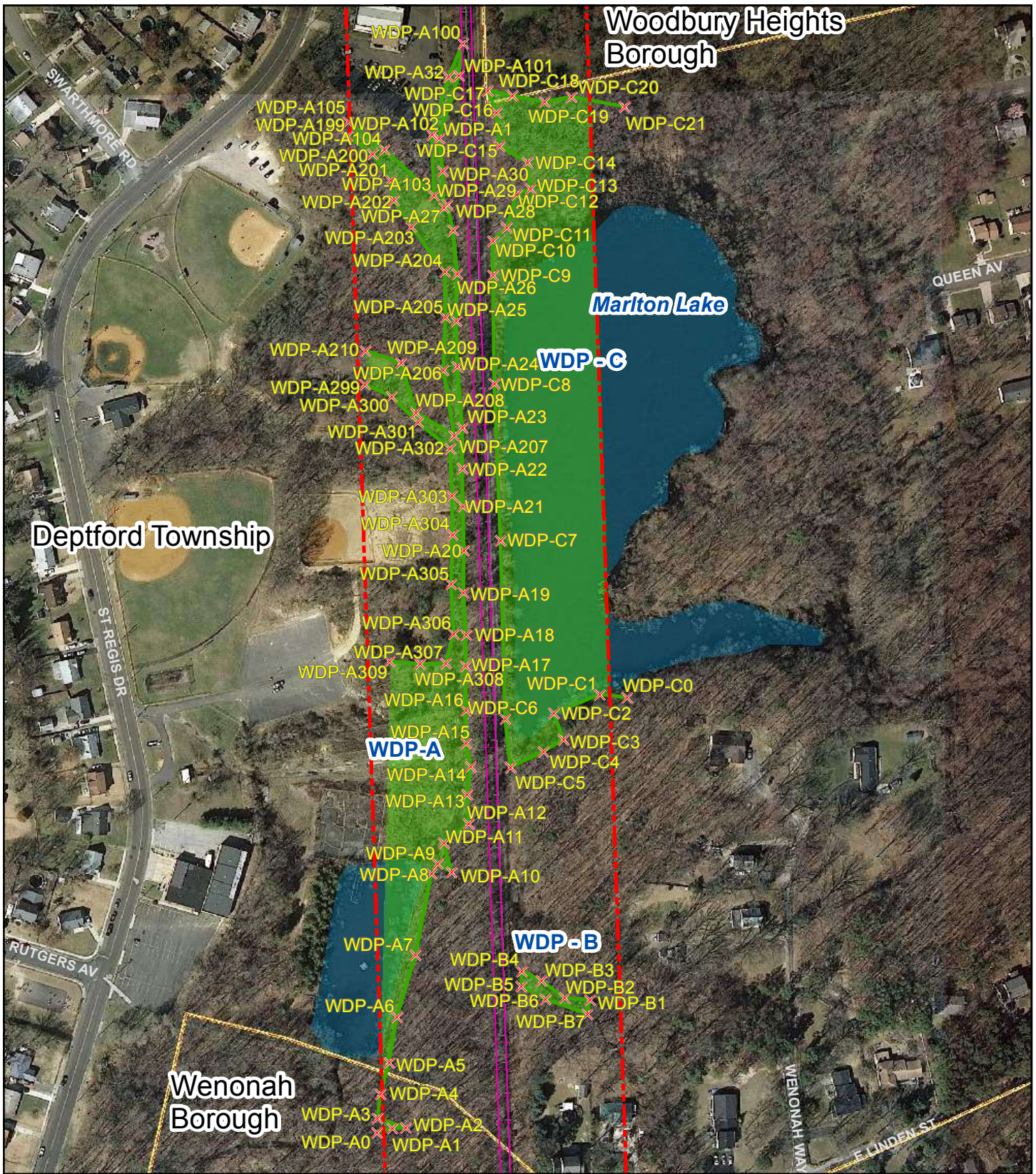
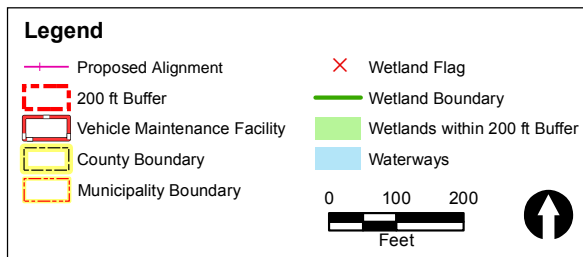


Figure 18h: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



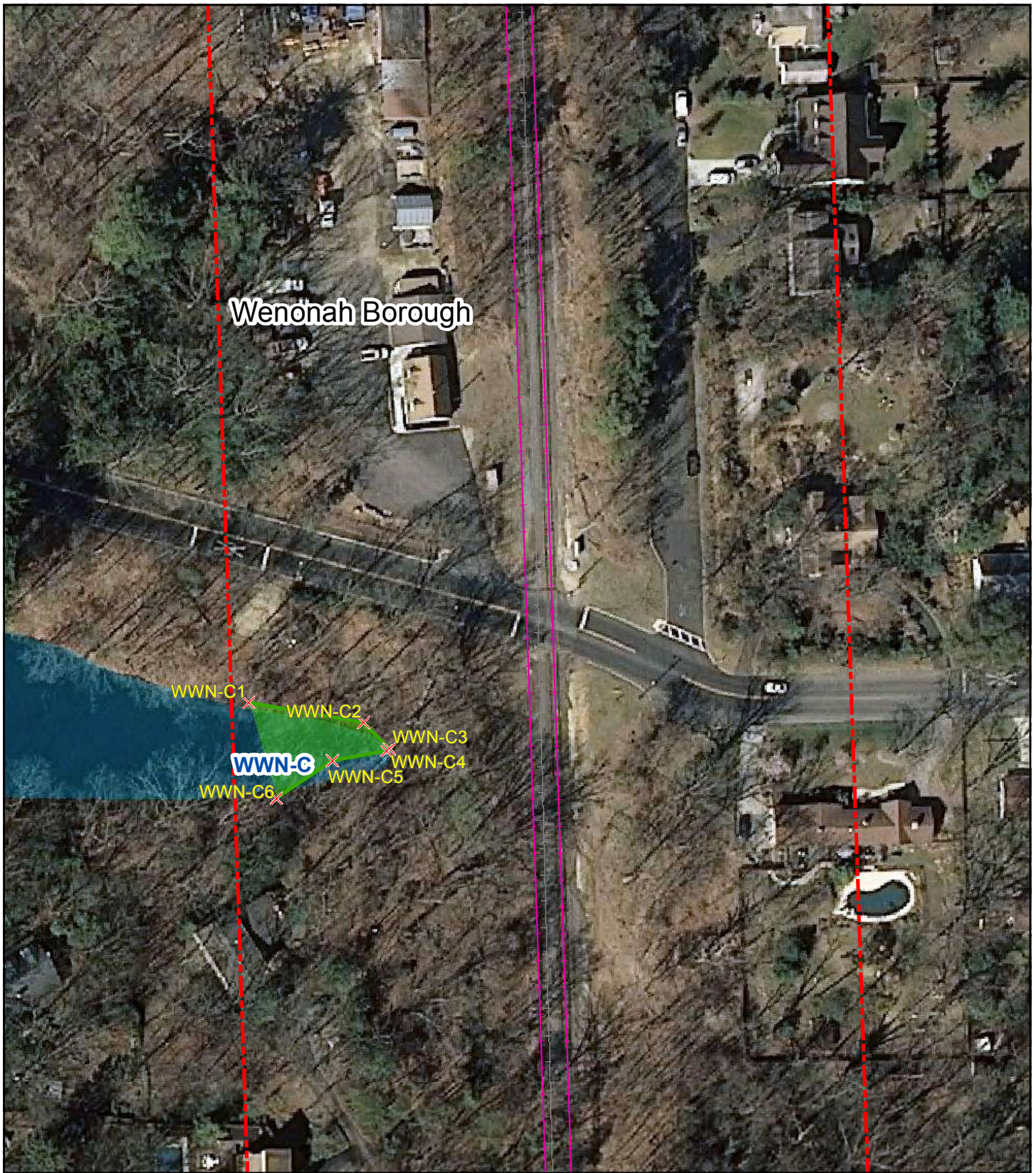
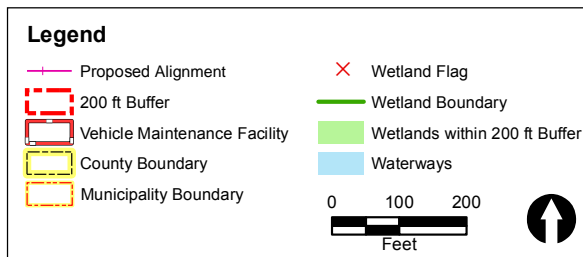


Figure 18i: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



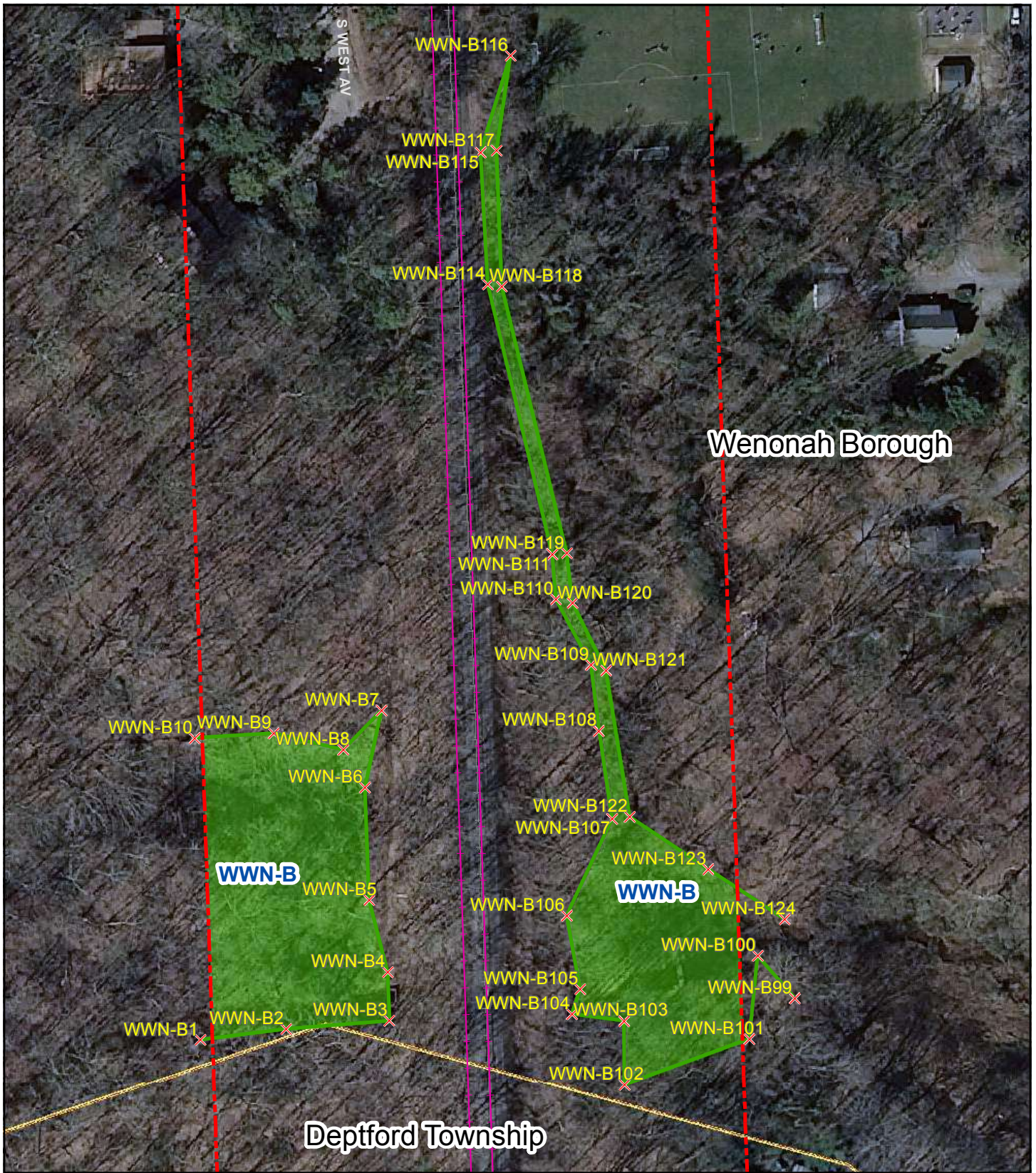
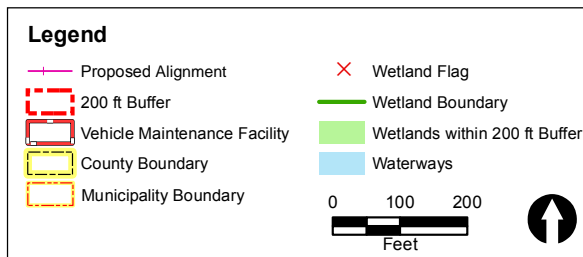


