

2. Environment Prior to the Implementation of the Project

2.1. INTRODUCTION

This chapter describes the affected environment for the proposed Glassboro-Camden Line (“proposed GCL” or “proposed project”) in accordance with New Jersey Executive Order 215 (EO215) guidelines.

The GCL is a proposed 18-mile expansion of transit service in Southern New Jersey that would traverse 11 communities between Camden (Camden County) and Glassboro (Gloucester County), primarily parallel to the existing Conrail corridor between Camden and Glassboro. The proposed project would provide 14 new transit stations, including ~~12 “walk-up” stations and two “park-and-ride” facilities~~ five “walk-up” stations, four “moderate park-and-ride” stations, and five “park-and-ride” stations.

The regional study area of the proposed GCL consists of the entire Delaware Valley Regional Planning Commission (DVRPC) region, comprised of four counties in New Jersey and five counties in Pennsylvania (see Figure 1-1, “Regional Study Area”). The proposed GCL would provide service to the City of Camden, Gloucester City, Westville Borough, the City of Woodbury, Woodbury Heights Borough, Wenonah Borough, Mantua Township, Pitman Borough, and the Borough of Glassboro (see Figure 1-2, “GCL Corridor,” and Figure 1-3, “Municipalities Serviced”). Study areas for specific technical areas vary based on relevant guidance and appropriateness for analysis and are defined in their respective sections.

2.2. NATURAL RESOURCES

This section describes existing natural resources within the natural resources study area (an area extending up to ¼ mile from the rail corridor) and the wetlands delineation study area (an area extending up to 200 feet from the rail corridor) for the proposed GCL such as geological character, soil characteristics, land form (i.e., wetlands, steep slopes, etc.), hydrological features, and biological resources of the area including State and Federal threatened and endangered species and critical habitats.

2.2.1. Summary

- ***Geological and Soil Characteristics*** - The proposed GCL is located within the New Jersey Inner Coastal Plain physiographic province consisting of marine-deposited quartz and glauconite sands, silt, and clay. The natural resources study area contains 46 soil types—two soil types in Camden County and 44 in Gloucester County—which are described in detail in Attachment 1, “Natural Resources Technical Report.”
- ***Land Form and Hydrological Features*** - Comprehensive wetland delineation for within the wetland delineation study area identified thirty-two water resources within the proposed GCL corridor, including five State open waters (three with a freshwater wetland fringe), nineteen freshwater wetlands, four coastal wetlands, and four ditches. Surface waterbodies identified

within the wetland delineation study area include FW2-NT and FW2-NT/SE2 classifications, which are further described below. The wetland delineation study area crosses twelve 100-year Federal Emergency Management Agency (FEMA) floodplain areas associated with various watercourses in the GCL corridor and is located in the Coastal Plain sole-source aquifer. Coastal Zone Special Areas, described in Attachment 1, “Natural Resources Technical Report,” would apply to the project as there are also tidally-influenced waterways located in the project area. With regards to farmlands, 12 farmland parcels were identified within the natural resources study area, all of which are located in Mantua and one of which consists of a permanently preserved 28-acre farm.

- **Biological Resources** - Plant communities that occur within the natural resources study area include deciduous forest, evergreen forest, mixed forest, deciduous forested wetlands, emergent wetlands, old-field, agriculture, and maintained land. Within the natural resources study area, there are three Natural Heritage Priority Sites and both confirmed and potential vernal pool habitats mapped along specific creeks that are described further below. With respect to wildlife in the natural resources study area, there are four Federally-listed threatened species and two Federally-listed endangered species that may occur within the natural resources study area, as well as six State-listed threatened species and eight State-listed endangered species; 17 additional species of concern may also occur within the natural resources study area.

2.2.2. Geological and Soil Characteristics

The proposed GCL is located 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 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 including two soil types in Camden County and 44 in Gloucester County, within the natural resource study area. The soils series found within the natural resources study area are shown in greater detail in Attachment 1, “Natural Resources Technical Report,” and in Table 2.2-1, “Study Area Soil Types.” Descriptions of these soils are provided in Attachment 1, “Natural Resources Technical Report.”

Table 2.2-1: 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

Table 2.2-1: Study Area Soil Types (Continued)

Gloucester County Soils			
Soil Type	Mapping Unit	Mapping Symbol	Hydric Soil
Berryland–Mulica	Berryland and Mullica 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.

2.2.3. Land Form and Hydrological Features

2.2.3.1. Surface Waters

Surface waters are classified based on the type and designated use of a waterbody. New Jersey has both fresh and saline waters. Within the wetland delineation 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 wetland delineation 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 wetland delineation study area, see Table 2.2-2, “Surface Waters within Project Study Area.”

Table 2.2-2: 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.

2.2.3.2. Wetlands

Comprehensive wetland delineation for the wetland delineation study area was completed between August and December 2013. Thirty-two water resources were identified within the proposed GCL corridor and include those watercourses identified in Table 2.2-2, "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 wetland delineation study area are located within the Lower Delaware River Basin watershed. They are described below and shown on Figures 2-1a through 2-1s, "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 U.S. Army Corp of Engineers (USACE) and New Jersey Department of Environmental Protection (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.
- Resource 7, WBL-B, is freshwater emergent wetland located in Brooklawn. This area is mapped by the U.S. Fish and Wildlife Service (USFWS) 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 Vehicle Maintenance Facility (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 effuses*). This area would be under the jurisdiction of NJDEP.

A description of the methodology used for the delineation and each individual water feature is provided in Attachment 2, "Wetland Delineation Report."

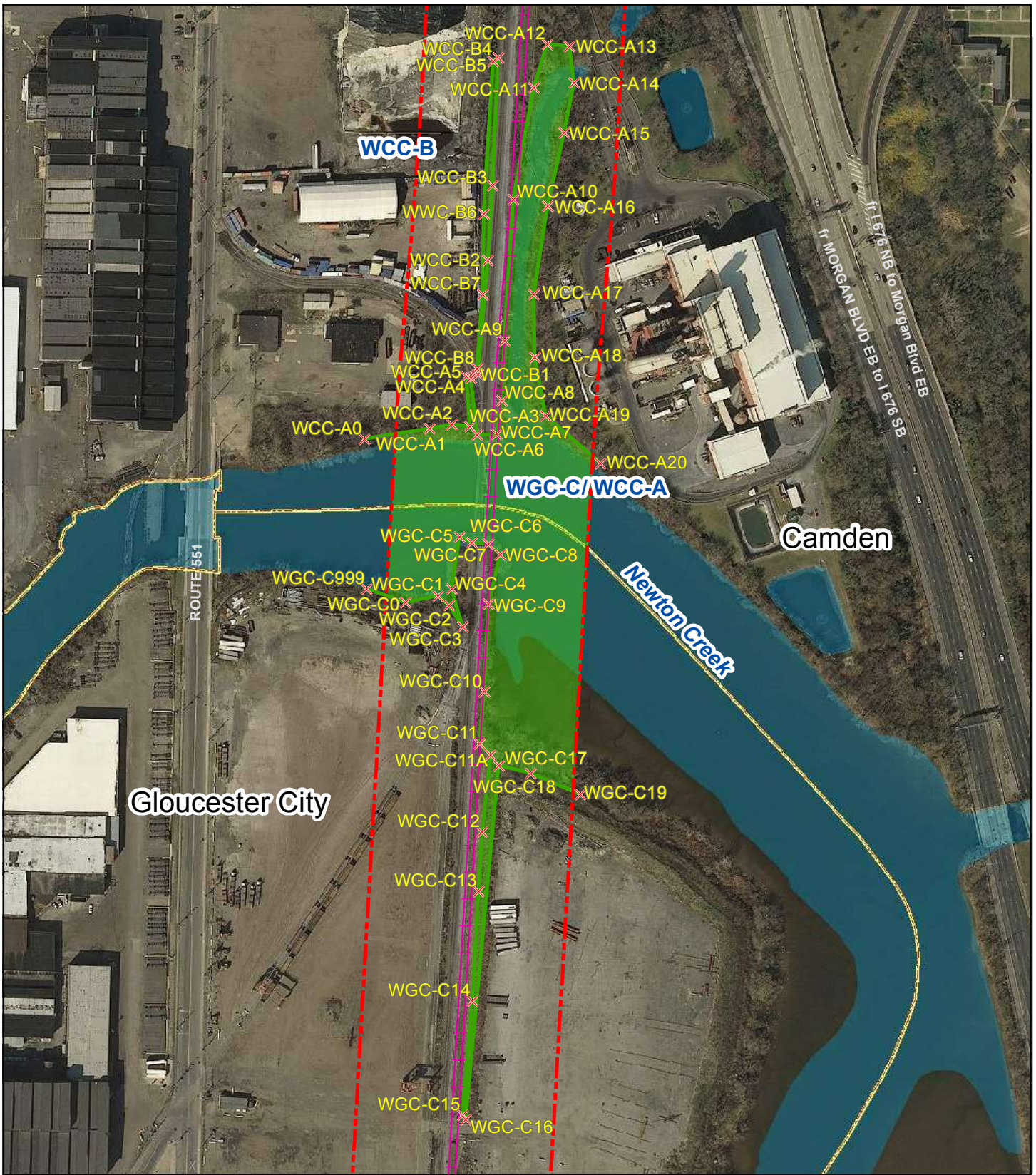
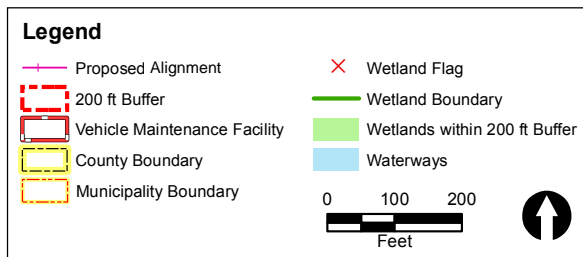


Figure 2-1a: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



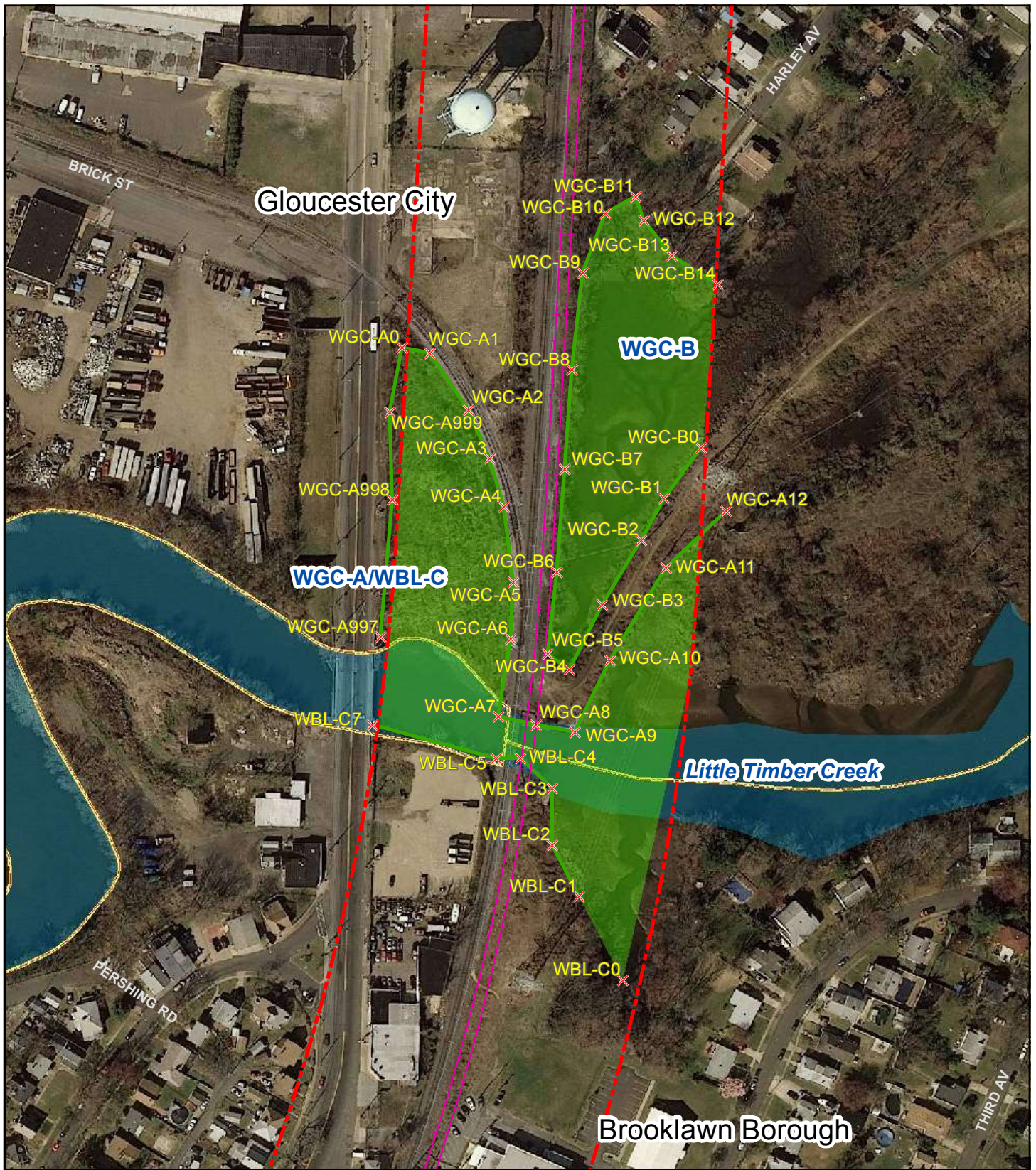
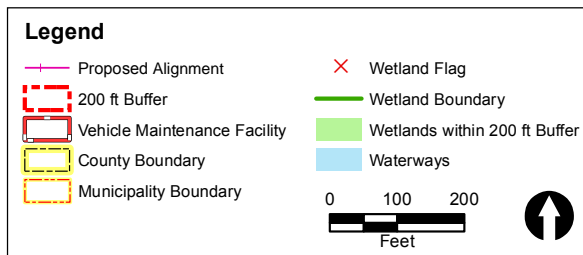