Figure 18j: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



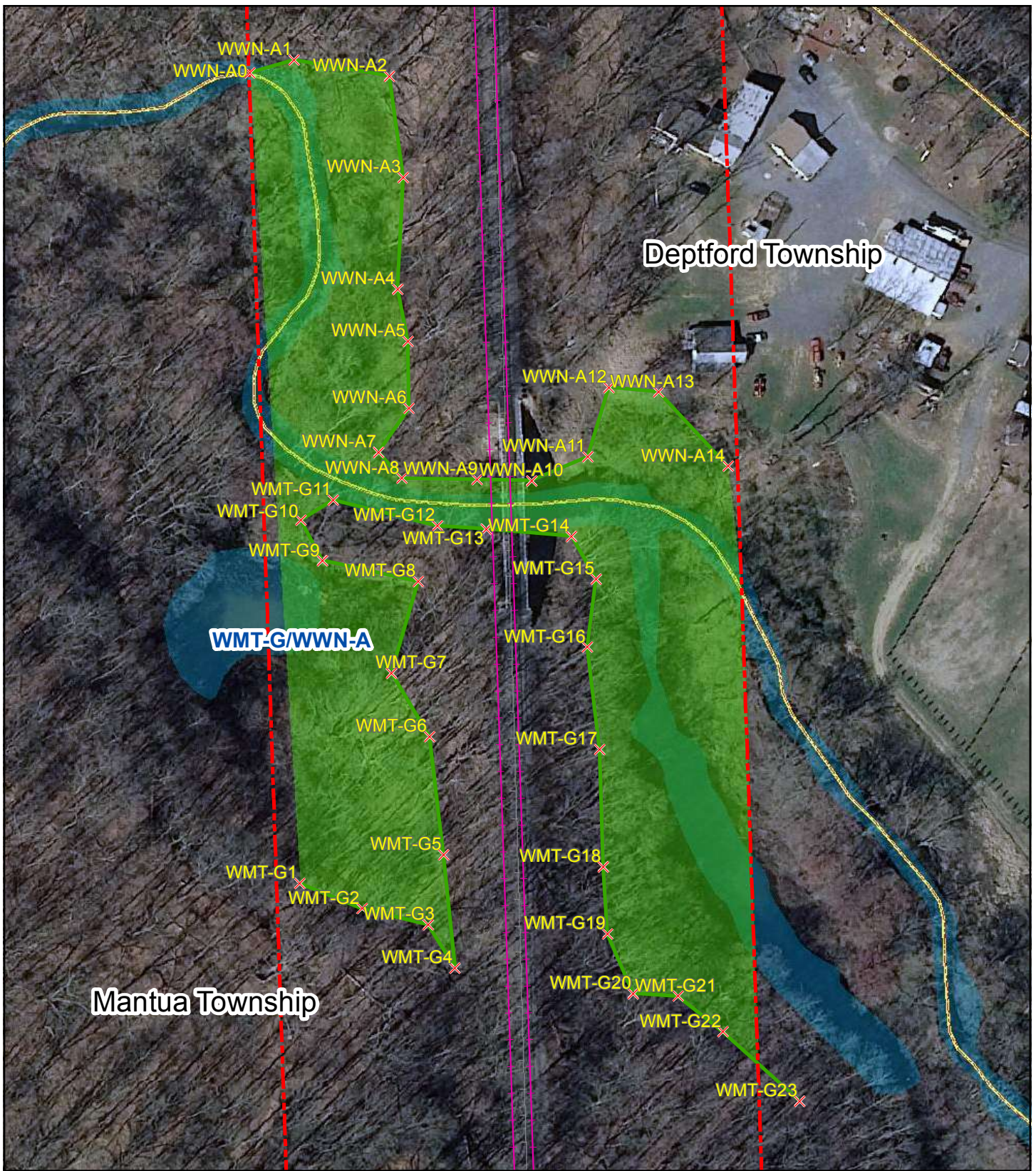


Figure 18k: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.

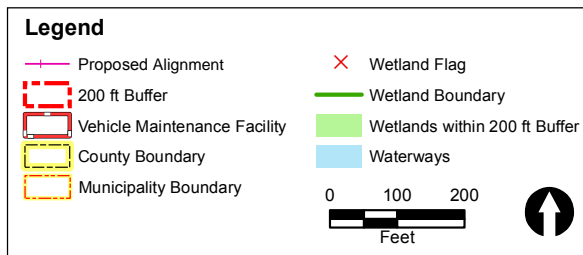
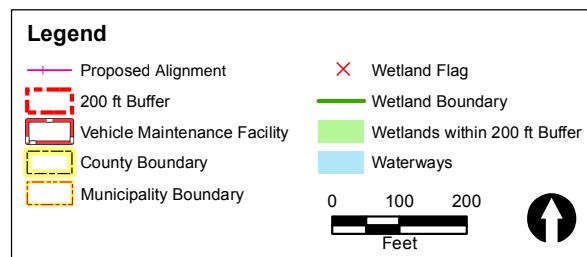




Figure 18l: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



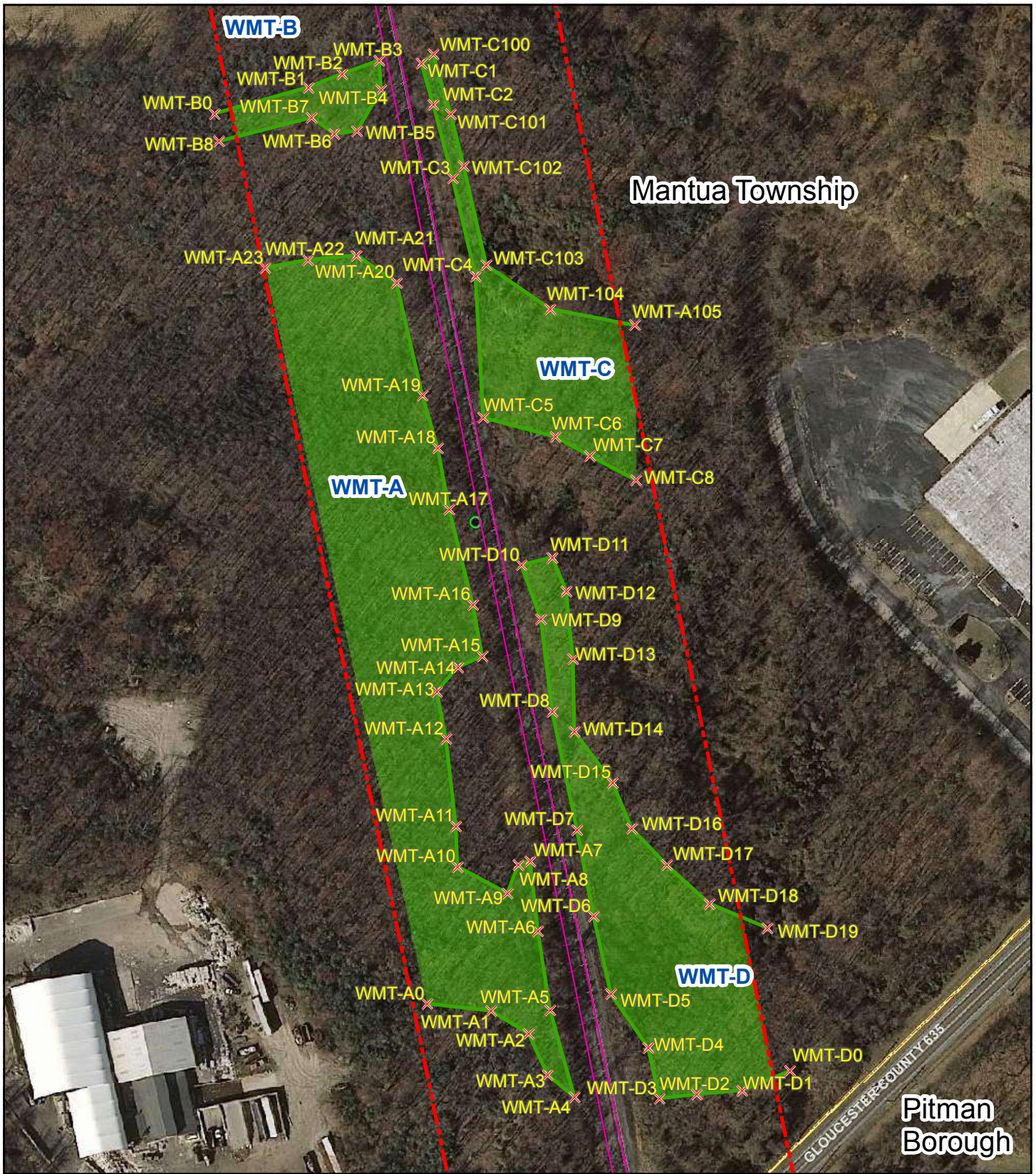


Figure 18m: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.

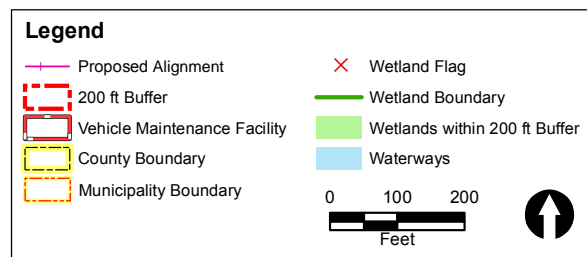
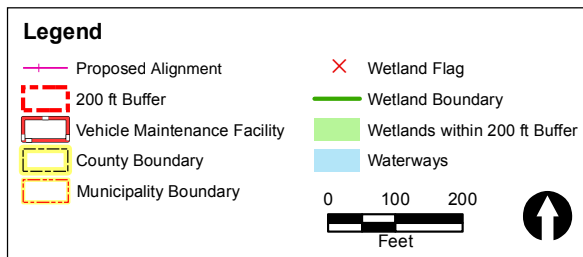




Figure 18n: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



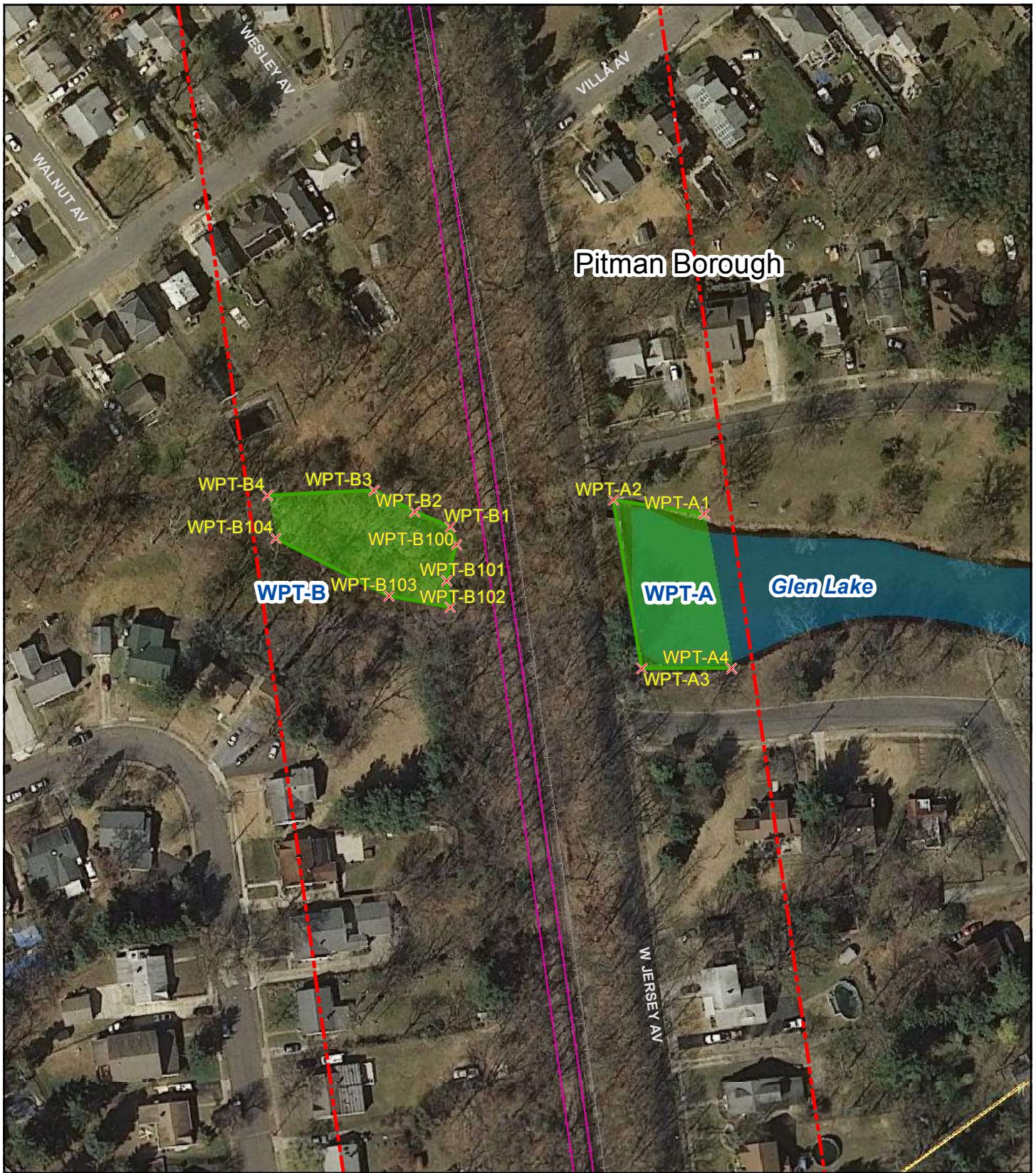
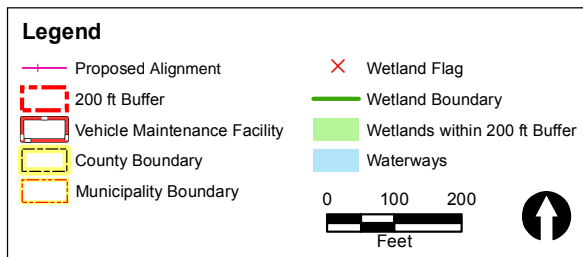


Figure 18o: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



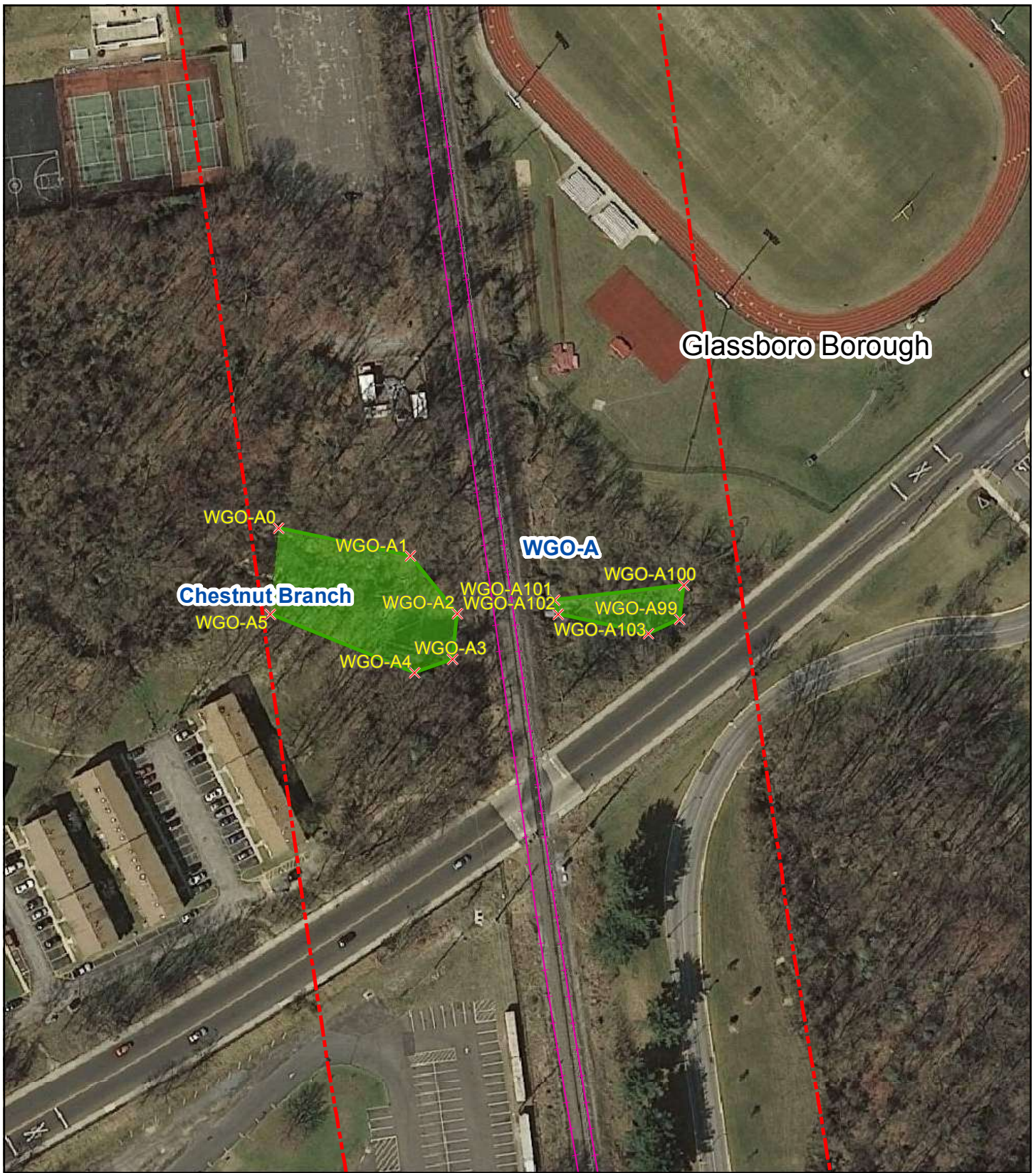
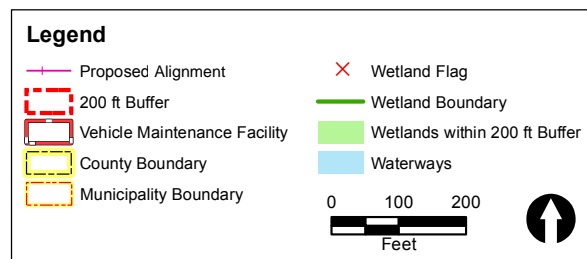


Figure 18p: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.





Glassboro Borough

Figure 18q: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



Legend

Proposed Alignment	Wetland Flag
200 ft Buffer	Wetland Boundary
Vehicle Maintenance Facility	Wetlands within 200 ft Buffer
County Boundary	Waterways
Municipality Boundary	

0 100 200
Feet

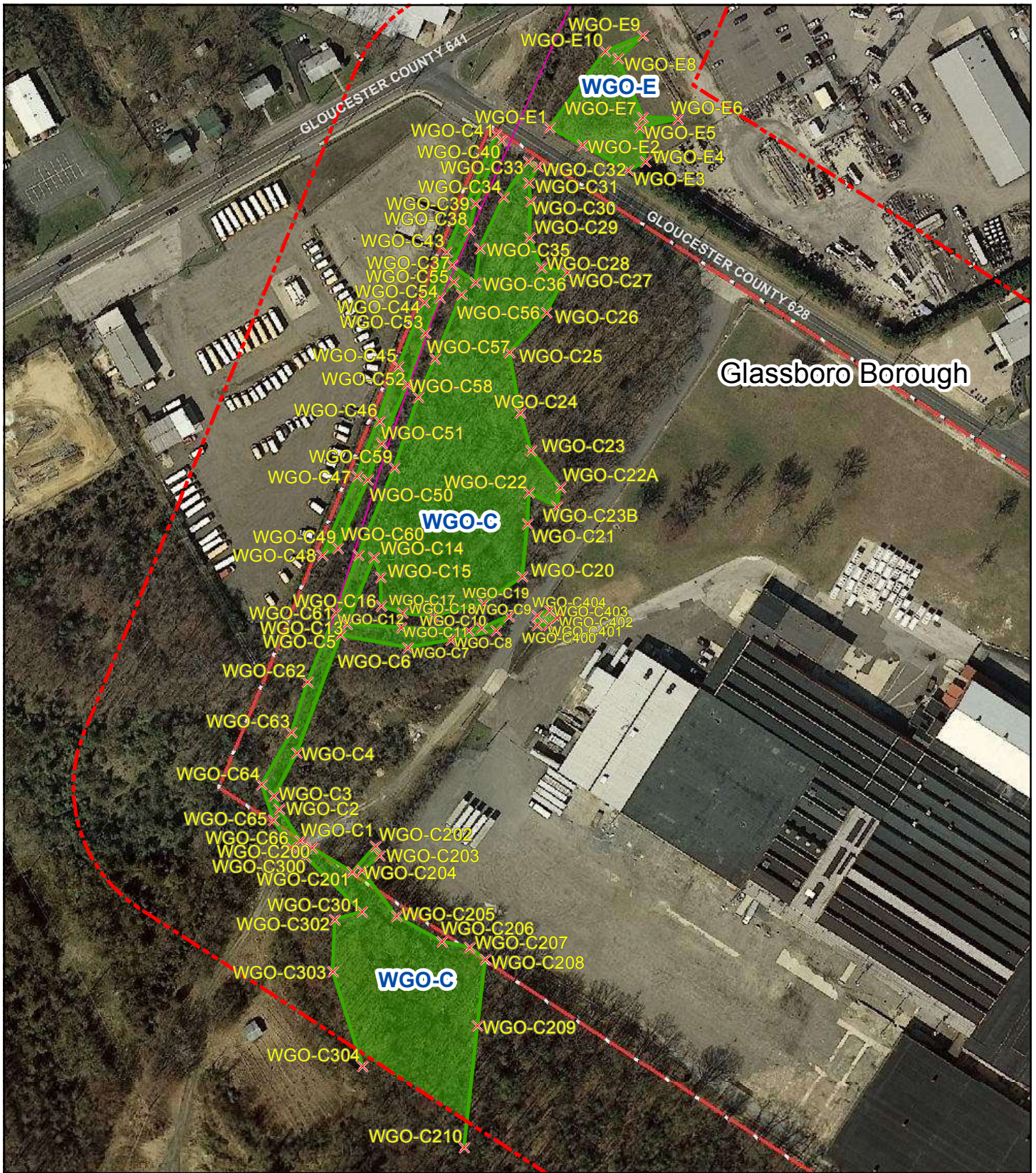


Figure 18r: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.

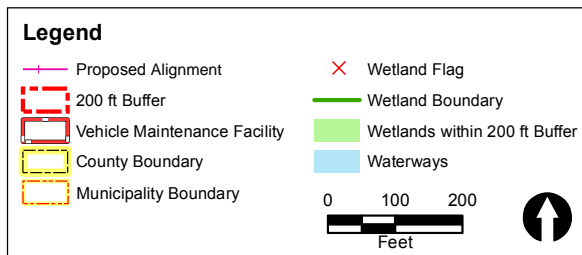
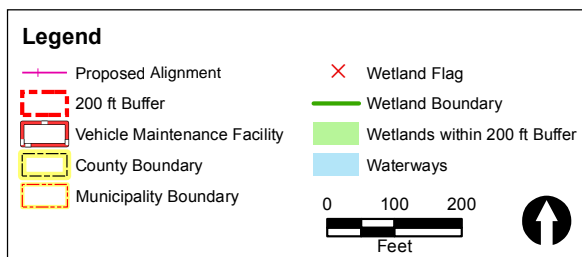




Figure 18s: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002, GCL Project Team, 2020.



- Resource 7, WBL-B, is freshwater emergent wetland located in Brooklawn. This area is mapped by the USFWS National Wetlands Inventory (NWI) as 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 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 NJDEP.
- Resource 9, WWY-A, is Hunter Street Lake/Woodbury Creek, a state open water with a freshwater forested wetland fringe 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 NJDEP.
- Resource 10, WWH-A, is a freshwater forested wetland located in Woodbury Heights and includes the area considered for a proposed VMF. 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*), northern spicebush (*Lindera benzoin*), Japanese honeysuckle (*Lonicera japonica*), and Virginia creeper (*Parthenocissus quinquefolia*). This area would be under the jurisdiction of NJDEP.
- Resource 11, WWH-B, is a non-tidal stormwater drainage ditch located in Woodbury Heights. This area would be under the jurisdiction of NJDEP.
- 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 NJDEP.
- 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 NJDEP.