Figure 2-1b: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



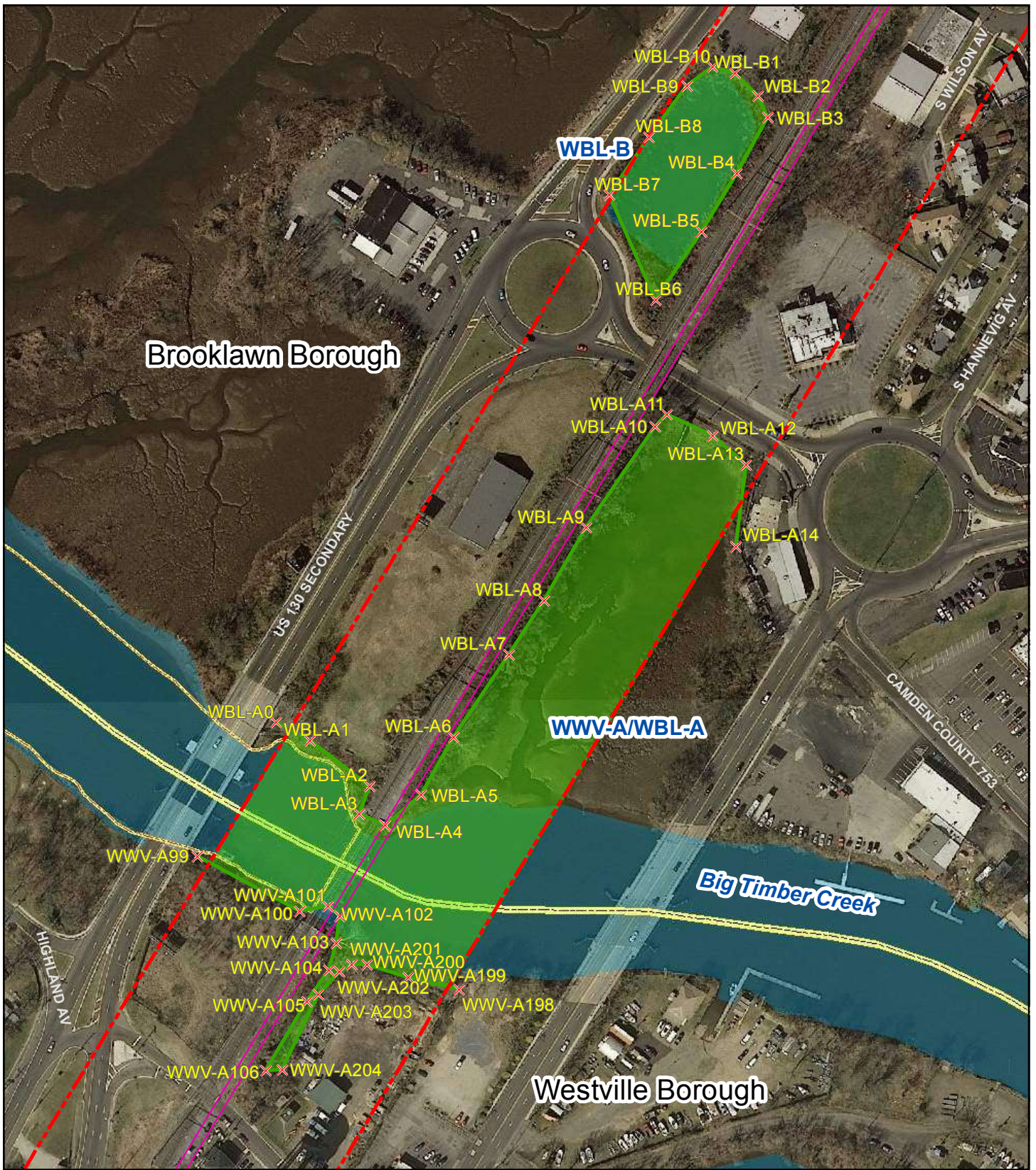


Figure 2-1c: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002

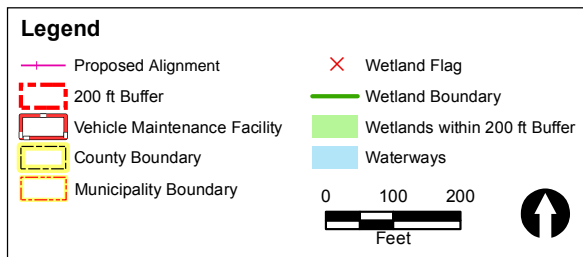
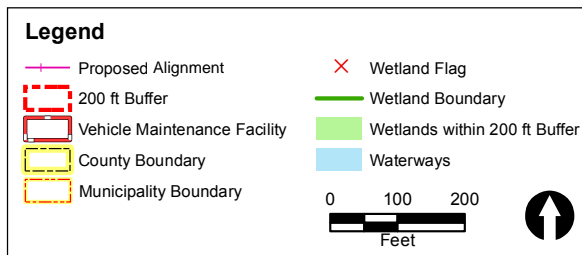




Figure 2-1d: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



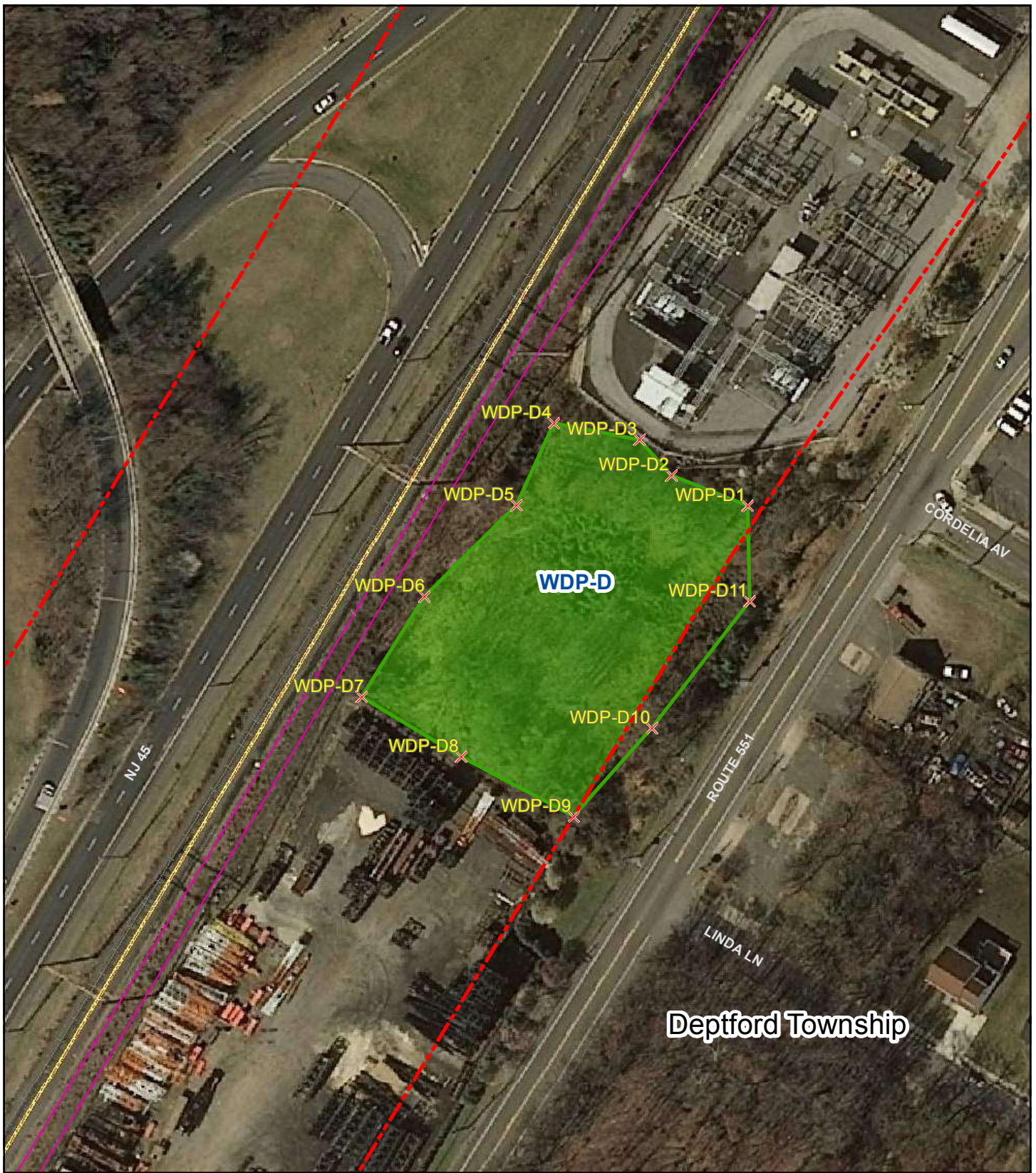
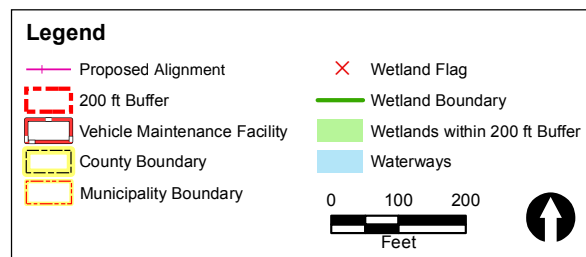


Figure 2-1e: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



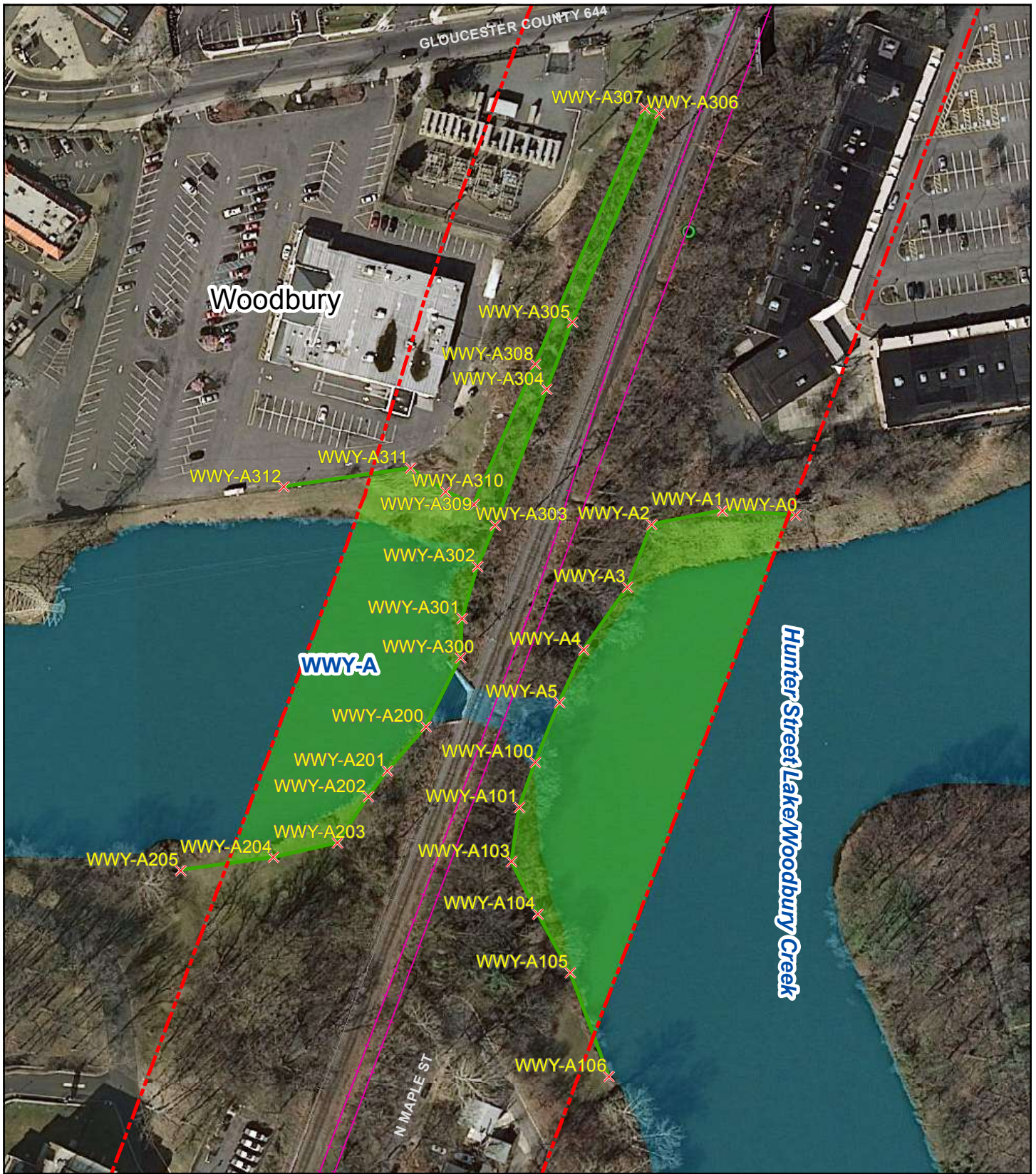


Figure 2-1f: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002

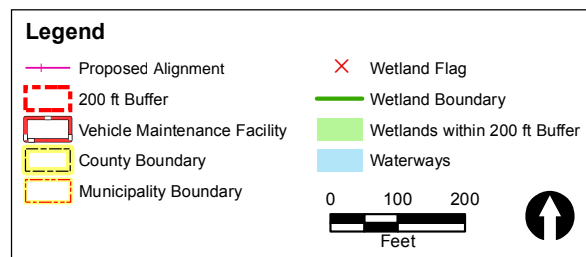
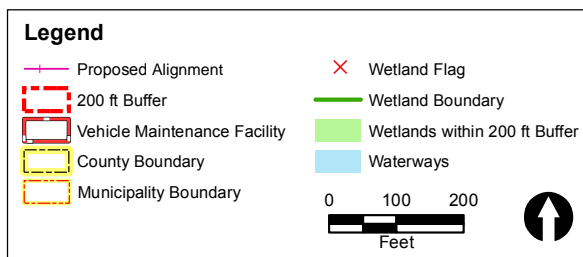