- Resource 14, WDP-C, is Marlton Lake, a state open water with a freshwater forested wetland fringe, 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 NJDEP.
- Resource 15, WWN-C, is a pond, 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. 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 pennsylvanica*). This area would be under the jurisdiction of NJDEP.
- 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 NJDEP.
- 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 NJDEP.
- Resource 18, WMT-E, is a non-tidal drainage ditch located in Mantua Township. This area would be under the jurisdiction of NJDEP.
- 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 NJDEP.

- 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*), sweetgum (*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 NJDEP.
- 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*), northern spicebush (*Lindera benzoin*), 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 NJDEP.
- 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. 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 NJDEP.
- 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 NJDEP.
- 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: sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), great bladder sedge (*Carex intumescens*), and uptight sedge (*Carex stricta*). This area would be under the jurisdiction of NJDEP.
- 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. Dominant vegetation includes: red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), common reed (*Phragmites australis*), and lamp rush (*Juncus effuses*). This area would be under the jurisdiction of NJDEP.
- Resource 26, WPT-A, is Glen Lake, a state open water located in Pitman. This area would be under the jurisdiction of NJDEP.

- 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 NJDEP.
- Resource 28, WGO-A, is Chestnut Branch, a state open water located in Glassboro. This area would be under the jurisdiction of NJDEP.
- 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 NJDEP.
- Resource 30, WGO-C, is a forested freshwater wetland with associated drainage ditches located in the area considered for a proposed VMF 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*), sweetgum (*Liquidambar styraciflua*), red osier (*Cornus sericea*), ash-leaf maple (*Acer negundo*), horsebrier (*Smilax rotundifolia*), Japanese honeysuckle (*Lonicera japonica*), and lamp rush (*Juncus effusus*). This area would be under the jurisdiction of NJDEP.
- Resource 31, WGO-D, is a forested freshwater wetland located in the area considered for a proposed VMF 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 NJDEP.
- Resource 32, WGO-E, is an emergent freshwater wetland located in the area of the proposed VMF 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*), dogbane blackberry (*Rubus allegheniensis*), common reed (*Phragmites australis*) and lamp rush (*Juncus effusus*). This area would be under the jurisdiction of NJDEP.

A more detailed description of the methodology used for the delineation and each individual water feature is located in the *Glassboro to Camden Line Wetland Delineation Report* (January 2014)

4.7.3 Flood Hazard Areas

Executive Order 11988, Floodplain Management, is applicable to any federal activity which involves acquisition by purchase or lease or disposal of federal lands and public buildings; renovations or building additions; financing or assisting in construction activities; or conducting federal activities and programs affecting land use. This federal legislation recognizes floodplains, primarily the 100-year floodplain, as having “unique and significant public values” and requires measures to minimize, restore and preserve

natural floodplain values. According to the Federal Emergency Management Agency (FEMA), flood hazard areas identified on the Flood Insurance Rate Map (FIRM) are identified as a Special Flood Hazard Area. Special Flood Hazard Areas are defined as the area that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year as is considered the 100-year floodplain.

In the State of New Jersey, the Flood Hazard Area Control Act (N.J.A.C. 7:13) is intended to control development within floodplains, also referred to by NJDEP as flood hazard areas, for the purpose of minimizing potential on- and off-site flood damage to public and private property and to avoid or mitigate the detrimental effects of development. As such, construction or alteration of any structure, or the placement of fill along, in, or across the channel of a watercourse and associated floodplain requires a Flood Hazard Area permit from NJDEP.

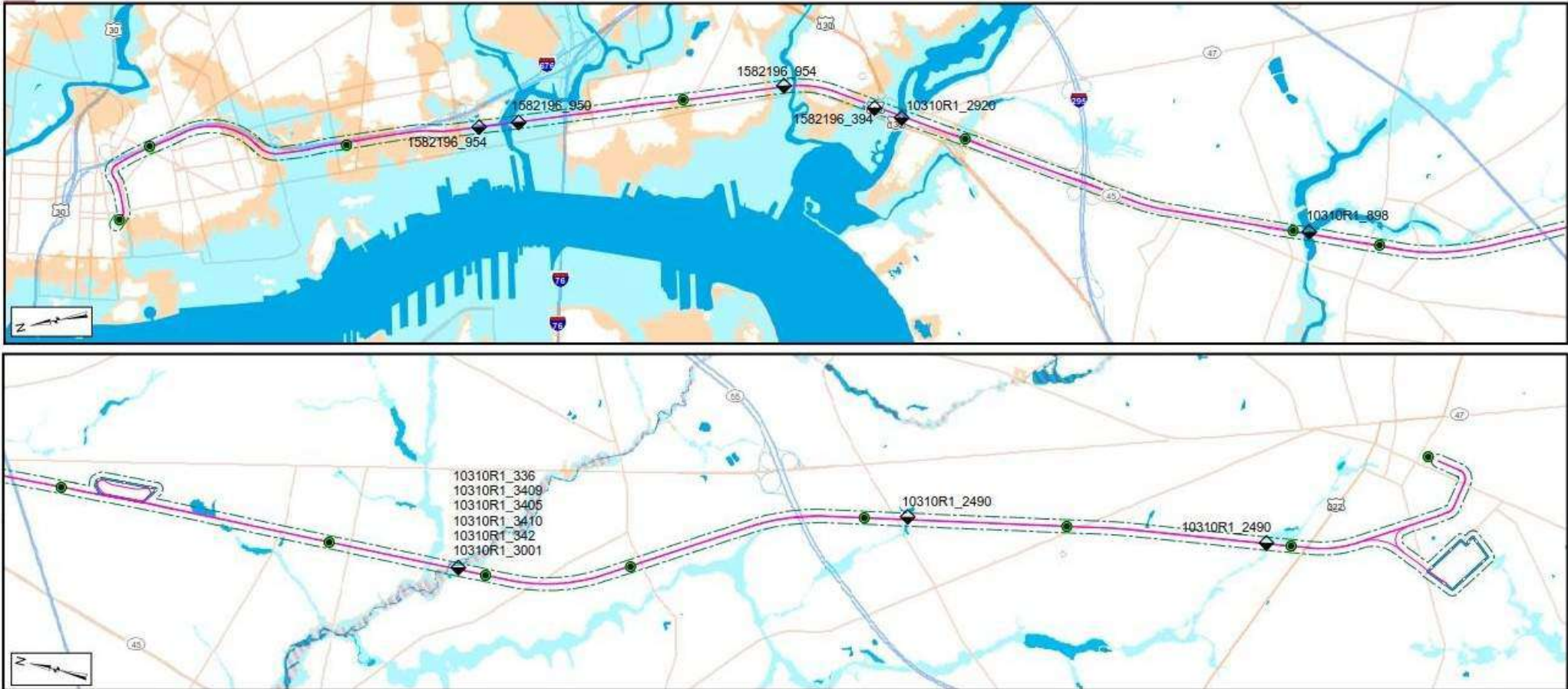
According to NJDEP, a flood hazard area exists along every regulated waterway that has a drainage area of 50 acres or more. If the State of New Jersey has studied a stream and has a delineation of the flood hazard area, the mapping is to be used to establish the flood hazard area. Where no NJDEP delineation exists, NJDEP regulations allow for the use of FEMA’s FIRM mapping to identify flood hazard areas. It is noted that no NJDEP delineations exist for any of the watercourses in the study area. As such, FIRM mapping was utilized to identify flood hazard areas within the study area.

A review of the FIRM mapping revealed the project study area crosses twelve 100-year floodplain areas shown on Figure 19, “Floodplains.” Floodplains listed in Table 10, “Flood Hazard Areas within the Project Study Area,” are associated with each of the following watercourses identified in the project corridor.

Table 10: Flood Hazard Areas within the Project Study Area

Waterbody	Location	Floodplain Influence
Newton Creek	City of Camden/City of Gloucester City	Tidal
Little Timber Creek	City of Gloucester City/Borough of Brooklawn	Tidal
Big Timber Creek	Borough of Brooklawn/Borough of Westville	Tidal
Woodbury Creek/Hunter Street Lake	City of Woodbury	Fluvial
Marlton Lake	Township of Deptford	Fluvial
Unnamed tributary to Mantua Creek	Township of Deptford	Fluvial
Monongahela Brook	Borough of Wenonah/Township of Deptford	Fluvial
Mantua Creek	Township of Deptford/Township of Mantua	Fluvial
Unnamed tributary to Chestnut Branch	Township of Mantua	Fluvial
Glen Lake	Borough of Pitman	Fluvial
Chestnut Branch	Borough of Glassboro	Fluvial

Source: FEMA National Flood Hazard Layer, 2010.



Source: FEMA Flood Map Service Center; GCL Project Team, 2020.

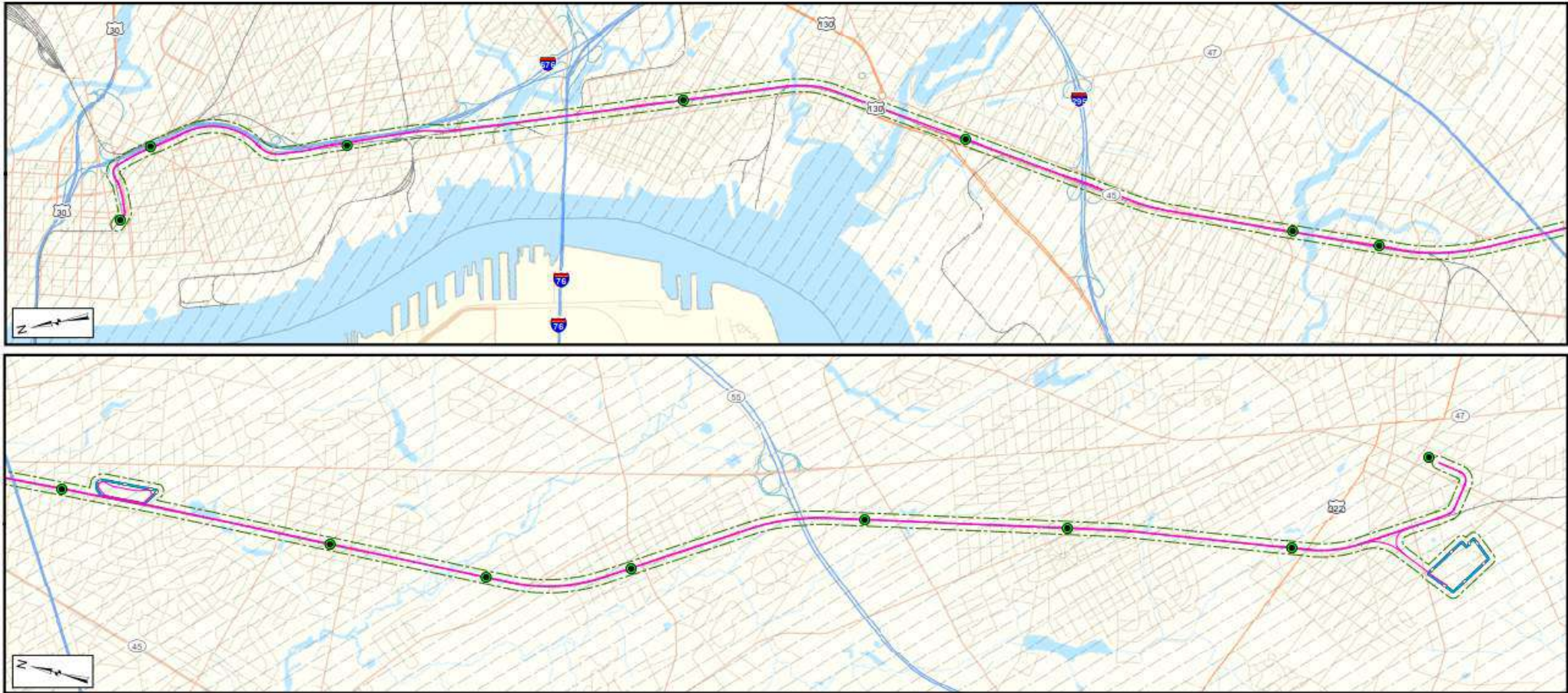
Figure 19: Floodplains



4.7.4 Groundwater

Sole-source aquifers are those aquifers that contribute more than 50 percent of the drinking water to a specific area and the water would be impossible to replace if the aquifer were contaminated. Sole-source aquifers are defined with guidelines set forth by the EPA as authorized in section 1424(e) of the Safe Drinking Water act of 1974. Any federally-funded project in an area that could affect ground water in a sole-source aquifer must be reviewed by the EPA.

This project study area includes the aquifer's recharge zone and its stream-flow source zone. The recharge zone is the area through which water recharges the aquifer. The source zone is the upstream area that contributes recharge water to the aquifer. The entire project corridor is located in the Coastal Plain sole-source aquifer, see Figure 20, "Coastal Plain Sole-Source Aquifer."



Source: DGS98-6 Sole-Source Aquifers of New Jersey, New Jersey Department of Environmental Protection (NJDEP), Division of Water Supply and Geoscience, http://www.state.nj.us/dep/njgs/geodata/dg_s98-6.htm; GCL Project Team, 2020.

0 0.25 0.5 1 Miles

**Figure 20: Coastal Plain
Sole-Source Aquifer**



Legend

- Proposed Stations
- Proposed Alignment
- Rail Lines
- 200 ft Buffer
- ▭ Vehicle Maintenance Facility
- ▨ Coastal Plain SSA

4.7.5 Coastal Zone Special Areas

The Waterfront Development Law, and implementing rules found at N.J.A.C. 7:7, is intended to limit problems and environmental impacts that new development could cause for existing navigation channels, marinas, moorings, and other existing uses. As such, any construction below the mean high water elevation would require a Waterfront Development Permit from NJDEP Division of Land Use Regulation. For projects outside of the New Jersey Coastal Zone (i.e., areas subject to the Coastal Area Facility Review Act rules), the Waterfront Development Law also regulates activities in areas within 500 feet of the mean high water line to the first paved public road, railroad or surveyable property line. As part of the Waterfront Development Permit Process, applicable coastal policies identified in the Coastal Zone Management Rules found at N.J.A.C. 7:7E must be addressed. The complete list of coastal policies to be addressed would be determined by NJDEP during the permitting phase of the project. Anticipated policies applicable to the proposed project are identified below.

The tidally-influenced waterways, as well as the regulated area generally within 500 feet, include Newtown Creek, Little Timber Creek and Big Timber Creek. These are the areas anticipated to be under the jurisdiction of the Waterfront Development Law. As such, the following Coastal Zone Special Areas would apply to the project.

4.7.5.1 Finfish Migratory Pathways

Finfish migratory pathways are waterways which can be determined to serve as passageways for diadromous fish to or from seasonal spawning areas. Species of concern include: alewife or river herring (*Alosa pseudoharengus*), blueback herring (*Alosa sapidissima*), American shad (*Alosa aspidissima*), striped bass (*Monroe saxatilis*), Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*) and American eel (*Anguilla rostrata*).

Development which creates a physical barrier to the movement of fish along finfish migratory pathways is prohibited, unless acceptable mitigating measures are used. Development which lowers water quality to such an extent as to interfere with the movement of fish along finfish migratory pathways or to violate State and Delaware River Basin Commission water quality standards is prohibited.

4.7.5.2 Submerged Vegetation Habitat

A submerged vegetation special area consists of water areas supporting or documented as previously supporting rooted, submerged vascular plants such as widgeon grass (*Ruppia maritima*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Zannichellia palustris*), and eelgrass (*Zostera marnia*).

Based on a visual reconnaissance of the study area, there is no submerged habitat present within the project corridor.

4.7.5.3 Flood Hazard Areas

Flood hazard areas (FHAs) include any land that lies below the flood hazard area design flood elevation, which is equal to FEMA’s 100-year floodplain in coastal areas and at least one foot higher than FEMA’s floodplain in fluvial (non-coastal) areas.

As NJDEP has not formally studied the streams in the study area and NJDEP FHA delineations do not exist, potential FHAs will be identified using FEMA mapping or detailed Hydraulic and Hydrologic studies conducted during the permitting phase of the project. Flood hazard area impacts would be addressed in NJDEP Waterfront Development Permit. It is noted that a separate NJDEP Flood Hazard Area Permit would not be required.

4.7.5.4 Riparian Zones

A riparian zone includes the land and vegetation within and adjacent to a regulated waterway. A riparian zone is assigned to all regulated waterways within New Jersey except the Atlantic Ocean, man-made lagoons, stormwater basins, and oceanfront barrier islands. Riparian zones are measured landward of the top of the bank of a channel with a discernable bank. If a discernable bank is not present, then the riparian zone is measured from the centerline of a linear waterway or amorphous feature (e.g., wetland complex), from the edge of water of a non-linear feature (e.g., lake or pond), and from mean high water of a non-linear tidal water (e.g., bay or inlet). In accordance with the Flood Hazard Area Control Act Rules (FHA Rules) at N.J.A.C. 7:13, the width of the riparian zone is assigned based on the following criteria:

- A 300-foot riparian zone is assigned to all Category 1 waterways and upstream tributaries within the same HUC-14 watershed. It is noted that no 300-foot riparian buffers are identified in the study area.
- A 150-foot riparian zone is assigned to trout production or trout maintenance waterways and one mile upstream (including tributaries), and waterways flowing through areas containing documented habitat for T&E species that are dependent on the waterway for survival. Several waterways within the study area have 150-foot riparian buffers due to the presence of acid-producing soils and/or documented habitat for threatened and endangered species.
- A 50-foot riparian zone is assigned to all other waterways.

Refer to Table 11, “Riparian Buffer Requirements,” for a list of all stream crossings within the study area and their associated riparian buffer.

Table 11: Riparian Buffer Requirements

Stream	Resource Classification	T&E Habitat	Riparian Buffer
Newton Creek	FW2-NT	No	50 ft.
Little Timber Creek	FW2-NT	Yes	150 ft.
Big Timber Creek	FW2-NT	Yes	150 ft.
Woodbury Creek	FW2-NT/SE2	No	150 ft.
Mantua Creek	FW2-NT/SE2	Yes	150 ft.
Chestnut Branch	FW2-NT	No	50 ft.

Source: NJDEP Surface Water Quality Standards GIS Data, 2010; NJDEP Landscape Project; NJDEP Flood Hazard Area Control Act Rules Draft Technical Manual, December 2008.

4.7.5.5 Wetlands

Wetlands are defined by USACE and EPA as areas that are 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.

As wetlands are included as a Special Area in the Coastal Zone Management Rules found at N.J.A.C. 7:7E, wetland impacts would be addressed in the NJDEP Waterfront Development Permit, as well as NJDEP Freshwater Wetlands Individual Permit.

4.7.5.6 Wetland Buffers

Wetland buffer or transition area means an area of land adjacent to a wetland which minimizes adverse impacts on the wetlands or serves as an integral component of the wetlands ecosystem.

Wetland buffers are present at each of the wetland areas within the study area and will be defined during the permitting process of the project. As wetland buffers area included as a Special Area in the Coastal Zone Management Rules found at N.J.A.C. 7:7E, wetland buffer impacts would be addressed in NJDEP Waterfront Development Permit, as well as NJDEP Freshwater Wetlands Individual Permit.

5 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

For the purposes of evaluating the impact to natural resources, the Limit of Disturbance (LOD) for the proposed GCL includes impacts attributed to permanent improvements such as the construction of new track, bridge structures, stations, and vehicle maintenance facilities, as well as additional temporary impacts areas associated with construction-related activities. The total LOD for the GCL, excluding the existing track and ballast, accounts for approximately 195 acres.

The LOD (Figure 1, “Corridor Study Area”) includes the following temporary and permanent impact areas:

- Toe of slope of the ballast or fill used to support the new track or outer limit of retaining walls used to minimize fill
- Limit of any permanent structure used to carry new track over streams, roadways, or other features
- Limit of grading to accommodate new stations and vehicle maintenance facilities including parking lots, platforms, buildings and other site improvements
- Other construction-related activities, including construction access and staging areas

Impacts to natural resources from construction of the proposed GCL would include permanent and temporary disturbance to soil and vegetation resulting in the loss, alteration, or degradation of wildlife habitat and plant communities. While efforts have already been made to minimize impacts through design and mitigation measures, the significance of any impacts identified in this attachment cannot be determined until consultation with the regulating agency.

Appendix 1-A, “Natural Resources Impact Locations,” contains maps showing locations where impacts to natural resources from the proposed GCL are anticipated, including impacts to sensitive plant communities and habitat for federal and state-listed species.

5.1 Plant Communities

Within the 195 acre proposed GCL LOD, impacts to plant communities account for approximately 67.6 acres (Table 12, “Impacts to Plant Communities from the Construction of the Proposed GCL”).

Table 12: Impacts to Plant Communities from the Construction of the Proposed GCL

Plant Community Type	Total Impact Area (Acres)
Deciduous Forest	41.86
Mixed Forest	12.57
Forested Wetlands	6.87
Old Field	1.91
Agriculture	4.41
Total Plant Community Impact	67.62

Source: GCL Project Team LOD and Plant Communities GIS Files, 2017

5.1.1 Forest

Construction of the proposed GCL would result in the loss of 61.3 acres of forest. Forest that would be affected by the GCL consists of deciduous forest, mixed deciduous/evergreen forest, and deciduous forested wetlands. Most forest impacts would occur immediately adjacent to the existing rail corridor.

Most impacts to forest attributed to the proposed GCL would be to predominantly secondary growth forest that occurs immediately adjacent to previously developed areas. However, construction activities primarily associated with the crossing of Mantua Creek drainage would affect mature forest.

The following 7 of the 14 proposed stations would affect forest communities: the South Camden, Crown Point Road, Red Bank Avenue, Woodbury Heights, Wenonah, Mantua Boulevard, and Mantua-Pitman Stations. In addition, the two proposed vehicle maintenance facilities in Woodbury Heights and Glassboro would also affect forest, accounting for approximately 10 percent of the total forest impacts attributed to the proposed GCL.

5.1.2 Agriculture

The proposed Mantua Boulevard Station would permanently affect one farmland parcel—Block 170, Lots 3 and 3.01, in Mantua Township. The construction of the station would affect approximately 4.41 acres of farmland due to the change in land use from agriculture use to rail/transportation.

5.1.3 Old Field

The GCL would affect 1.91 acres of old-field plant communities. Most of this impact area is located within an old-field community adjacent to the Glassboro VMF. Smaller impact areas to old-field communities exist in fragmented patches adjacent to the existing rail right-of-way.

5.1.4 Unique and Significant Natural Areas

The proposed GCL would traverse the Wenonah Ravine Natural Heritage Priority Site in Wenonah Borough and Mantua Township. This site includes habitat for several listed species, including known occurrences of the state-endangered shingle oak. The proposed GCL would result in the loss of approximately 1.59 acres of forested habitat within the Wenonah Ravine site (see Appendix 1-A, “Natural Resources Impact Locations”).

Two other Natural Heritage Priority Sites—including the Mantua Natural Heritage Priority Site and Aura Natural Heritage Priority Sites—are located outside of the LOD and would not be affected by the proposed GCL.

In addition, documented vernal habitat mapped by NJDEP along the Chestnut Branch of Mantua Creek and potential vernal habitat mapped near tributaries to Still Run, Mantua Creek, Woodbury Creek, and Big Timber Creek are all outside of the LOD and would not be affected by the proposed GCL.

5.2 Soils

5.2.1 Acid-Producing Soils

Most of the project corridor within Camden County and the northern portion of Gloucester County lies within acid-producing soil (APS) formations. Approximately 63.74 acres of potential APS would be disturbed during construction. The significance of this disturbance will be determined during coordination with the USDA; this coordination is ongoing.

5.2.2 Farmland Soils

Important farmlands soils occur within the LOD, including soils that have been classified as prime, unique, or of statewide importance according to the United States Department of Agriculture, Natural Resources Conservation Service.

The proposed Mantua Boulevard Station would permanently affect one farmland parcel—Block 170, Lots 3 and 3.01, in Mantua Township. The construction of the station would affect approximately 4.41 acres of farmland due to the change in land use from agriculture use to rail/transportation. The significance of this disturbance will be determined during coordination with the USDA; this coordination is ongoing.

5.3 Threatened and Endangered Species

5.3.1 Federally-Listed Species

Habitat for federally-listed threatened and endangered species occurs within the LOD of the proposed GCL. Six federally-listed species were identified as potentially occurring within or adjacent to the project area. The three federally-listed threatened and endangered species listed in Table 13, “Federally-Listed Species Not Affected by the Proposed GCL,” would not be affected by the GCL due to an absence of suitable habitat within the proposed GCL LOD.

Table 13: Federally-Listed Species Not Affected by the Proposed GCL

Common Name (<i>Latin Name</i>)	Federal Status
Swamp Pink (<i>Helonias bullata</i>)	Threatened
Bog Turtle (<i>Clemmys muhlenbergii</i>)	Threatened
Red Knot (<i>Calidris canutus rufa</i>)	Threatened

Source: USFWS IPaC - Information, Planning, and Conservation System (<http://ecos.fws.gov/ipac/>); NJDEP Bureau of Non-game species, Landscape proposed rail corridor Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017

Three federally-listed species may be affected by the proposed GCL as a result of loss or alteration to documented or suitable habitat (Table 14, “Federally-Listed Species Potentially Affected by the Proposed GCL”). Appendix 1-A, “Natural Resources Impact Locations,” shows the location of impacts to threatened and endangered species habitat.