Figure 2-1g: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



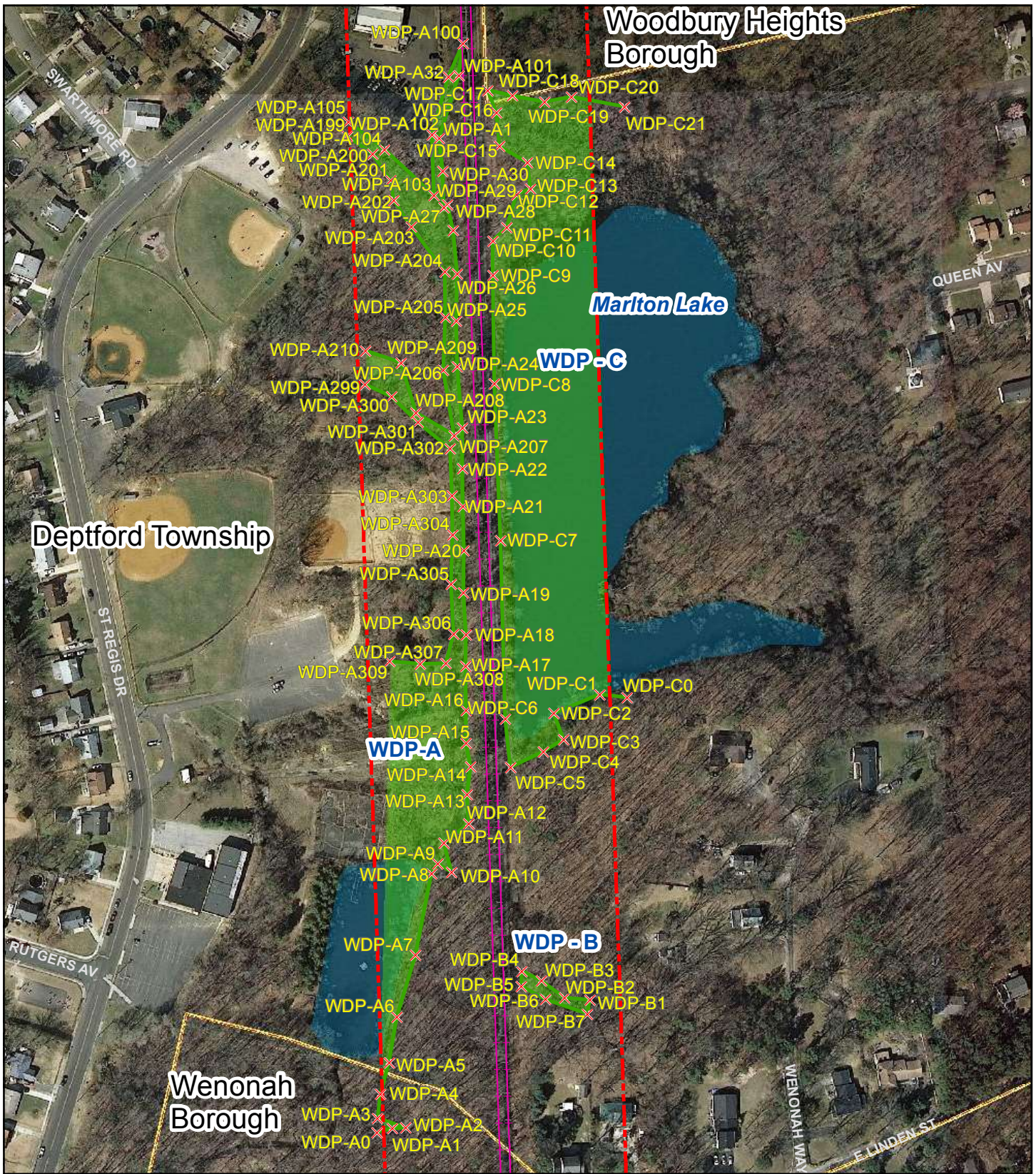
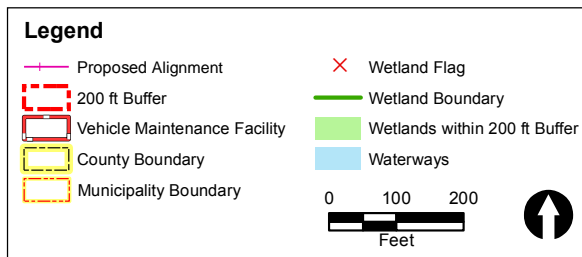


Figure 2-1h: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



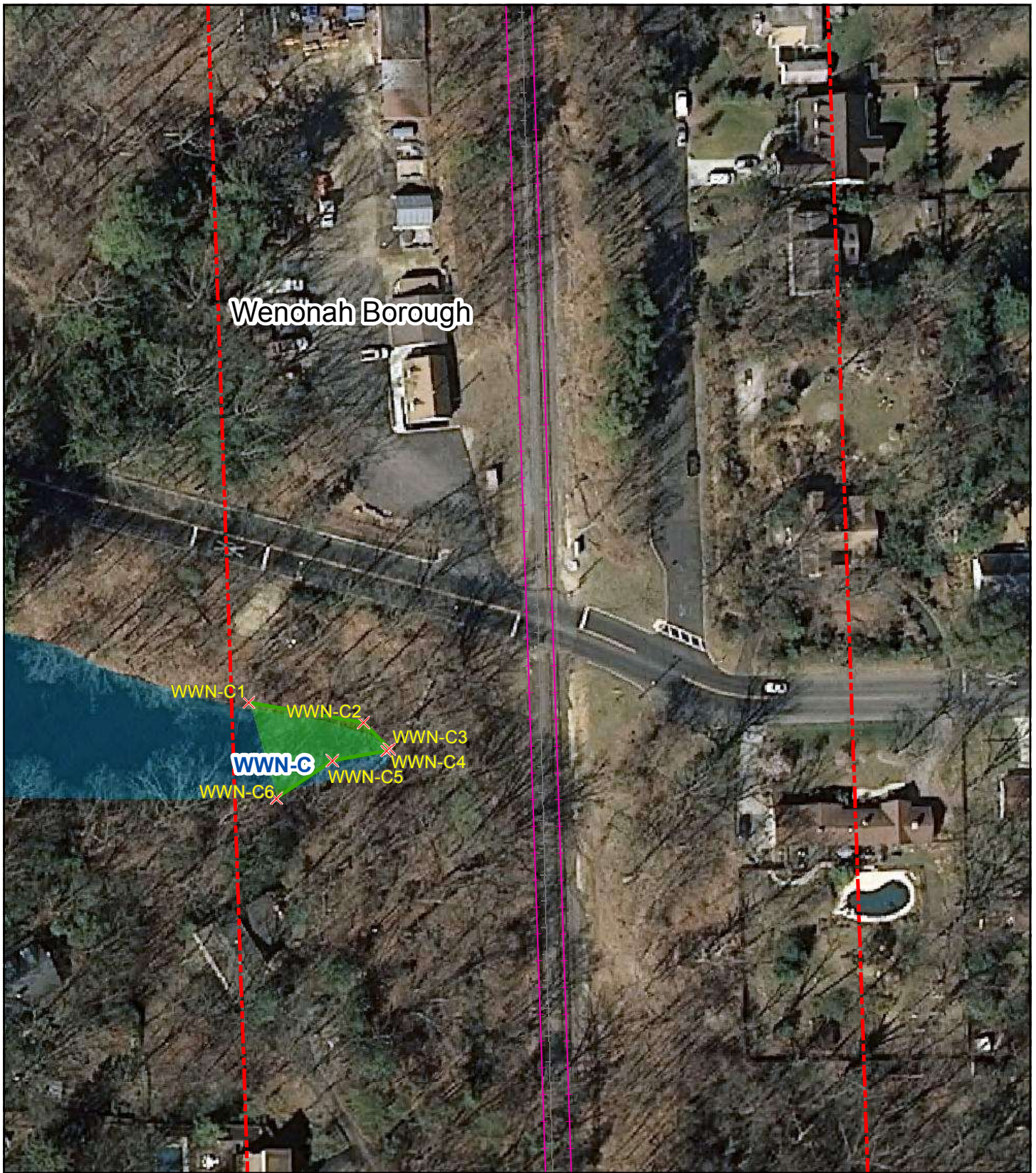
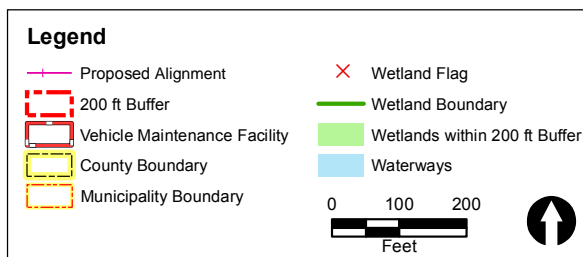


Figure 2-1i: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



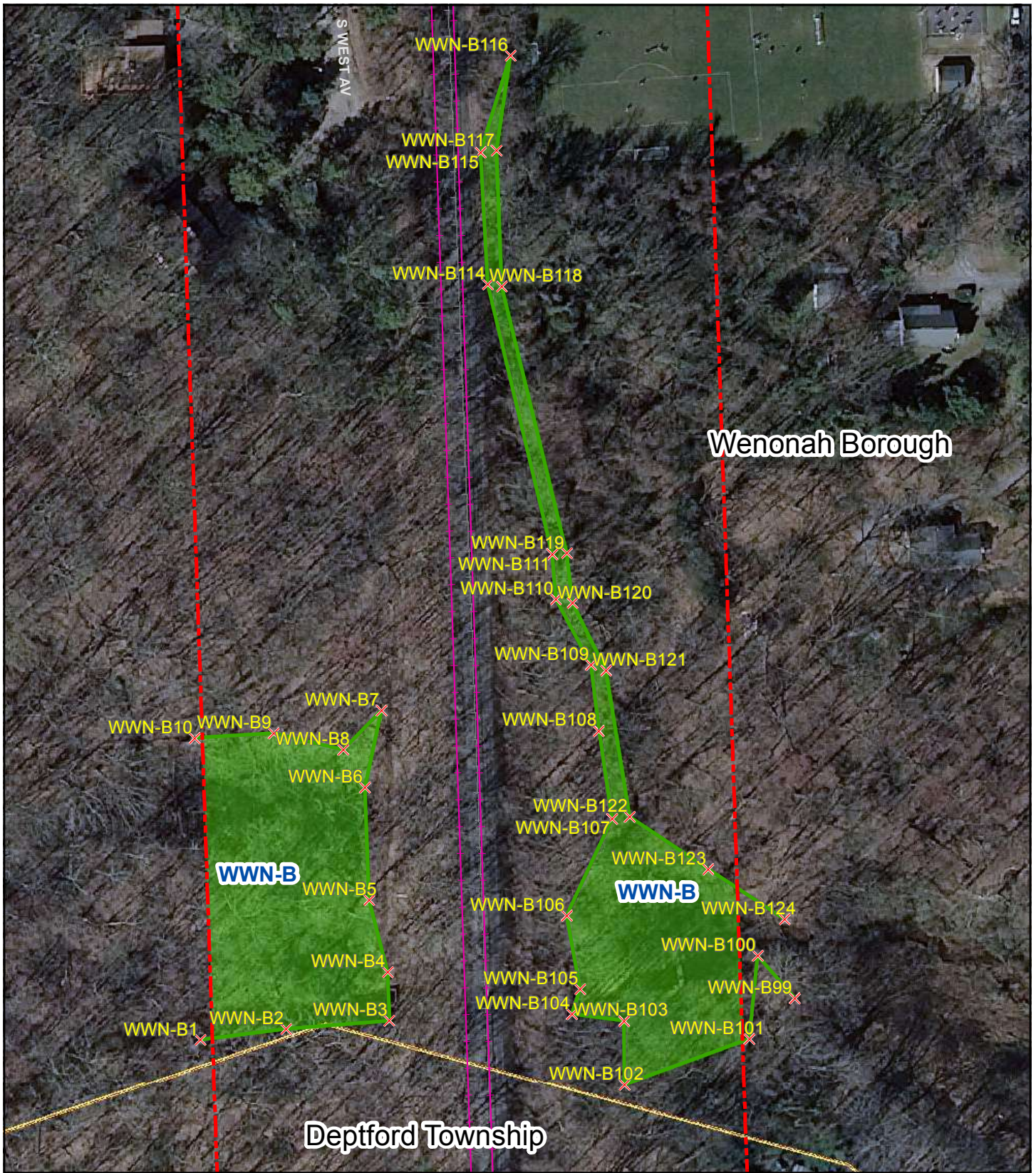
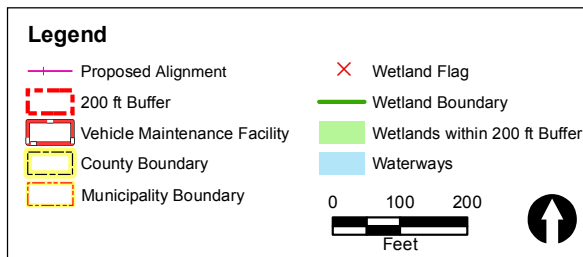