Table 14: Federally-Listed Species Potentially Affected by the Proposed GCL

Common Name (<i>Latin Name</i>)	Federal Status
Northern Long-Eared Bat (<i>Myotis septentrionalis</i>)	Threatened
Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>)	Endangered
Shortnose sturgeon (<i>Acipenser brevirostrum</i>)	Endangered

Source: USFWS IPaC - Information, Planning, and Conservation System (<http://ecos.fws.gov/ipac/>); NJDEP Bureau of Non-game species, Landscape rail corridor Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017

5.3.1.1 Northern Long-Eared Bat (*Myotis septentrionalis*)

Forested areas throughout the rail corridor provide habitat for the northern long-eared bat. Approximately 61.3 acres of forest would be affected by the proposed GCL. While there are no known maternity or hibernacula sites documented within Camden or Gloucester Counties, surveys conducted in the summer of 2017 confirmed northern long ear bats occur within the GCL project area in several locations. Measures should be taken to minimize tree clearing when the bat species may be present within the project area. The significance of this impact will be determined during agency coordination; this coordination is ongoing.

5.3.1.2 Shortnose Sturgeon (*Acipenser brevirostrum*) and Atlantic Sturgeon (*Acipenser oxyrinchus*)

Documented habitat for shortnose sturgeon and Atlantic sturgeon exists within the Big Timber Creek, Little Timber Creek, and Newton Creek. To avoid adverse impacts to these species, bridge design should avoid impeding the passage of fish within the waterway and in-water work during spawning periods should be avoided. In addition, noise resulting from in-water construction activities, such as pile driving, could cause both behavioral and physiological effects to these species. The significance of this impact will be determined during agency coordination; this coordination is ongoing.

5.3.2 State-Listed Species

Of the 13 state-listed threatened and endangered species that may occur within and adjacent to the project area, seven species would be affected by the proposed GCL due to the absence of suitable habitat within the project LOD (Table 15, “State-Listed Threatened and Endangered Species Not Affected by the Proposed GCL”).

However, documented and suitable habitat for six state-listed threatened and endangered species would be affected by the proposed GCL (Table 16, “State-Listed Threatened and Endangered Species Potentially Affected by the Proposed GCL”). Appendix 1-A, “Natural Resources Impact Locations,” shows the location of impacts to threatened and endangered species habitat.

Table 15: State-Listed Threatened and Endangered Species Not Affected by the Proposed GCL

Type	Common Name	Scientific Name	State Status
Plants	Pale Indian Plantain	<i>Arnoglossum atrilicifolium</i>	Endangered
	Putty Root	<i>Aplectrum hyemale</i>	Endangered
	Hairy Wood-Rush	<i>Luzula acuminata var. acuminata</i>	Endangered
	Broad-leaf Ironweed	<i>Vernonia glauca</i>	Endangered
Freshwater Mussels	Eastern Pondmussel	<i>Ligumia nasuta</i>	Threatened
	Tidewater Mucket	<i>Leptodea ochrcea</i>	Threatened
	Yellow Lampmussel	<i>Lampsilis cariosa</i>	Threatened

Source: NJDEP Bureau of Non-game species, Landscape Project Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017.

Table 16: State-Listed Threatened and Endangered Species Potentially Affected by the Proposed GCL

Type	Common Name	Scientific Name	State Status
Birds	American Kestrel	<i>Flaco sparverius</i>	Threatened
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Endangered (Breeding)
			Threatened (Non-Breeding)
	Peregrine Falcon	<i>Falco peregrinus</i>	Endangered
	Barred Owl	<i>Strix varia</i>	Threatened
Red-Shouldered Hawk	<i>Buteo lineatus</i>	Endangered	
Plants	Shingle Oak	<i>Quercus imbricaria</i>	Endangered

Source: NJDEP Bureau of Non-game species, Landscape Project Data and New Jersey Natural Heritage Program Correspondence, December 5, 2017.

5.3.2.1 American Kestrel

Suitable breeding habitat for the American kestrel would be affected by the proposed GCL. The habitat consists of old-field communities located along the GCL within the proposed Glassboro VMF. The construction of the proposed GCL would disturb approximately 1.91 acres of suitable breeding habitat. Measures can be taken to provide alternative nesting structures for this species within the project corridor. The significance of this impact will be determined during agency coordination; this coordination is ongoing.

5.3.2.2 Bald Eagle

There is no record of nesting habitat occurring within the proposed GCL LOD; however, potential wintering and foraging habitat for the bald eagle is associated with Newton Creek, Little Timber Creek, Big Timber Creek, Woodbury Creek, and Mantua Creek. Approximately 3.63 acres of bald eagle foraging habitat occurs within the proposed GCL LOD. However, impacts would primarily be limited to temporary disturbance to over-wintering birds during construction near Little Timber and Big Timber Creeks. The significance of this impact will be determined during agency coordination; this coordination is ongoing.

5.3.2.3 Peregrine Falcon

A documented peregrine falcon nest exists on the Walt Whitman Bridge located approximately ½ mile to the west of the proposed GCL. The project is not anticipated to adversely affect this species.

5.3.2.4 Barred Owl and Red-Shouldered Hawk

The barred owl and red-shouldered hawk have similar habitat requirements, preferring larger expanses of mature forested habitat. Suitable forested habitat for these species occur within the proposed GCL primarily associated with forested drainage areas of the Mantua Creek and Chestnut Branch. The construction of the proposed GCL would clear approximately 11.21 acres of suitable breeding and nesting habitat for these species. Measures should be taken to minimize tree clearing when these species may be present within the project area. The significance of this impact will be determined during agency coordination; this coordination is ongoing.

5.3.2.5 Shingle Oak

The proposed GCL would traverse the Wenonah Ravine Natural Heritage Priority Site where two state-endangered shingle oaks have been documented to occur within and in the immediate vicinity of the proposed GCL. Based on the 2014 survey, one 16.5-inch diameter at breast height shingle oak was found within the proposed GCL clearing limit on the western side of the track. However, a supplemental survey conducted in October 2020 has determined that the shingle oak may no longer be present at this location. Potential impacts to the species will be determined after the resurvey and during agency coordination, and mitigation will be developed as appropriate.

5.4 Mitigation Measures and Environmental Commitments

The following BMPs and mitigation measures can be implemented to minimize impacts to natural resources:

- **Minimize Site Disturbance**
 - Reduce clearing of vegetation within habitat of a federally or state-listed species and Natural Heritage Priority Site.
 - Locate staging and stockpiling areas outside of sensitive habitat areas.
 - Implement appropriate BMPs such as exclusion fencing to exclude construction access beyond designated LOD.
- **Restore Temporary Impact Areas**
 - Revegetate temporary impact areas using native species.
 - Develop and implement a reforestation plan.
 - Provide alternative nest structures for affected species such as the American kestrel.

- **Seasonal restrictions on Construction Activities**
 - To avoid impacts to Atlantic and shortnose sturgeon and other anadromous fish species, all in-water work should be avoided between March 1 and June 30. In addition, measures to abate underwater noise caused by in-water pile driving activities, such as the use of cushions and/or bubble curtains, should be considered.
 - To avoid impacts to the barred owl and the red-shouldered hawk and other migratory birds, tree clearing should be avoided from March 15 through August 15.
 - To provide protection for the northern long-eared bat, tree clearing should be avoided from April 1 through August 31.
- **Soil Erosion and Sediment Control**
 - Implement appropriate soils erosion and sediment control measures.
 - Implement appropriate storm water management measures.
 - Conduct testing to determine the extent of APS within LOD prior to land clearing or grading activities. Minimize exposure of APSs to the maximum extent practicable during construction. Develop and implement an APS management plan to contain and remediate APS soils exposed during all stages of construction.

5.5 Agency Coordination and Approvals

The following potential agency coordination and approvals may be required for the proposed GCL associated with anticipated impacts to natural resources:

- **Potential Agency Consultation/Review Requirements**
 - US Fish and Wildlife Service and National Marine Fishery Service Consultation/ Coordination in accordance with the Endangered Species Act to address impacts and develop appropriate conservation measures for federal listed species
 - US Department of Agriculture review in accordance with the Farmland Protection Policy Act to address potential for loss of important farmland soils
- **Potential Permit Authorization Requirements**
 - US Army Corps of Engineers Section 404 Permit in accordance with the Clean Water Act for construction activities within Waters of the U.S. to address impacts and compensatory mitigation requirements to special aquatic sites including threatened and endangered species
 - NJDEP Freshwater Wetlands Permit to address impacts and compensatory mitigation requirements for wetlands and wetland transition areas including protection of threatened and endangered species habitat in accordance with the New Jersey Freshwater Wetlands Protection Act

- NJDEP Flood Hazard Area Permit to address impacts and compensatory mitigation requirements to riparian zones including protection of threatened and endangered species habitat New Jersey Flood Hazard Control Act
- NJDEP Waterfront Development Permit to address impacts to applicable coastal zone policies, including protection of Special Areas such as Threatened and Endangered Species Habitat in accordance with the New Jersey Coastal Zone Management Rules
- NJDEP Stormwater Management Plan Review and Approval for the protection of water quality and flood control in accordance with the New Jersey Stormwater Management Rules
- NJDEP Reforestation Plan Approval to allow for the replacement of forest in accordance with the New Jersey No Net Loss Reforestation Act

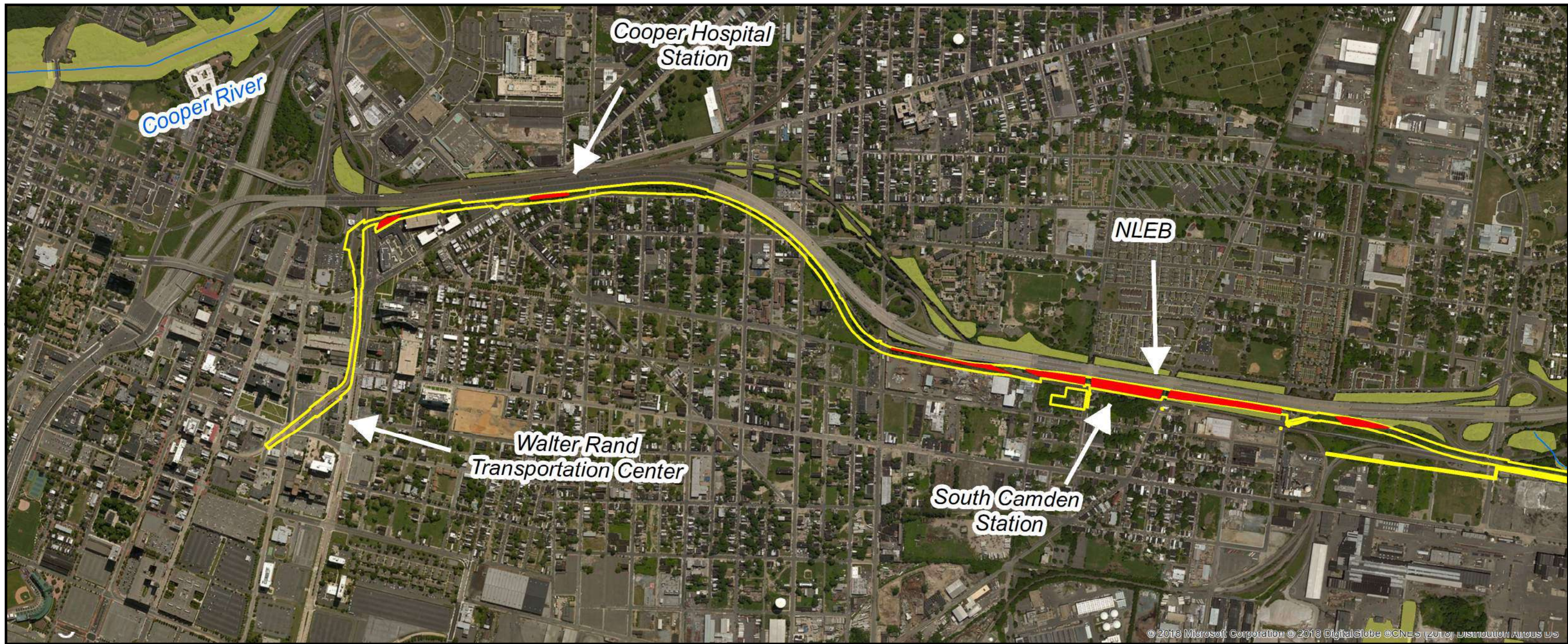
Camden County and Gloucester County Soil Conservation District Soil Erosion and Sediment Control Plan Certification