Figure 2-1j: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



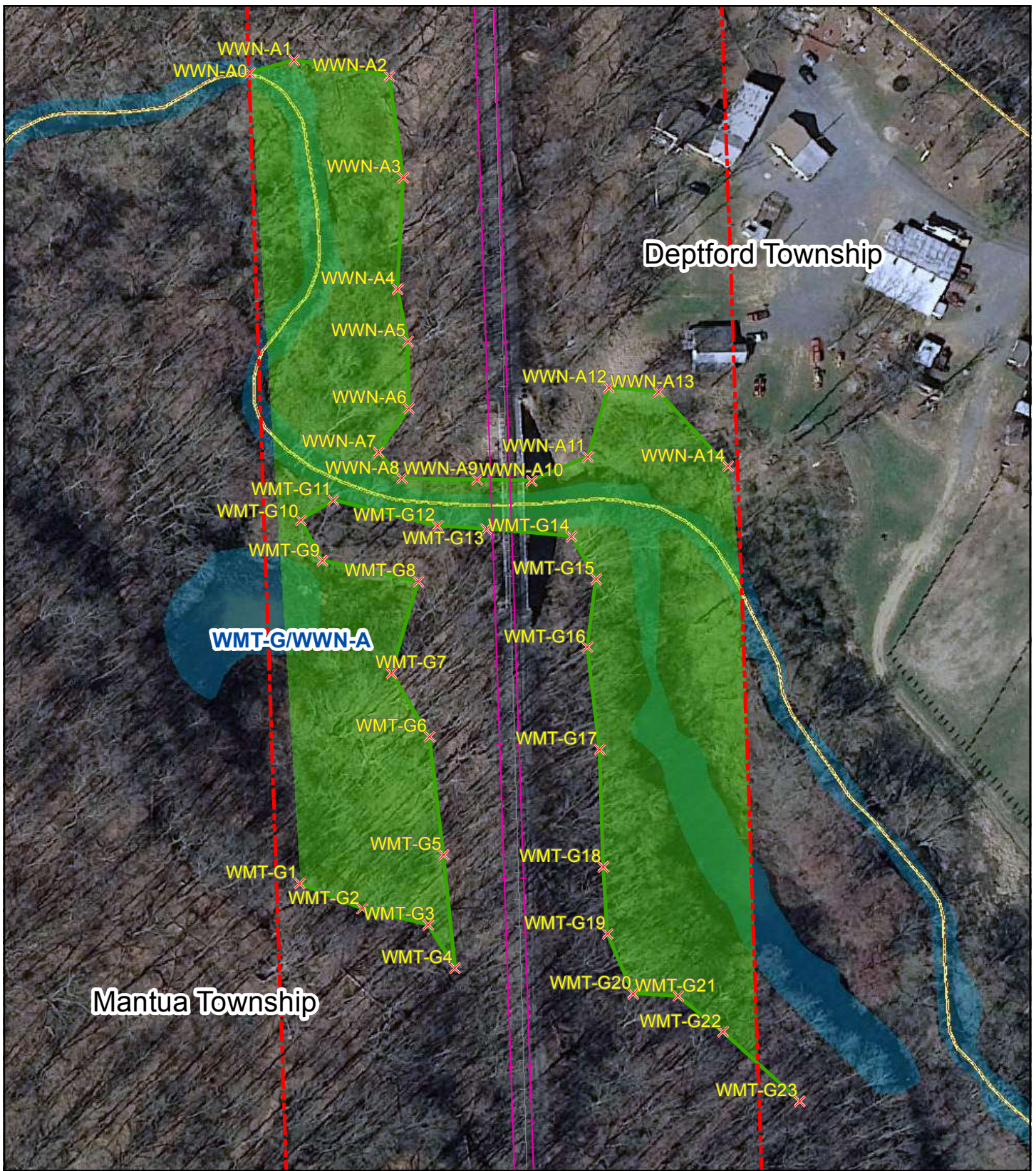


Figure 2-1k: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



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

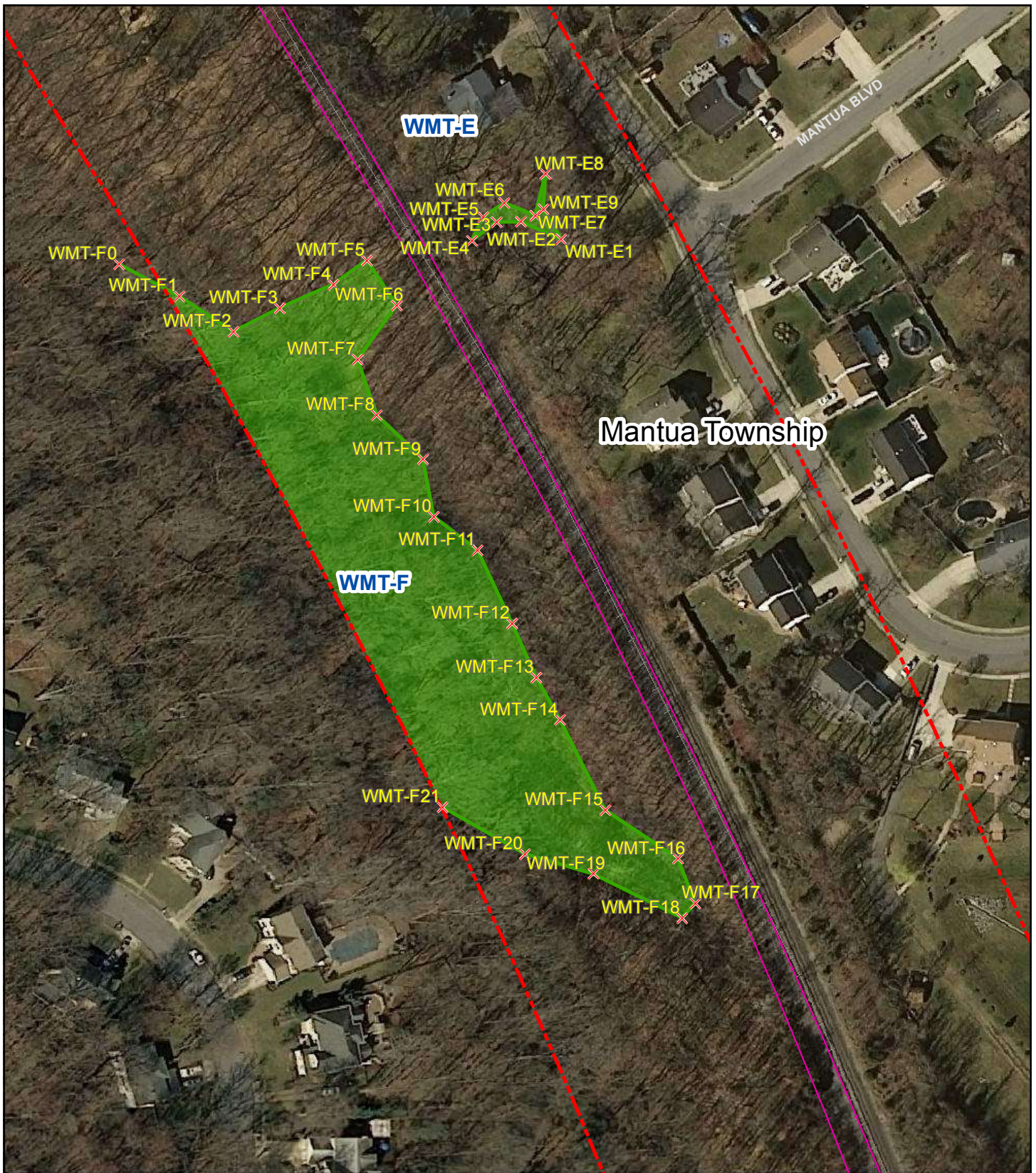
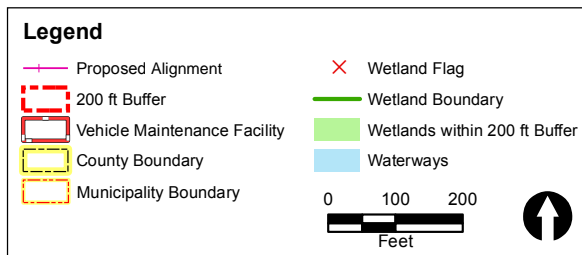


Figure 2-11: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



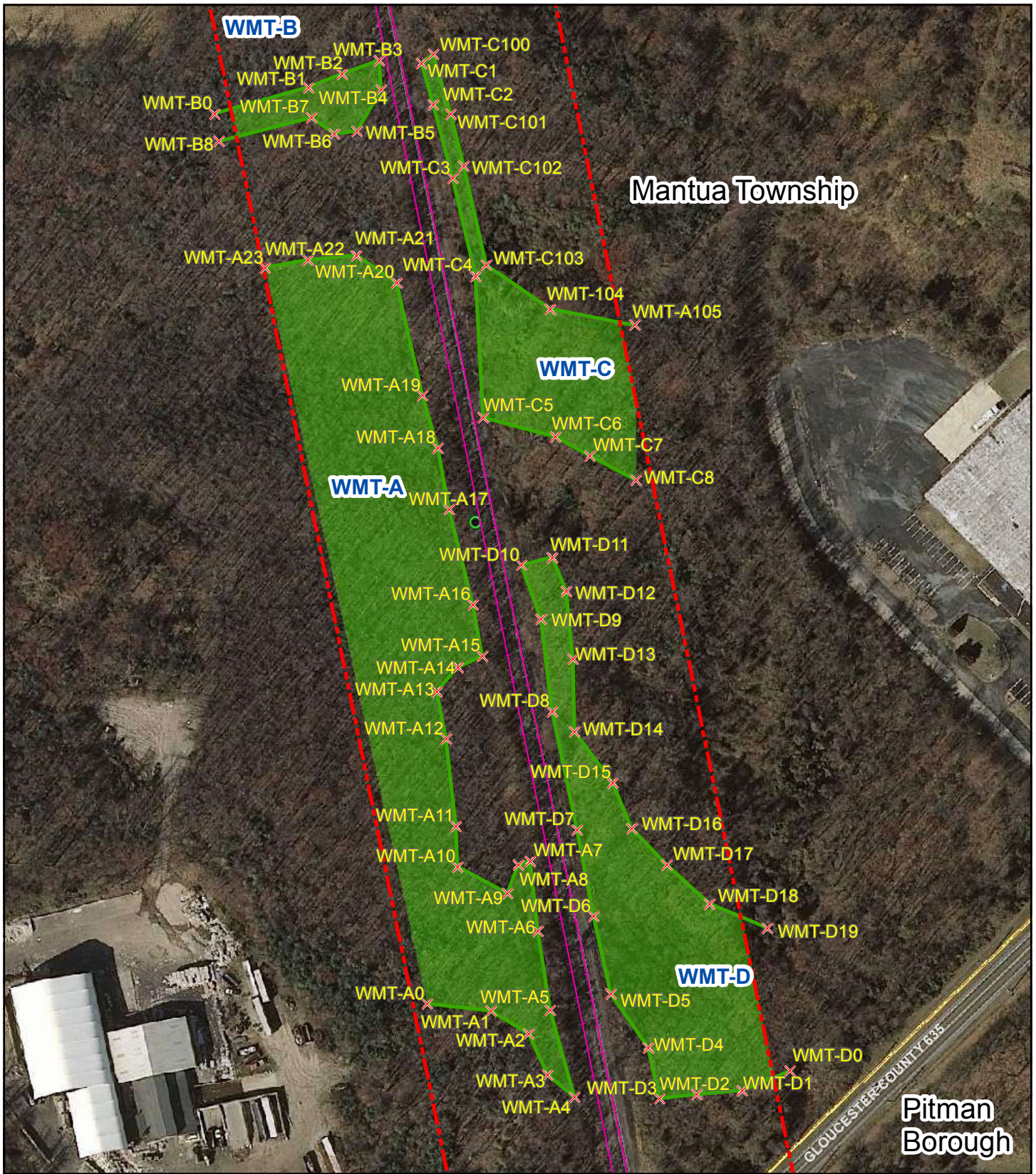


Figure 2-1m: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002

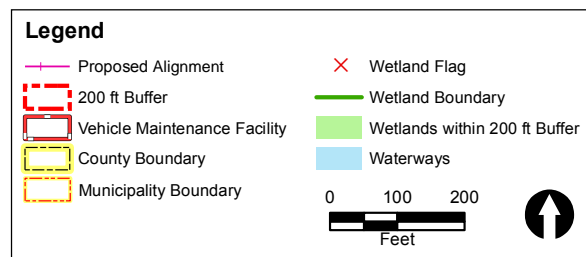
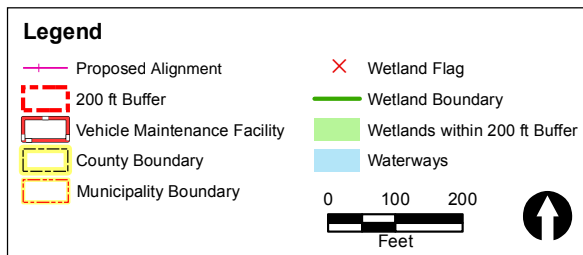