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Appendix 1-A: Natural Resources Impact Location

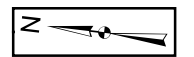
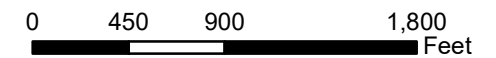
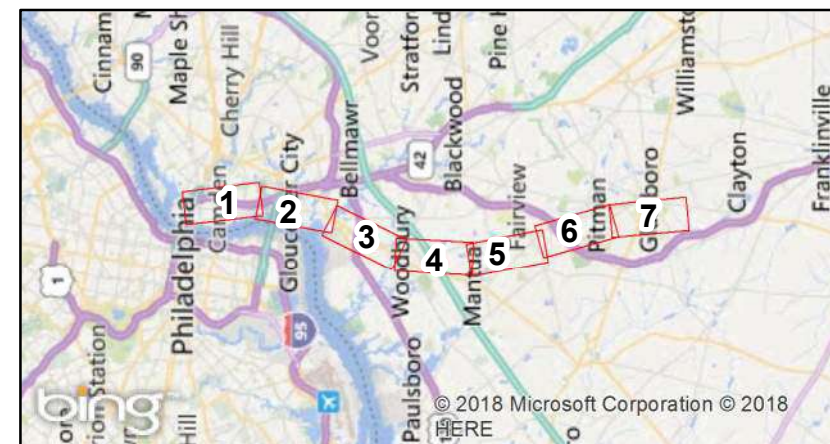


Legend

-  Limit of Disturbance
-  Streams
-  Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
-  Documented Habitat
-  Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
NLEB	Northern Long-Eared Bat	State Endangered	Federally Threatened
PF	Peregrine Falcon	State Endangered	N/A
SO	Shingle Oak	State Endangered	N/A
STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

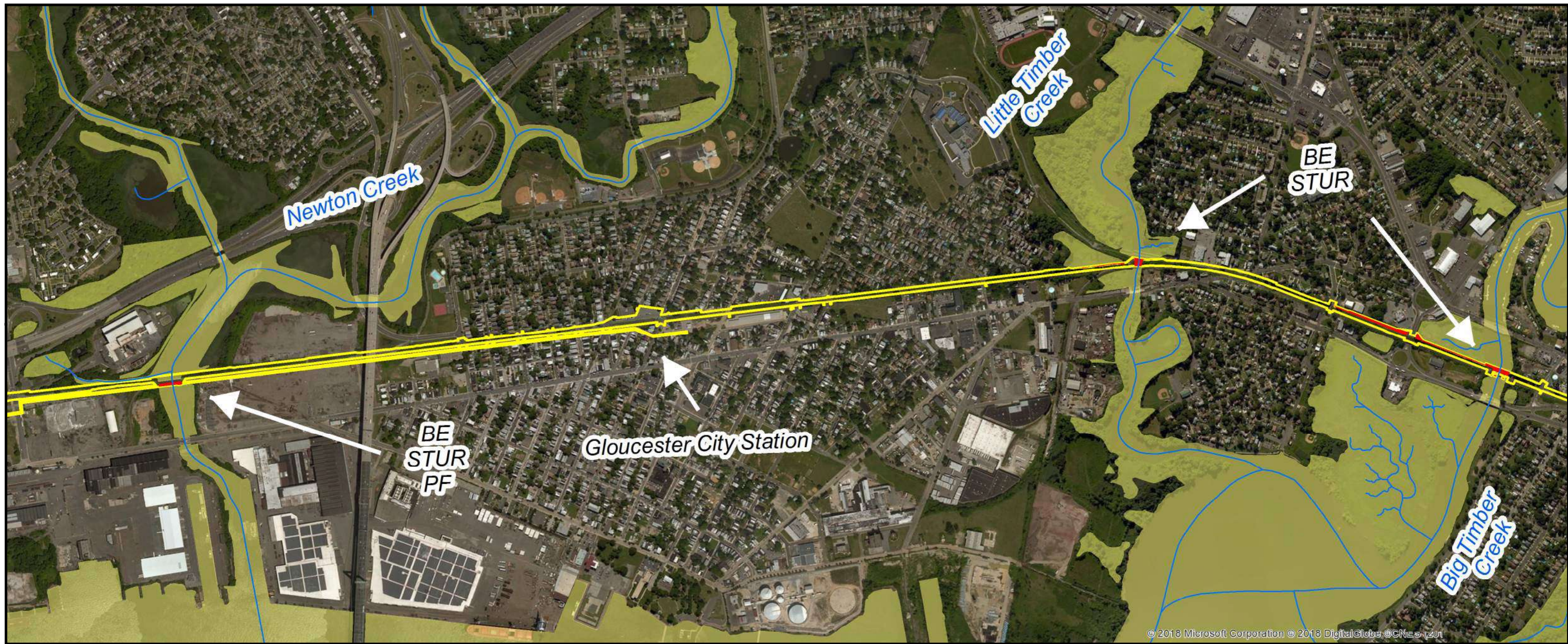
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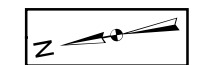
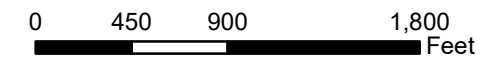
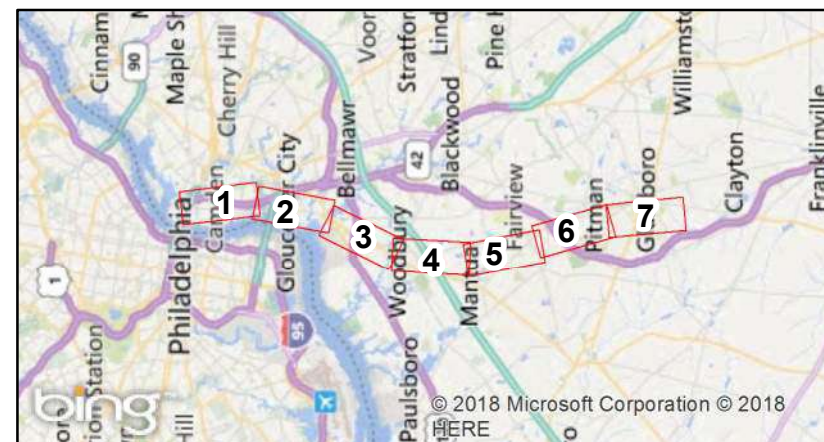


Legend

-  Limit of Disturbance
-  Streams
-  Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
-  Documented Habitat
-  Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
NLEB	Northern Long-Eared Bat	State Endangered	Federally Threatened
PF	Peregrine Falcon	State Endangered	N/A
SO	Shingle Oak	State Endangered	N/A
STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

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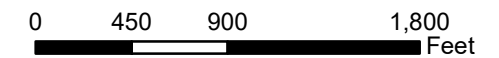
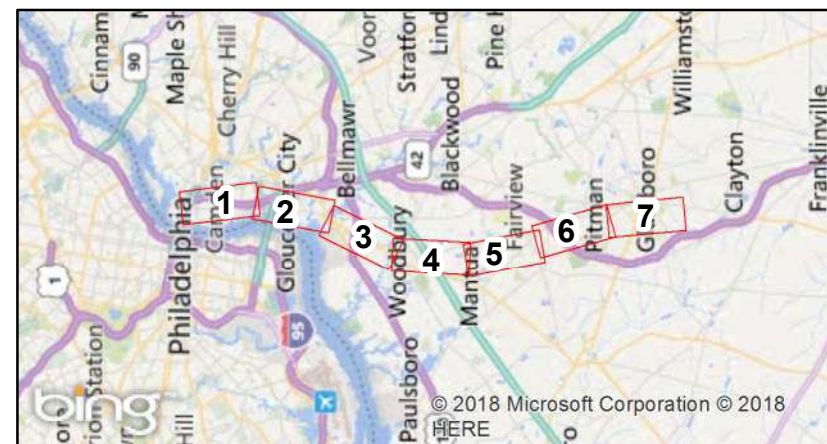


Legend

-  Limit of Disturbance
-  Streams
-  Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
-  Documented Habitat
-  Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
NLEB	Northern Long-Eared Bat	State Endangered	Federally Threatened
PF	Peregrine Falcon	State Endangered	N/A
SO	Shingle Oak	State Endangered	N/A
STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

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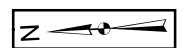
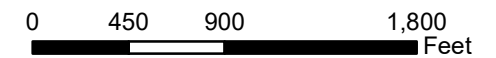
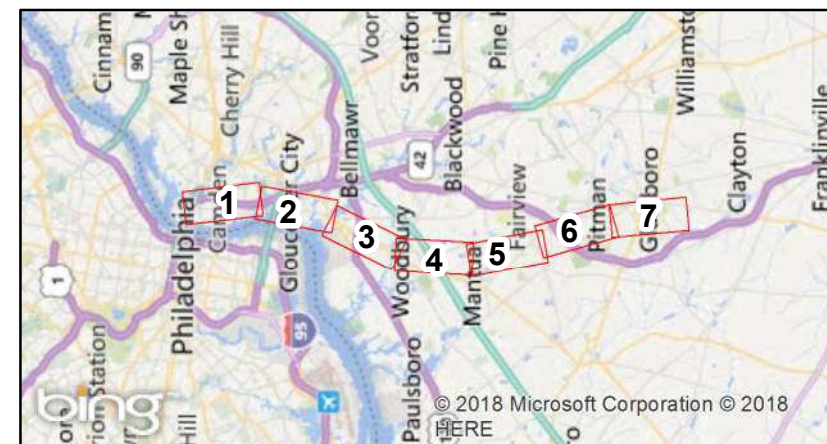


Legend

- Limit of Disturbance
- Streams
- Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
- Documented Habitat
- Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
NLEB	Northern Long-Eared Bat	State Endangered	Federally Threatened
PF	Peregrine Falcon	State Endangered	N/A
SO	Shingle Oak	State Endangered	N/A
STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

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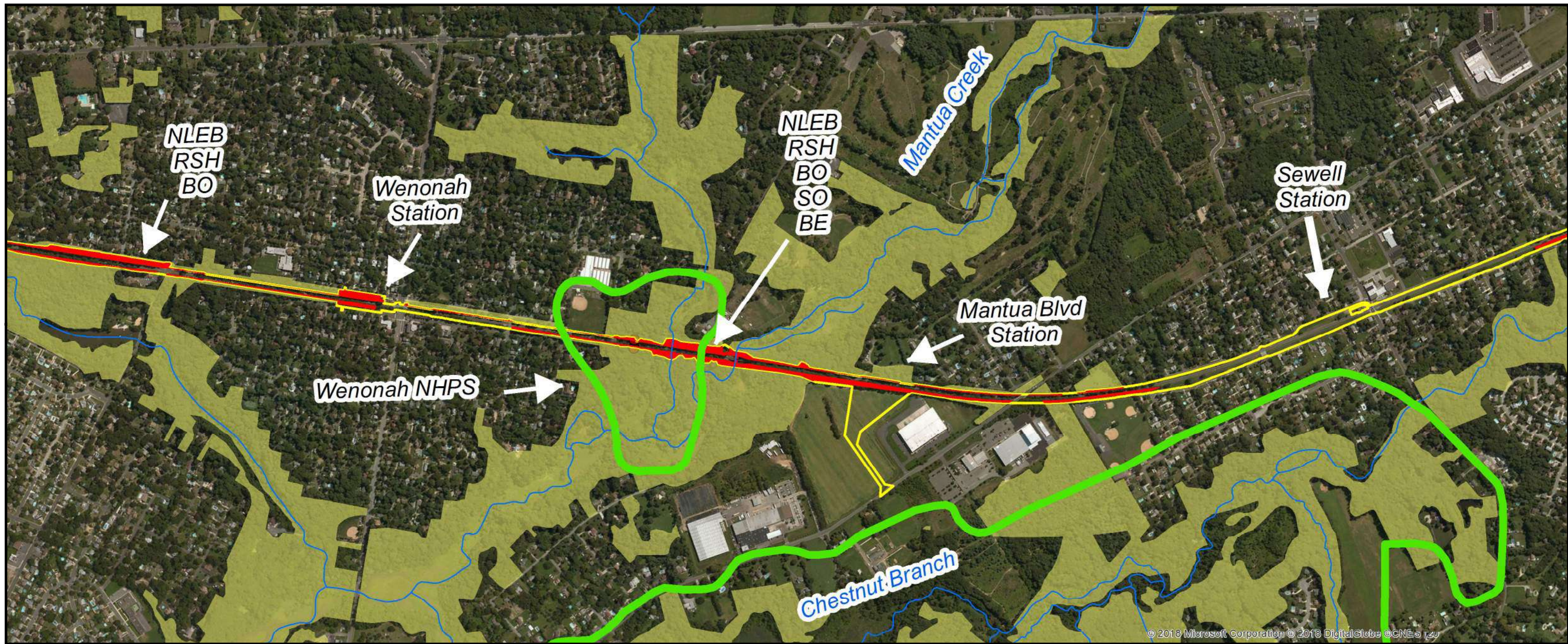