Figure 2-1n: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



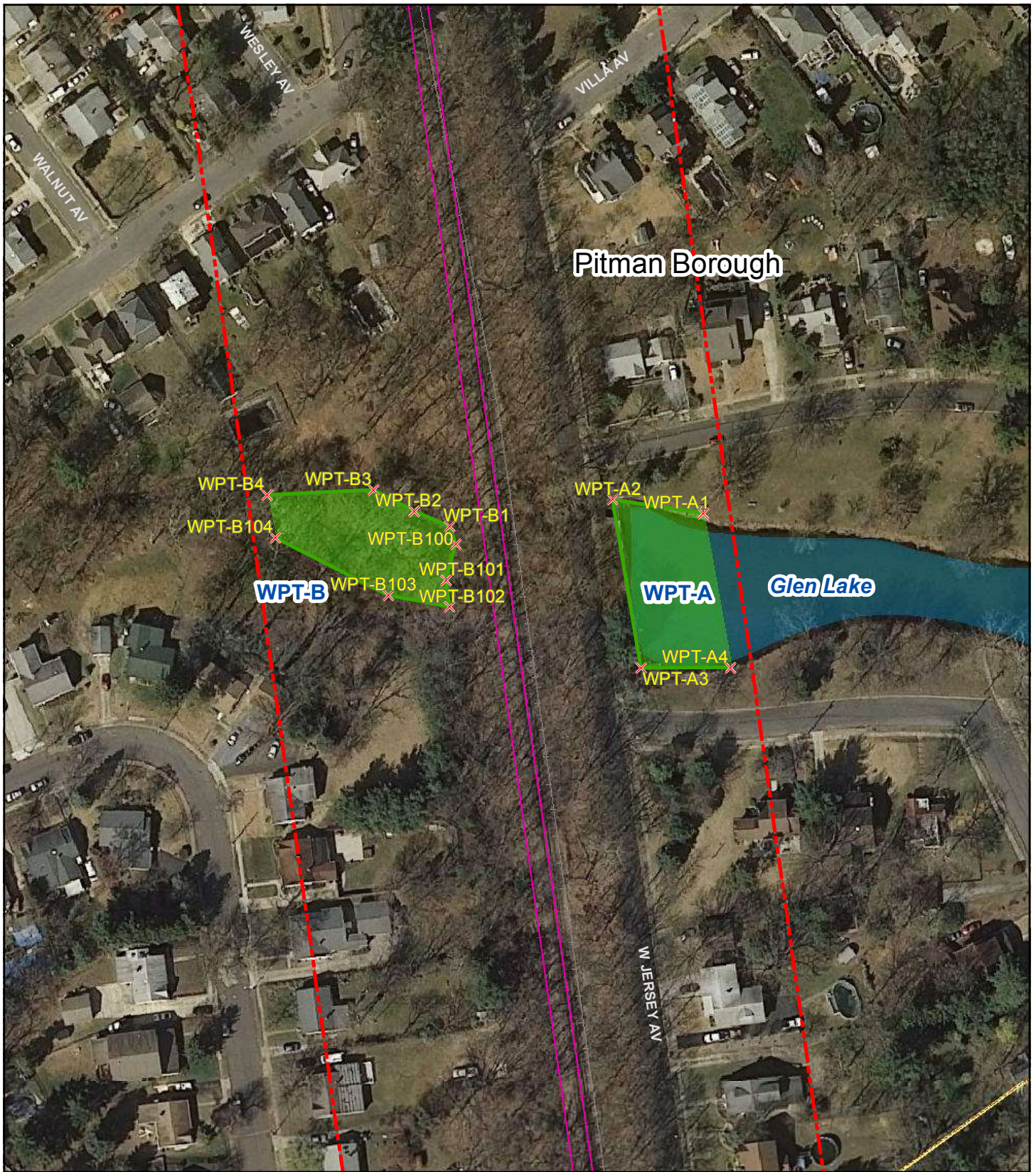
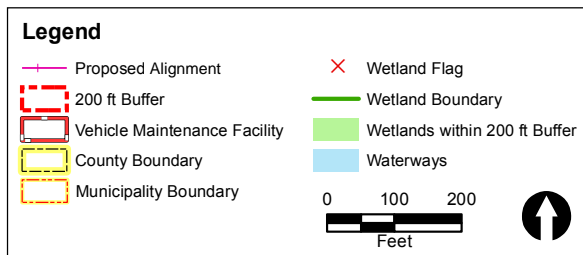


Figure 2-1o: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



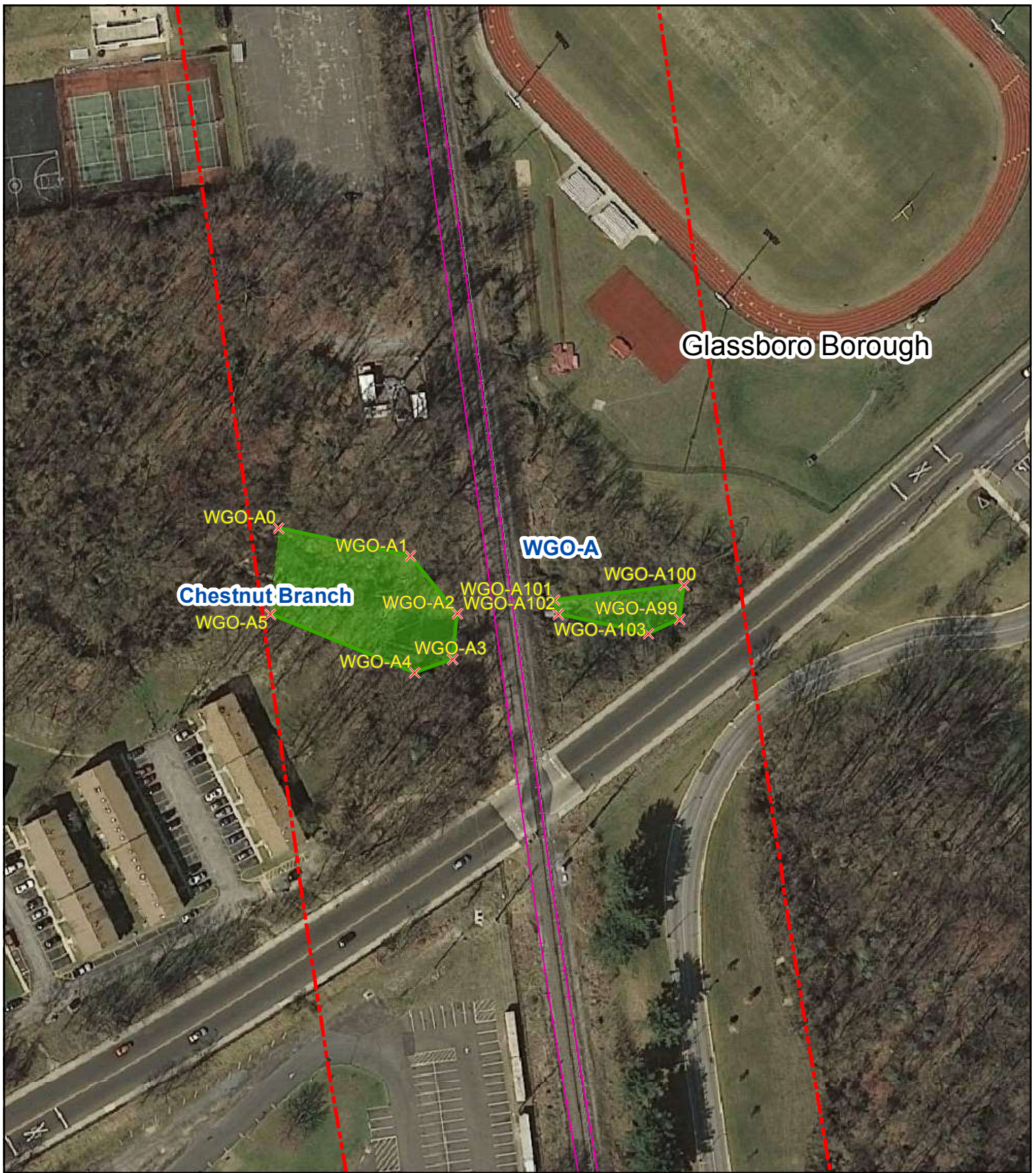
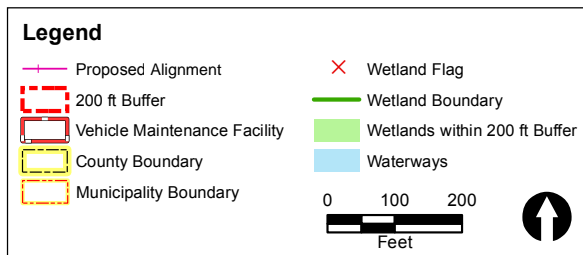
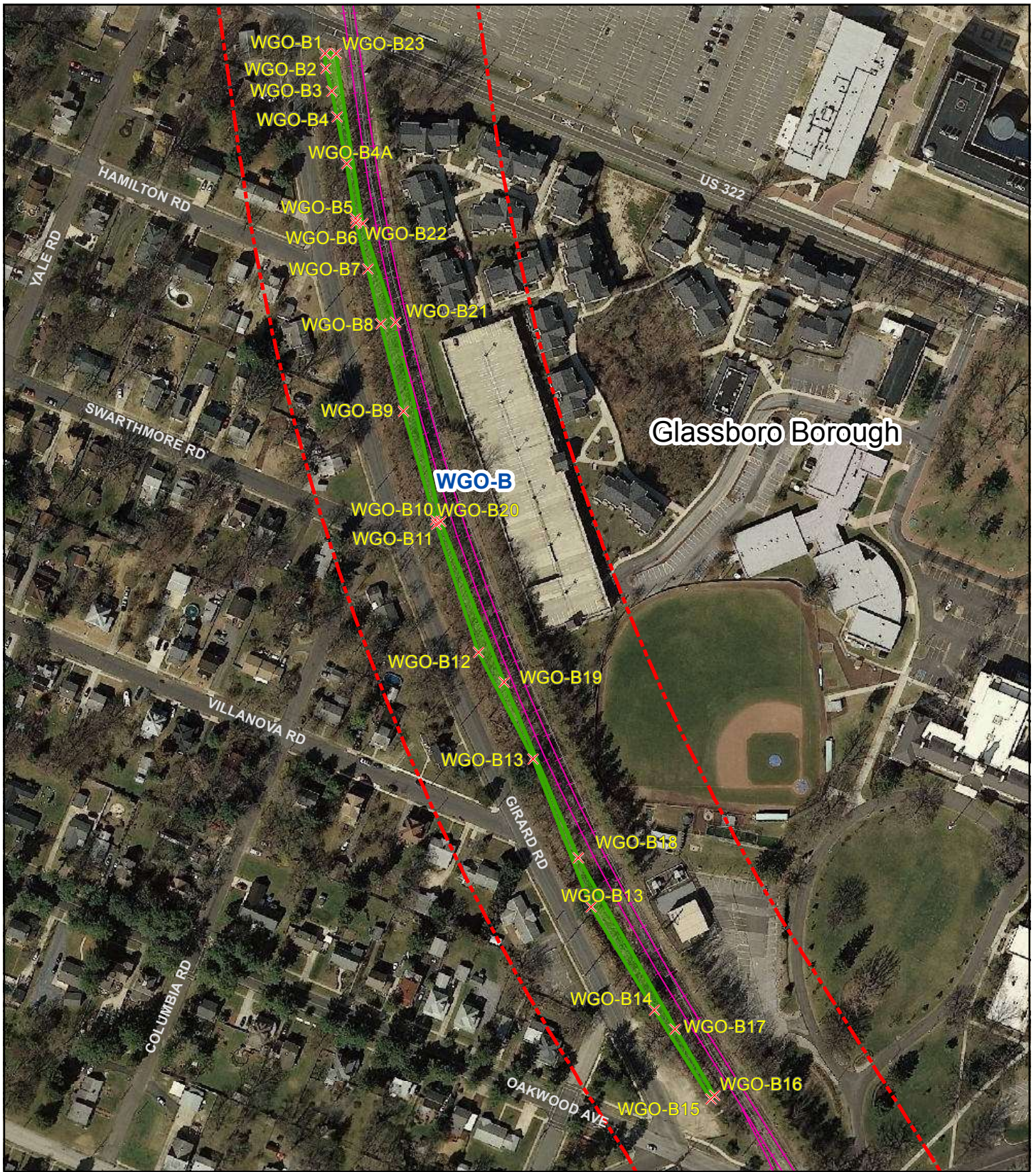


Figure 2-1p: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002





Glassboro Borough

Figure 2-1q: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



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

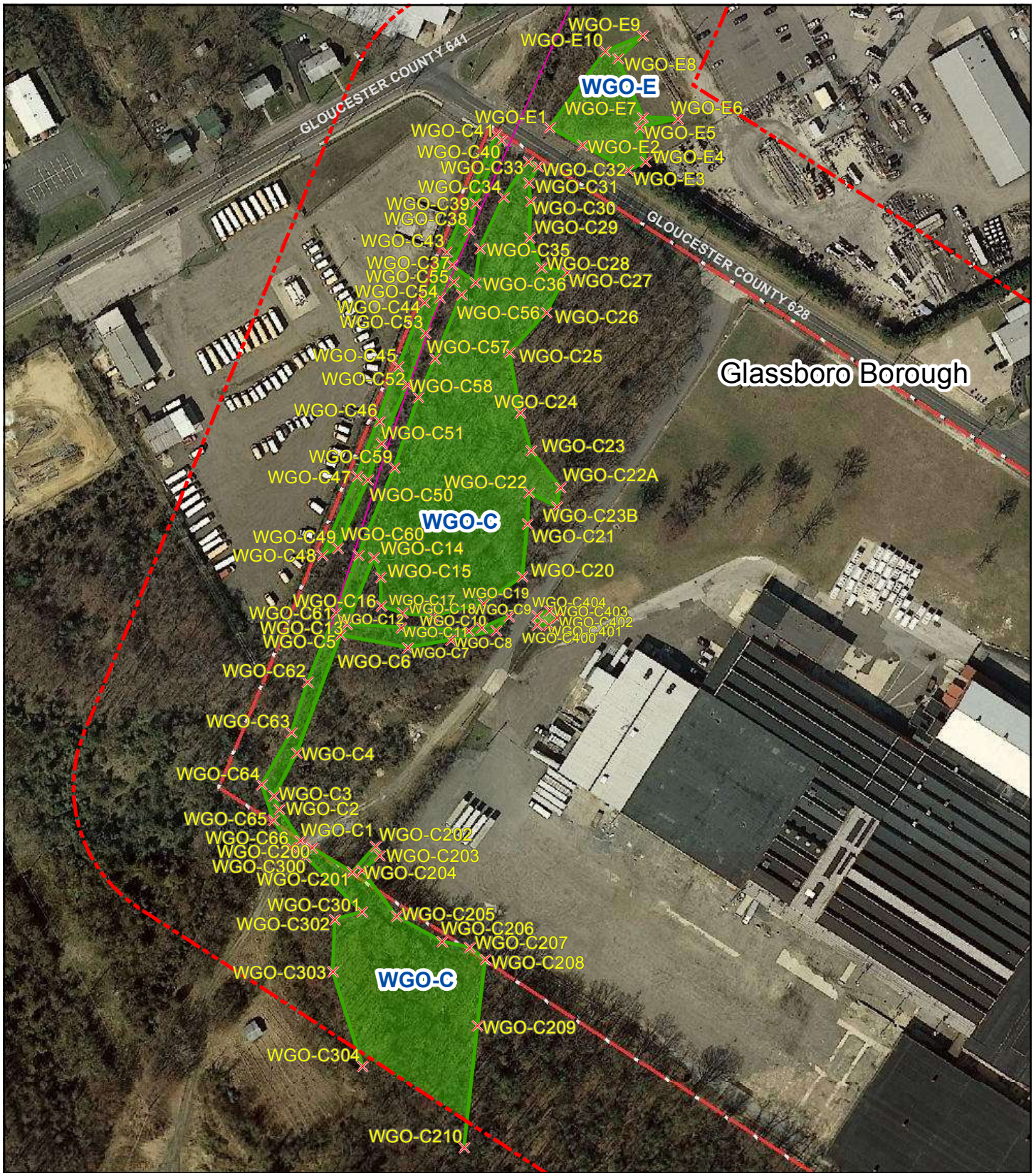


Figure 2-1r: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002

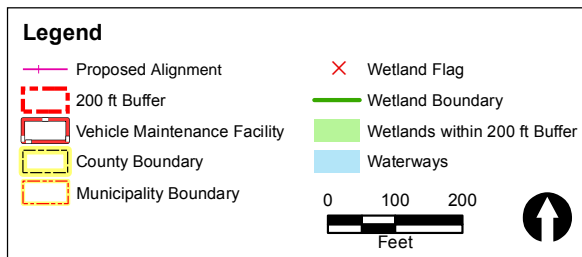
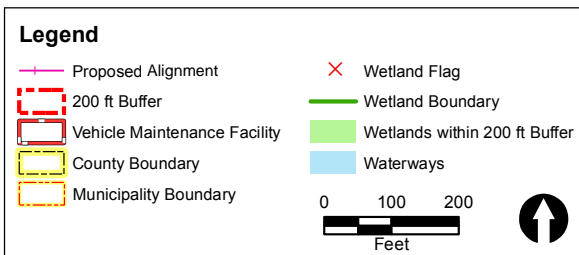




Figure 2-1s: Water Resources

Source: National Hydrography Dataset (NHD) Waterbody 2002



2.2.3.3. Floodplains

Executive Order 11988, Floodplain Management, 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 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 one 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 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.

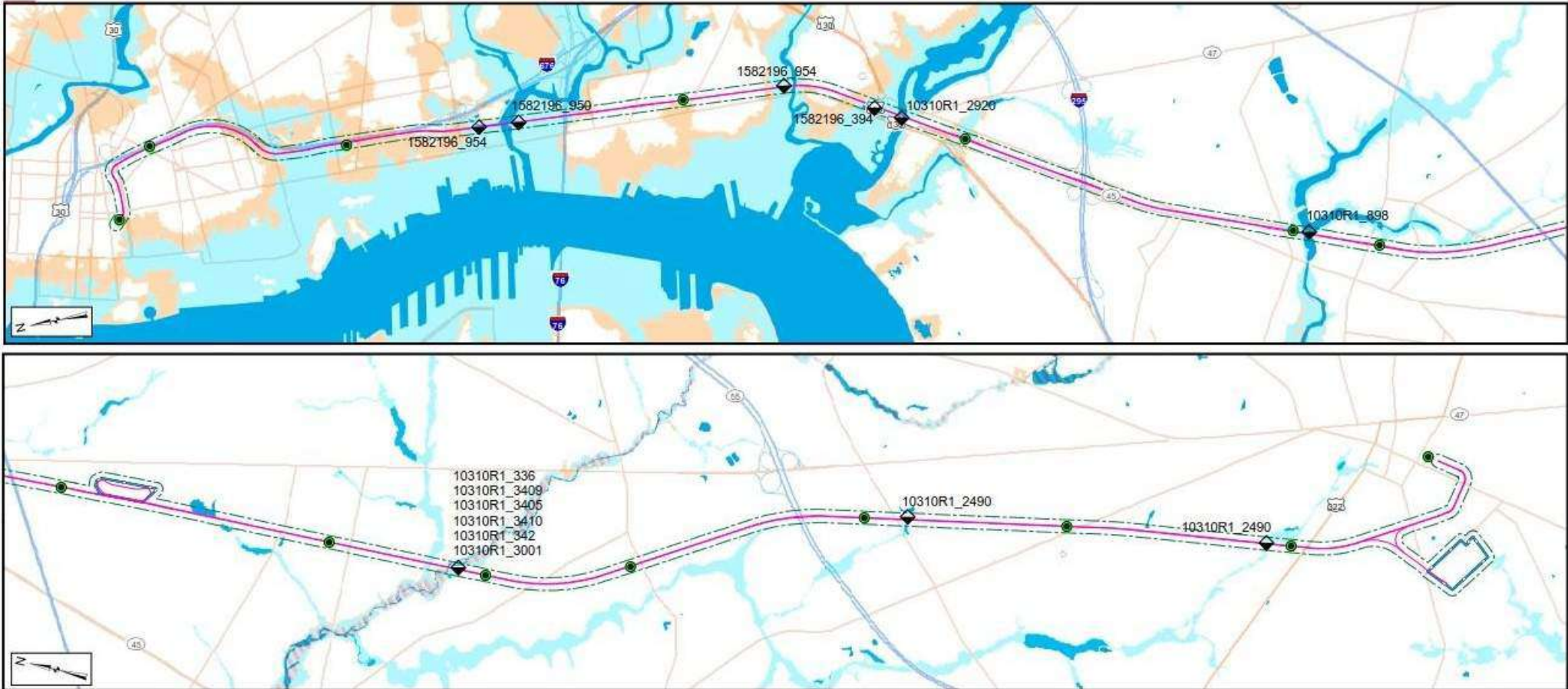
According to NJDEP, a flood hazard area exists along every regulated waterway that has a drainage area of 50 acres or more. If the State of New Jersey has studied a stream and has a delineation of the flood hazard area, the mapping is to be used to establish the flood hazard area. Where no NJDEP delineation 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 wetland delineation study area. As such, FIRM mapping was utilized to identify flood hazard areas within the wetland delineation study area.

A review of the FIRM mapping revealed the wetland delineation study area crosses twelve 100-year floodplain areas shown on Figure 2-2, “Floodplains.” Floodplains listed in Table 2.2-3, “Flood Hazard Areas within Project Study Area,” are associated with each of the following watercourses identified in the GCL corridor.

Table 2.2-3: Flood Hazard Areas within 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.

Figure 2-2: Floodplains



2.2.3.4. Groundwater

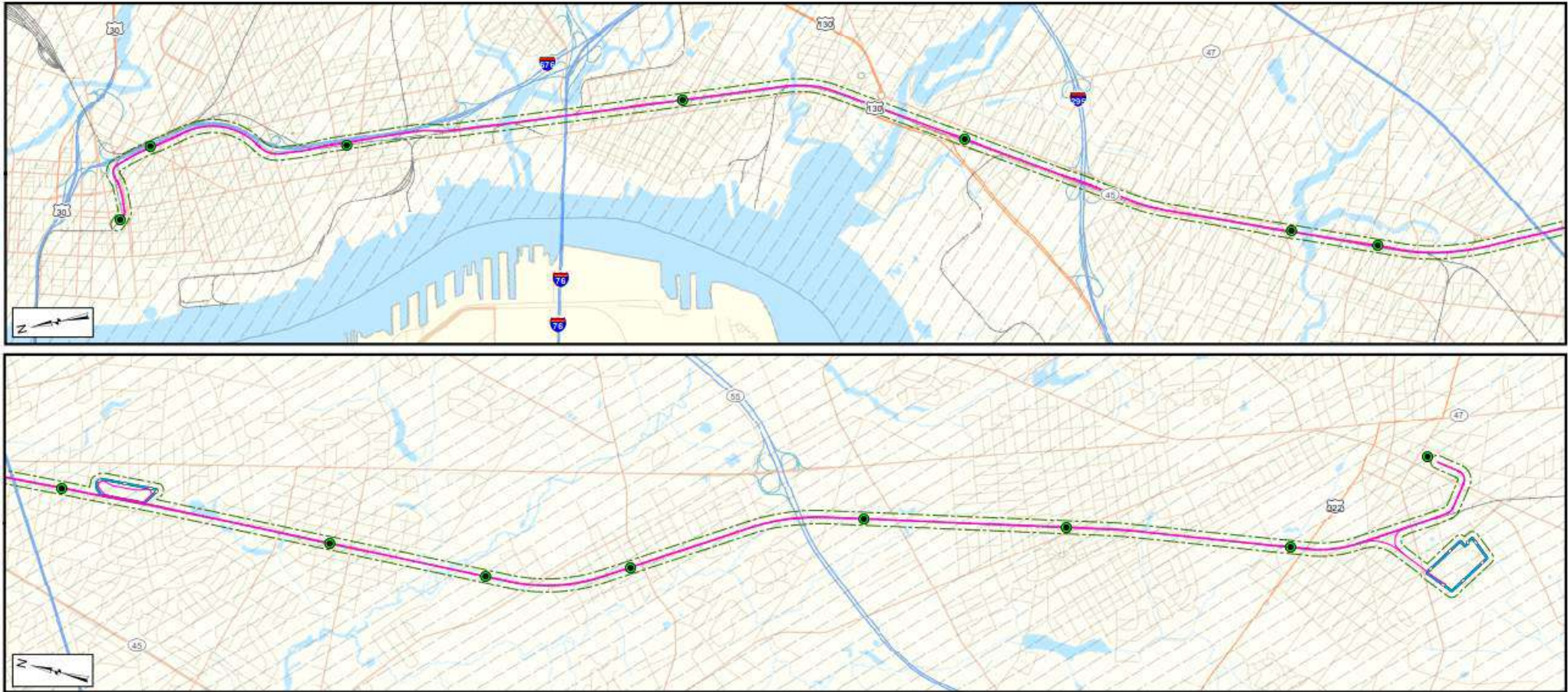
Sole-source aquifers are those aquifers that contribute more than 50 percent of the drinking water to a specific area and are defined with guidelines set forth by the U.S. Environmental Protection Agency (EPA) as authorized in section 1424(e) of the Safe Drinking Water Act of 1974.

The proposed GCL is located in the Coastal Plain sole-source aquifer, as shown on Figure 2-3, "Coastal Plain Sole-Source Aquifer." The wetland delineation study area also 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.

2.2.3.5. Coastal Zone Special Areas

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.

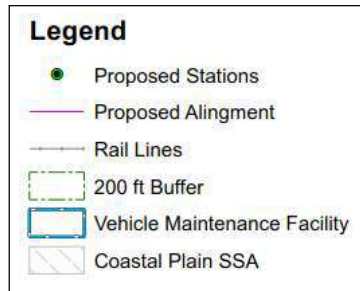
The Waterfront Development Law, and implementing rules found at N.J.A.C. 7:7, is intended to limit problems and environmental impacts that new development could cause for existing navigation channels, marinas, moorings, and other existing uses. As such, any construction below the mean high water elevation would require a Waterfront Development Permit from NJDEP Division of Land Resource Protection. 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 GCL include the finfish migratory pathways, submerged vegetation habitat, flood hazard areas, riparian zones, wetlands, and wetland buffers. Additional information on these policies are included in Attachment 1, "Natural Resources Technical Report."



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/dgs98-6.htm>

0 0.25 0.5 1 Miles

Figure 2-3: Coastal Plain Sole-Source Aquifer



2.2.3.6. Farmland

Types of farmland uses within the natural resources study area are summarized in Table 2.2-4, “Farmland Uses in Study Area,” and illustrated on Figure 2-4, “Farmlands.” Table 2.2-5, “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 2.2-4: Farmland Uses in Study Area

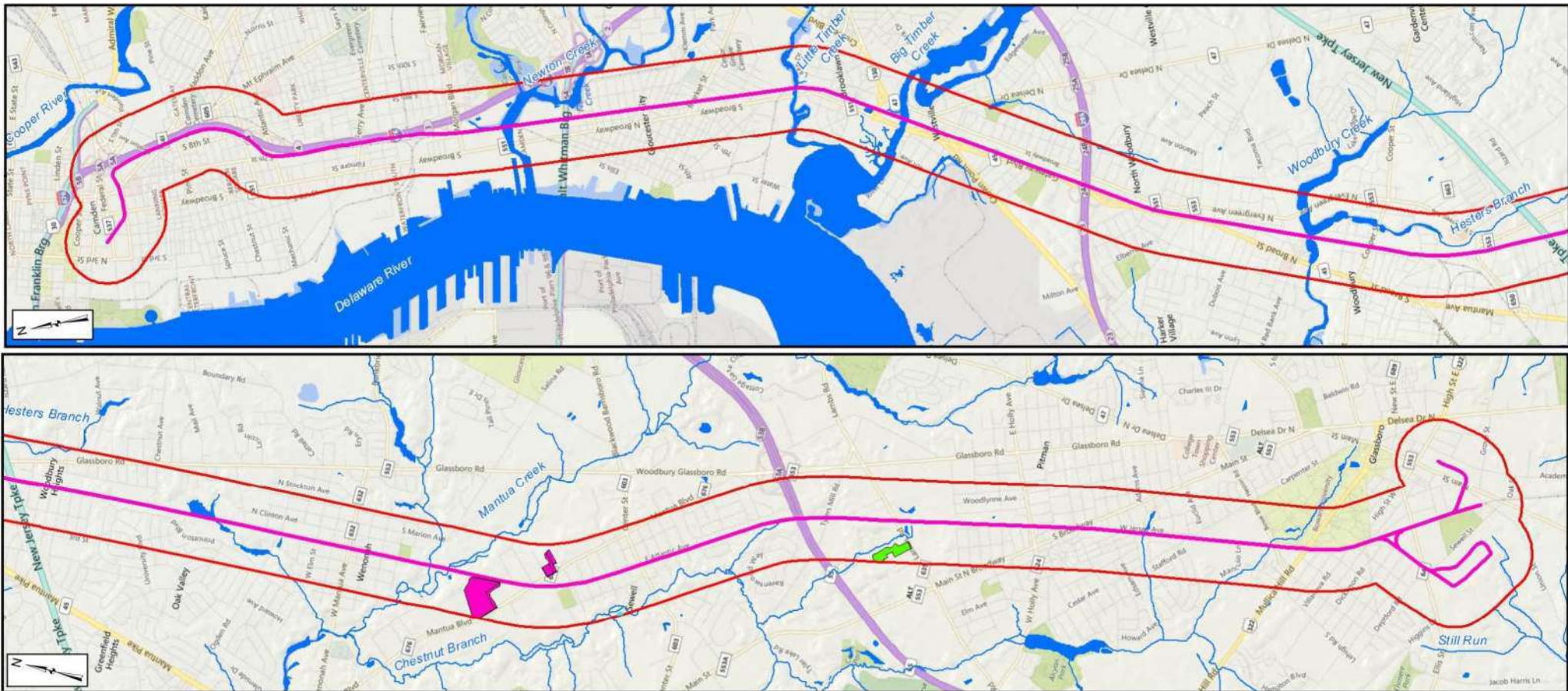
Farmland Uses	Area (acres)
Cropland and Pastureland	27.6
Other Agriculture	7.7
Total	35.3