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Appendix 1 A - Natural Resources Impact Locations (Sheet 4 of 7)



Source: NJDEP Landscape Project, NJDEP Land Use/ Land Cover 2012, NJDEP Natural Heritage Program Mapping, GCL Team Limit of Disturbance and Station Locations

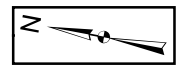
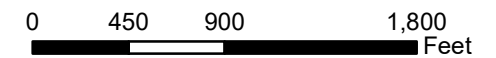
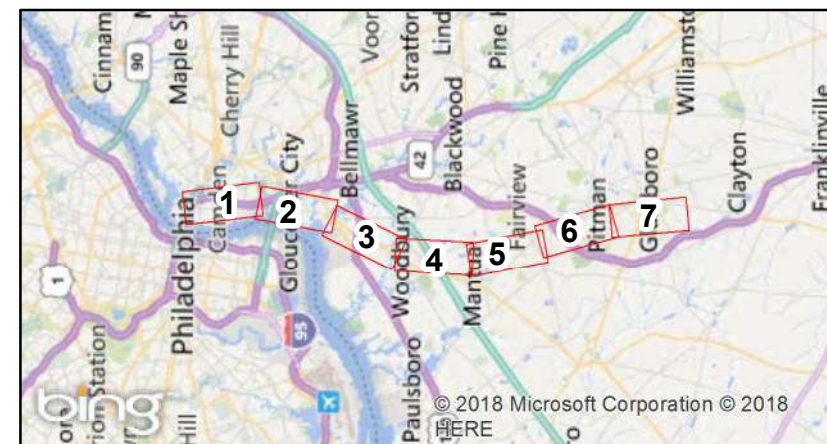


Legend

-  Limit of Disturbance
-  Streams
-  Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
-  Documented Habitat
-  Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
NLEB	Northern Long-Eared Bat	State Endangered	Federally Threatened
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SO	Shingle Oak	State Endangered	N/A
STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

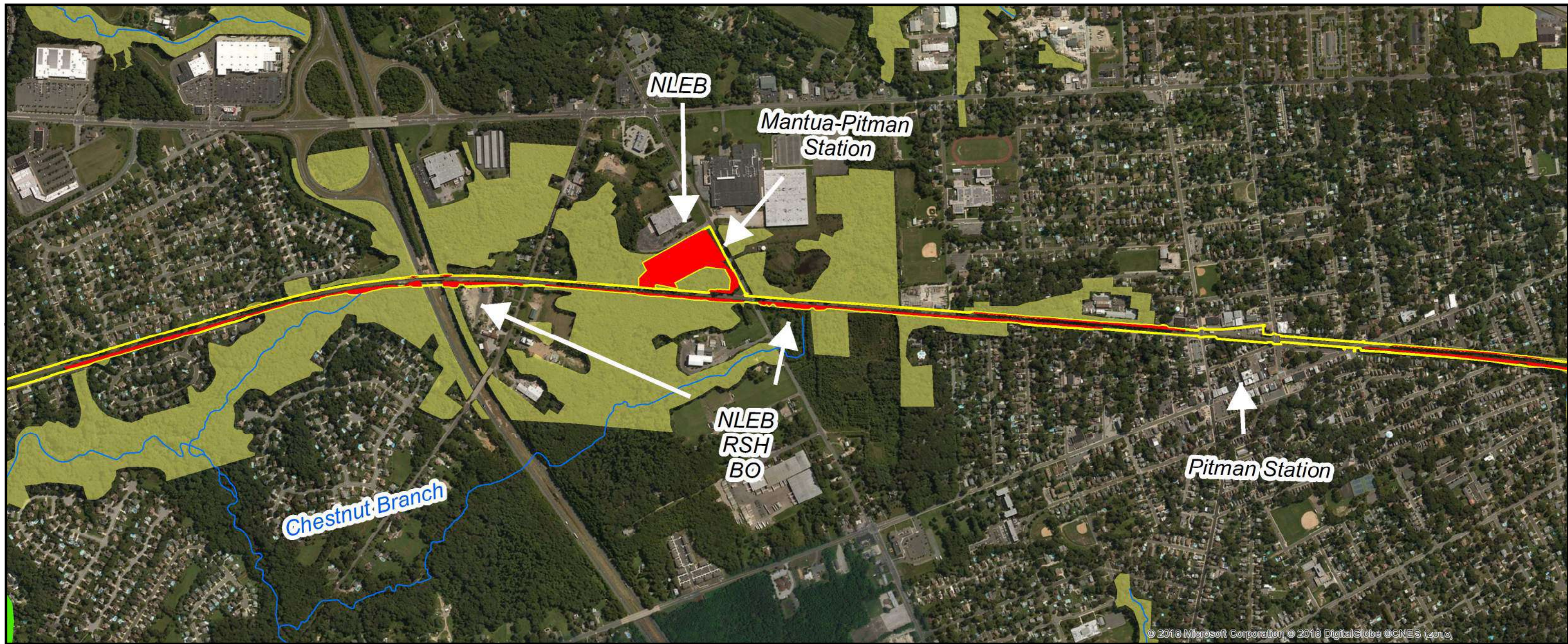
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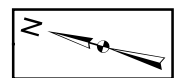
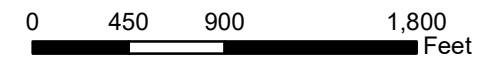
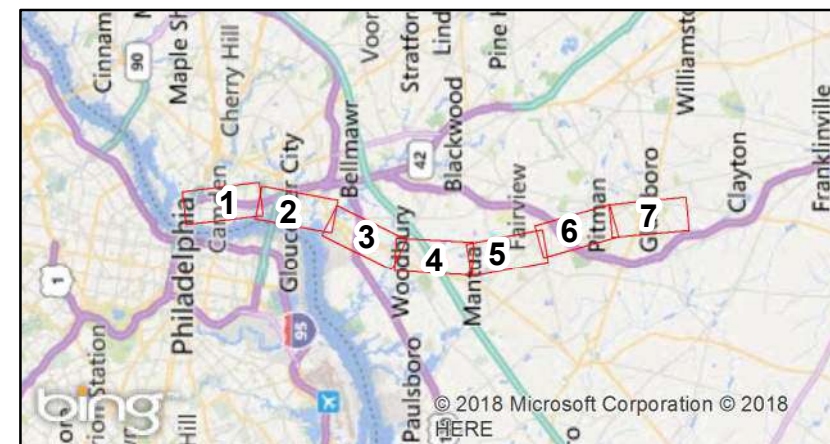


Legend

- Limit of Disturbance
- Streams
- Natural Heritage Priority Sites
- Threatened and Endangered Species Habitat**
- Documented Habitat
- Impacted Habitat

Map Unit	Species	State Status	Federal Status
AK	American Kestrel	State Threatened	N/A
BE	Bald Eagle	State Endangered	N/A
BO	Barred Owl	State Threatened	N/A
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STUR	Atlantic Sturgeon	State Endangered	Federally Endangered
STUR	Shortnose Sturgeon	State Endangered	Federally Endangered
RSH	Red-Shouldered Hawk	State Endangered	N/A

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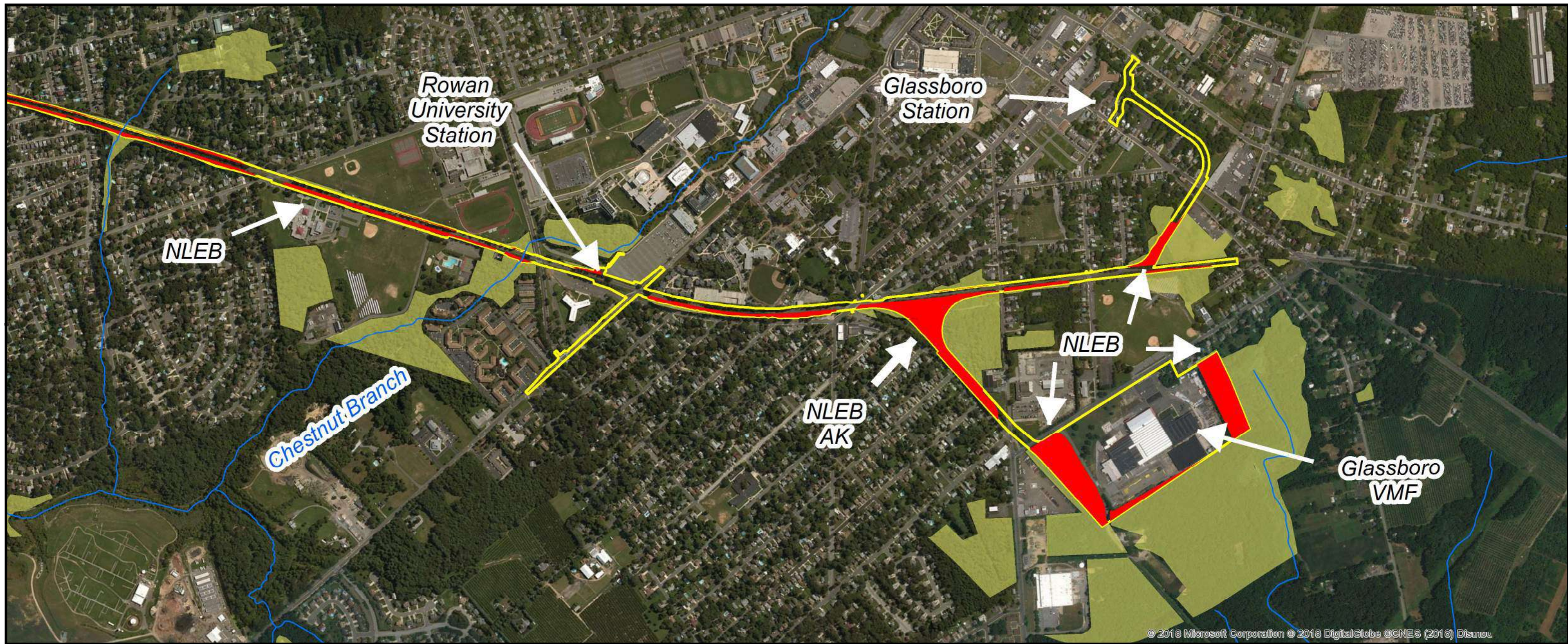


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Appendix 1 A - Natural Resources Impact Locations (Sheet 6 of 7)



Source: NJDEP Landscape Project, NJDEP Land Use/ Land Cover 2012, NJDEP Natural Heritage Program Mapping, GCL Team Limit of Disturbance and Station Locations

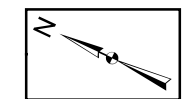
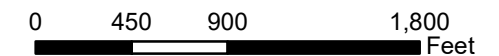
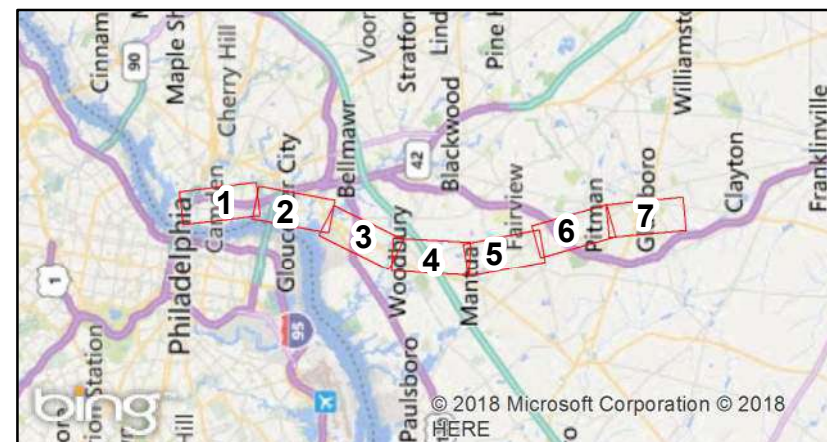


Legend

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RSH	Red-Shouldered Hawk	State Endangered	N/A

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