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

Table 2.2-5: Farmland Parcels in the Study Area

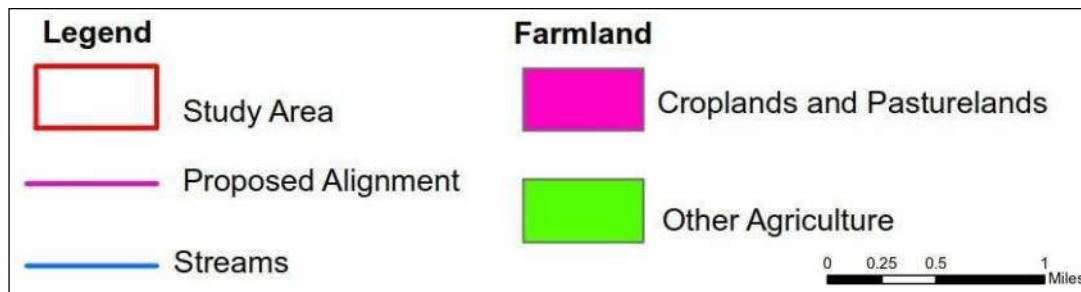
County	Municipality	Block	Lot(s)
Gloucester	Mantua Township	158	4
Gloucester	Mantua Township	170	3.01, 3
Gloucester	Mantua Township	175	4-6
Gloucester	Mantua Township	195	1
Gloucester	Mantua Township	253.01	21,21.01,24
Gloucester	Mantua Township	278	1.01,1.03

Source: Gloucester County Parcel Data, 2017



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

Figure 2-4: Farmlands



2.2.4. Biological Resources

2.2.4.1. Plant Communities

Plant communities that occur within the natural resources 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 geographic information systems (GIS) data (NJDEP Geographic Information Systems, last updated February 17, 2015), and augmented through field investigation. The distribution of different plant communities is shown on Figure 2-5, "Plant Communities," and include deciduous forest, evergreen forest, mixed forest communities, deciduous forested wetlands, emergent wetlands, and old-field plant communities. The distribution of different plant communities is shown on Figure 2-5. Additional information on these plant communities is provided in Attachment 1, "Natural Resources Technical Report."

2.2.4.2. 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 2-6, "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 natural resources 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.

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.

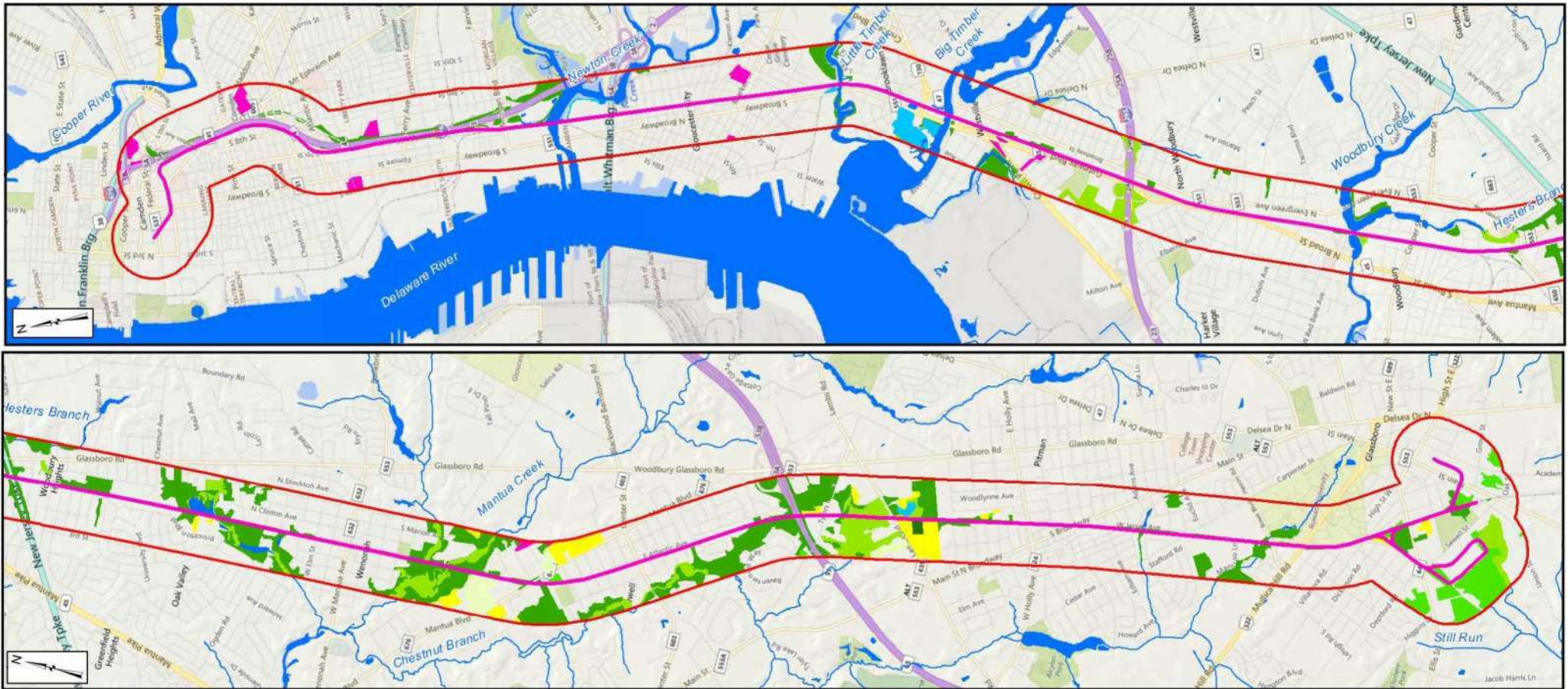
The Wenonah Ravine Natural Heritage Priority Site is located in Wenonah, Deptford, and Mantua. The site is a wooded ravine and contains the only occurrence in New Jersey for the Shingle Oak, a State-listed endangered species.

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 natural resources 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 natural resources 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 2-6, "Unique and Significant Natural Areas").

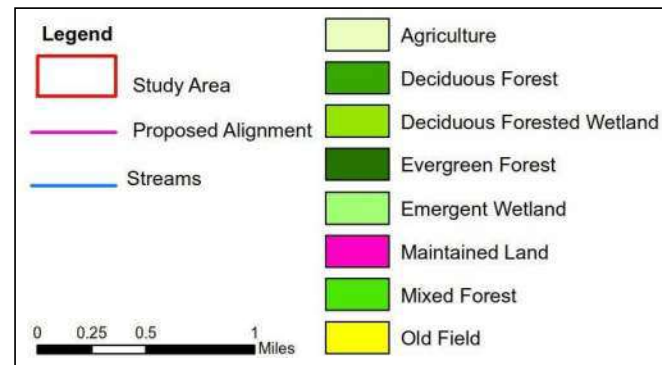


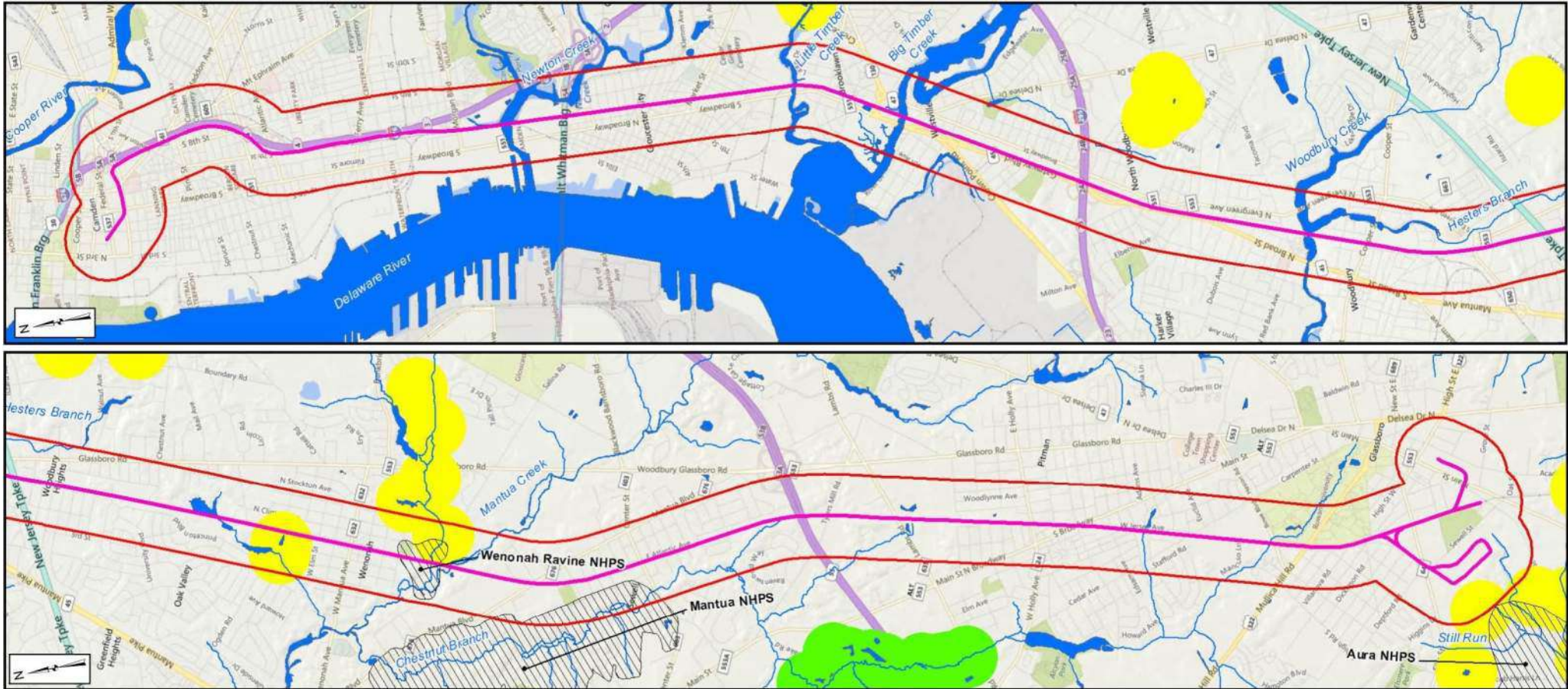
Source: NJDEP Land Use/Land Cover 2012.

Figure 2-5: 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





Source: NJDEP Landscape Project Vernal Habitat, NJ Natural Heritage Program Natural Heritage Priority Sites.

Figure 2-6: Unique and Significant Natural Areas



2.2.4.3. Endangered and Threatened Wildlife Species

Information on the potential presence of Federally-listed species within the natural resources 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 the National Oceanic and Atmospheric Administration (NOAA) Essential Fish Habitat (EFH) Online Mapper.

Federally-Listed Species

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 of land use, habitat requirements, and records of known occurrences of a species. The EFH online mapper shows EFH or those habitats that the NOAA National Marine Fisheries Service (NMFS) and regional fishery management councils have identified as necessary to fish for spawning, breeding, feeding or growth to maturity.

Based on these sources there are six Federally-listed species identified that may occur within the natural resources study area (Table 2.2-6, “Federally-Listed Species Potentially Occurring within the Study Area”). Per the NOAA EFH Online Mapper, no EFH occurs within the natural resources study area. Additional information on these species ~~are~~ is provided in Attachment 1, “Natural Resources Technical Report.”

Table 2.2-6: 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

State-Listed Species

In addition to the Federally-listed species referenced above, the 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 natural resources study area. Table 2.2-7, “State-Listed Threatened and Endangered Species Potentially Occurring within the Study Area,” shows State threatened and endangered species that may occur within the natural resources study area. Additional information on these species is provided in Attachment 1, “Natural Resources Technical Report.”

Table 2.2-7: 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 atriolicifolium</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.

2.2.4.4. 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 natural resources study area. These are not State- or Federally-listed endangered or threatened species but have been designated by the Natural Heritage Program State Rank as 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 natural resources study area are documented in Table 2.2-8, "Species of Special Concern."

Table 2.2-8: Species of Special Concern

Type	Common Name (NHP Rank)	Scientific Name	Habitat Requirements
Birds	Cooper's Hawk (S3)	Accipiter cooperii	Inhabits mature deciduous or mixed forests and forested wetlands with closed canopy. Suitable breeding habitat in the natural resources study area for Cooper's Hawk would consist of forested patches throughout the natural resources study area and heavily wooded residential areas.
	Great Blue Heron (S3)	Ardea herodias	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)	Hylocichla mustelina	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 natural resources study area.
Reptiles	Eastern Box Turtle (S3)	Terrapene carolina	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 natural resources study area.
Plants	Smooth Tick-trefoil (S1)	Desmodium laevigatum	Herbaceous plant found in rocky, open woods. New Jersey Natural Heritage Program documented habitat exists along the Chestnut Branch approximately 1.6 miles southeast of Mantua.
	Curtiss' Three-awn Grass (S3)	Aristida dichotoma var. curtissii	Grass species found in disturbed areas and early successional old-field communities. New Jersey Natural Heritage Program documented habitat exists southeast of Mantua along Mantua Creek but there have been no reported sightings since 1919.
	White Milkweed (S1)	Asclepias variegata	A wildflower found in dry or rocky forest and thickets. New Jersey Natural Heritage Program documented habitat within the natural resources study area found along the Chestnut Branch west in Sewell. The last reported sighting occurred in 1923.
	Wild Kidney Bean (S2)	Phaseolus polystachios var. polystachios	Native bean species inhabiting forest. Habitat for this species documented by the New Jersey Natural Heritage Program in forested areas associated with Mantua Creek southeast of Mantua.
	Spotted Phlox (S2)	Phlox maculata var. maculata	Herbaceous plant existing in old-field communities as well as disturbed sites. Habitat for this species has been documented by the New Jersey 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)	Sphenopholis pensylvanica	Grass species found in wetlands and along the shores of rivers and lakes. Habitat for this species has been documented by the New Jersey 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)	Callitriche palustris	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 New Jersey Natural Heritage Program along a tributary of the Big Timber Creek in Westville.

Table 2.2-8: Species of Special Concern (Continued)

Type	Common Name (NHP Rank)	Scientific Name	Habitat Requirements
Plants	Awl-leaf arrowhead (S2)	Sagittaria subulata	A herbaceous perennial plant typically found in brackish and tidal fresh waters, intertidal mudflats, and regularly flooded marshes. Historically found by the New Jersey 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)	Stachys tenuifolia	A native plant species typically inhabiting wetlands, wet meadows, and floodplain forests. New Jersey 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)	Equolobium strictum	A native plant species that grows in wetlands. New Jersey Natural Heritage Program has documented this species along Mantua Creek ¾ mile southwest of Hurffville. The last recorded sighting occurred in 1923.
Insects	Pink Streak (S3)	Faronta rubripennis	Moth inhabiting early successional old-field communities and grassland habitat. May also be found in emergent wetland areas. Suitable habitat may occur throughout the natural resources study area.
	A Noctuid Moth (S2)	Macrochilo Louisiana	Species of moth inhabiting emergent wetlands and wet grasslands. Suitable habitat may occur throughout the Mantua Creek drainage.
	A Noctuid Moth (S1)	Macrochilo santerivalis	Species of moth inhabiting emergent wetlands and wet grasslands. Suitable habitat may occur throughout the Mantua Creek drainage.

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,” the Little Brown Bat and the Tricolored Bat, whose habitat could be affected by the project, 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.

2.3. MAN-MADE RESOURCES

This section describes existing man-made resources within the land use and zoning, hazardous materials, and transportation study areas for the proposed GCL such as present site land use, adjacent land uses, access, the presence of any hazardous substances or waste, the presence of any underground storage tanks or structures, abandoned wells not properly sealed, transportation patterns, and zoning.

2.3.1. Summary

- Land Use and Zoning** – Primary land uses along the proposed alignment in the Camden County portion of the corridor are dense residential and commercial development, which is generally consistent with development patterns found throughout the northern portion of the county. Land uses in Gloucester County tend toward more single-family residential areas, with wooded lands predominating in the west and south of the corridor. The land use patterns in the Gloucester County portion of the corridor are generally more developed along the proposed

alignment than the rest of the county. Zoning in the vicinity of the proposed stations varies by station, but generally consists of medium- and high-density residential uses, various commercial uses, and light industrial uses; zoning is described further below.

- **Hazardous Materials** - An Environmental Data Resources Inc. DataMap Environmental Atlas report and additional data from NJDEP identified a total of 380 sites containing known or potential environmental areas of concern within a 300-foot radius from the GCL corridor, which are described in Attachment 4, “Hazardous Materials Technical Report.”
- **Transportation** – The primary freeway spine in the study area is I-676/I-295/I-76—generally known as the North-South Freeway—which serves as a key approach to both the Walt Whitman and Benjamin Franklin bridges over the Delaware River into Pennsylvania. To determine existing traffic conditions, an initial screening of roadways and key intersections near the GCL corridor was conducted, and a total of 42 intersections were subsequently selected for a detailed traffic analysis, the results of which are summarized below. Most roadways adjacent to or approaching proposed station areas were found to be either suitable for most cyclists or most adult cyclists and were determined to have appropriate pedestrian accommodations; the results of this inventory exercise are found in Attachment 5, “Traffic Analysis Technical Report.” With regards to transit, major routes within the existing transit network in the study include the Port Authority Transit Corporation (PATCO) Speedline, New Jersey Transit (NJ TRANSIT) River LINE, NJ TRANSIT Atlantic City Line, River LINE Ferry service, NJ TRANSIT Bus services, and local shuttles.

2.3.2. Land Use and Zoning

The land use and zoning study area for the land use assessment extends ½ mile from the centerline of the proposed alignment and the proposed stations/Vehicle Maintenance Facilities (VMFs). The GCL alignment would be located within or adjacent to the existing Conrail railroad right-of-way (ROW), which supported a passenger rail service in the past, and traverses eleven communities between Camden City and Glassboro Borough. These communities, listed from north to south, include the following within Camden County – Camden City, Gloucester City, and Brooklawn Borough – and the following communities within Gloucester County – Westville Borough, Woodbury City, Woodbury Heights Borough, Deptford Township, Wenonah Borough, Mantua Township, Pitman Borough, and Glassboro Borough.

In aggregate, the land area within ½ mile of the proposed GCL alignment is 19 square miles in size. Primary land uses along the proposed alignment in the Camden County portion of the corridor are dense residential and commercial development, which is generally consistent with development patterns found throughout the northern portion of the county. Land uses in Gloucester County tend toward more single-family residential areas, with wooded lands predominating in the west and south of the corridor. The land use patterns in the Gloucester County portion of the corridor are generally more developed along the proposed alignment than the rest of the county. Other land uses in the land use and zoning study area include commercial and recreational uses and vacant land.

2.3.2.1. Corridor

The GCL corridor is located within the counties of Camden and Gloucester in New Jersey. The corridor has developed as contiguous residential and non-residential land use was concentrated within municipalities and is accessed by major highways and a network of county and local roads. The primary freeway spine in the land use and zoning study area is I-676/I-295/I-76 – generally known as the North-South Freeway. This route serves as a key approach to both the Walt Whitman and Benjamin Franklin

bridges over the Delaware River into Pennsylvania. Other major freeways include I-295 and the New Jersey Turnpike – parallel routes that provide northeast-southwest routes across the region. Three major bridges provide access across the Delaware River within the land use and zoning study area: the Benjamin Franklin Bridge (I-676/U.S. 30), the Walt Whitman Bridge (I-76), and the Commodore Barry Bridge (U.S. 322). The northern limits of the proposed GCL corridor are characterized by older, more densely populated communities that developed along the rail line and near major employment and activity centers such as universities, medical centers, and other institutions. The southern limits of the corridor are not as dense. There is more suburban development with institutional uses in Pitman and Glassboro.

2.3.2.2. Station Areas

Walter Rand Transportation Center (WRTC), Camden

WRTC is the only existing station along the GCL. Located between Dr. Martin Luther King Boulevard and Federal Street in downtown Camden, the WRTC serves as the transfer hub for PATCO, NJ TRANSIT Bus, and River LINE services. Existing land use classifications within ½ mile of the existing WRTC Station are presented on Figure 2-7, “Existing Land Use – Walter Rand Transportation Center.” The land use composition within a ½ mile of the WRTC is broken down by percentage in Table 2.3-1, “Existing Walter Rand Transportation Center (WRTC) Area (Land Use Composition).”

Table 2.3-1: Existing Walter Rand Transportation Center (WRTC) Area (Land Use Composition)

Walter Rand Transportation Center (WRTC) Land Use Categories	Land Use Composition (%)
Parking	25.8%
Residential: High Density	21.4%
Institutional	16.9%
Transportation	16.7%
Commercial	7.9%
Undeveloped	5.4%
Open Space	3.8%
Industrial	1.7%
Agriculture	0.3%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

While transportation and commercial parking account for a significant amount of the land coverage, the station area contains a mix of residential, parkland, commercial, and institutional uses. Residential land uses are located primarily to the south and major employment centers are located north of the station. Several parkland areas are located within ½ mile of the station area, including Triangle Park, Roosevelt Plaza, Cooper Plaza, as well as additional smaller neighborhood parks. Additionally, various institutional uses are in the immediate vicinity of the station, including the Cooper University Hospital, Rutgers-University Camden, Rowan University Camden, the Walt Whitman Museum, Camden City Hall and various government facilities, multiple charter and private schools, the Catholic Partnership Schools’ administrative offices, and a U.S. Department of Housing and Urban Development office.

Multi-family residential and Mickle Towers, a senior public housing facility, are located southwest of WRTC. Large tracts of surface parking lots and parking structures owned by the Parking Authority of the City of Camden are located west of WRTC.

Several churches and the Camden Community Health Center are located throughout the residential neighborhood west of the station. Most commercial uses are located south of the station along Broadway and north of the station along Market Street. These commercial corridors include restaurants, specialty retail, personal services, banks, and professional offices.

The ½ mile area surrounding the WRTC has been divided into several zones designated by the City of Camden's zoning ordinance: Medium and High Density Residential, Medical and Support Services, University and Support Services, Office Light Industrial Uses, and Center City Commercial Uses. Medium-Density Residential (R-2) and High-Density Residential (R-3) allow for single-family and multi-family residential units or institutional uses including parks, schools, or municipal facilities.



Figure 2-7: Existing Land Use - WRTC



Legend		Land Use	Land Use, continued
●	Station	Low Density Residential	Parking
—	Rail line	High Density Residential	Undeveloped
- - -	Municipal boundaries	Commercial	Transportation
		Industrial	
		Open Space/Recreation	
		Agriculture	
		Institutional	

Source: DVRPC, 2015; GCL Project Team, 2020.

Cooper Hospital Station, Camden

The proposed Cooper Hospital Station would be located adjacent to I-676, near major Camden County employers Cooper University Hospital and Campbell Soup Company Headquarters. The station is also located less than ½ mile from Subaru of America’s new corporate headquarters in Camden’s Gateway District. Existing land use classifications within ½ mile of the proposed Cooper Hospital Station are shown on Figure 2-8, “Existing Land Use – Cooper Hospital Station,” and are ~~is~~ broken down by percentage in Table 2.3-2, “Proposed Cooper Hospital Station Area (Land Use Composition).”

Table 2.3-2: Proposed Cooper Hospital Station Area (Land Use Composition)

Cooper Hospital Station Area Land Use Categories	Land Use Composition (%)
Residential: High Density	26.1%
Undeveloped	17.4%
Transportation	15.3%
Parking	11.0%
Institutional	10.2%
Commercial	8.2%
Industrial	7.5%
Wooded	1.7%
Water	1.7%
Open Space	0.5%
Agriculture	0.2%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The ½ mile area surrounding the proposed station encompasses primarily single-family and multi-family residential, manufacturing, commercial, parking, and vacant land. Several institutional uses are also located in this area. KIPP Whittier Middle School is located to the south of the proposed station. Triangle Park is located adjacent to the corridor north of the proposed station. The Camden County Salvation Army facility is located southeast of the proposed station. Camden City Government and County Government offices are located to the north. Several churches and the Camden County Health Department are found throughout the residential neighborhood west of the station. Most commercial uses are located west of the station along Broadway, which is characterized by a mix of restaurants, specialty retail, and personal services. Commercial uses are also located south of the station along Mt. Ephraim Avenue, such as automotive services and a few neighborhood restaurants. KIPP Cooper Norcross Academy is located to the west of this station as well.

Within ½ mile of the proposed Cooper Hospital Station, most parcels are zoned Medium or High Density Residential, Center City Commercial, Conservation Overlay, Medical and Support, or Office Light Industrial, as designated by the City of Camden’s zoning ordinance.



Figure 2-8: Existing Land Use - Cooper Hospital Station



Legend		Land Use	Land Use, continued
●	Station	Low Density Residential	Parking
—	Rail line	High Density Residential	Undeveloped
- - -	Municipal boundaries	Commercial	Transportation
		Industrial	
		Open Space/Recreation	
		Agriculture	
		Institutional	

Source: DVRPC, 2015; GCL Project Team, 2020.

South Camden Station, Camden

The proposed South Camden Station would be located between Ferry Avenue and Carl Miller Boulevard in the City of Camden. Most of the land within the ½ mile station area is classified as an Urban Enterprise Zone. Existing land use classifications within ½ mile of the proposed South Camden Station are shown on Figure 2-9, “Existing Land Use – South Camden Station.” The land use composition within ½ mile of the proposed station is broken down by percentage in Table 2.3-3, “Proposed South Camden Station Area (Land Use Composition).”

Table 2.3-3: Proposed South Camden Station Area (Land Use Composition)

South Camden Station Area Land Use Categories	Land Use Composition (%)
Residential: High Density	29.3%
Transportation	20.2%
Undeveloped	14.1%
Industrial	9.8%
Parking	6.9%
Open Space	6.7%
Institutional	4.4%
Commercial	4.3%
Wooded	4.2%
Residential: Low Density	0.2%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

West of the proposed station, in the Waterfront South neighborhood, land use is predominantly comprised of single-family residential and manufacturing areas associated with the Delaware River waterfront. Community resources in the neighborhood include five recreational parks, the Isabel Miller Community Center, the Camden Shipyard and Maritime Museum, South Camden Theatre Company, Camden Rescue Mission, and other non-profit community organizations. The Waterfront South neighborhood also includes the County sewage treatment facility, scrap metal recycling facilities, two EPA Superfund sites, and 26 known contaminated sites identified by NJDEP as of 2011.

To the east of the station, a wooded buffer extends to I-676. Also, to the east of the station is the Centerville neighborhood, which is predominantly multi-family residential. The Branch Village public housing complex is located in Centerville. Other uses located east of the station area include: recreational uses such as the Judge Robert Johnson Park, Staley Park, and Elijah Perry Park; and institutional land uses ~~are located~~ including the Isabel Miller Community Center, Sumner Elementary School, Sacred Heart Elementary School, and Ferry Avenue Branch Library.

The ½ mile area surrounding the proposed South Camden Station consist of several zoning districts including Residential, Commercial, Port-Related Industry, and General Industry.

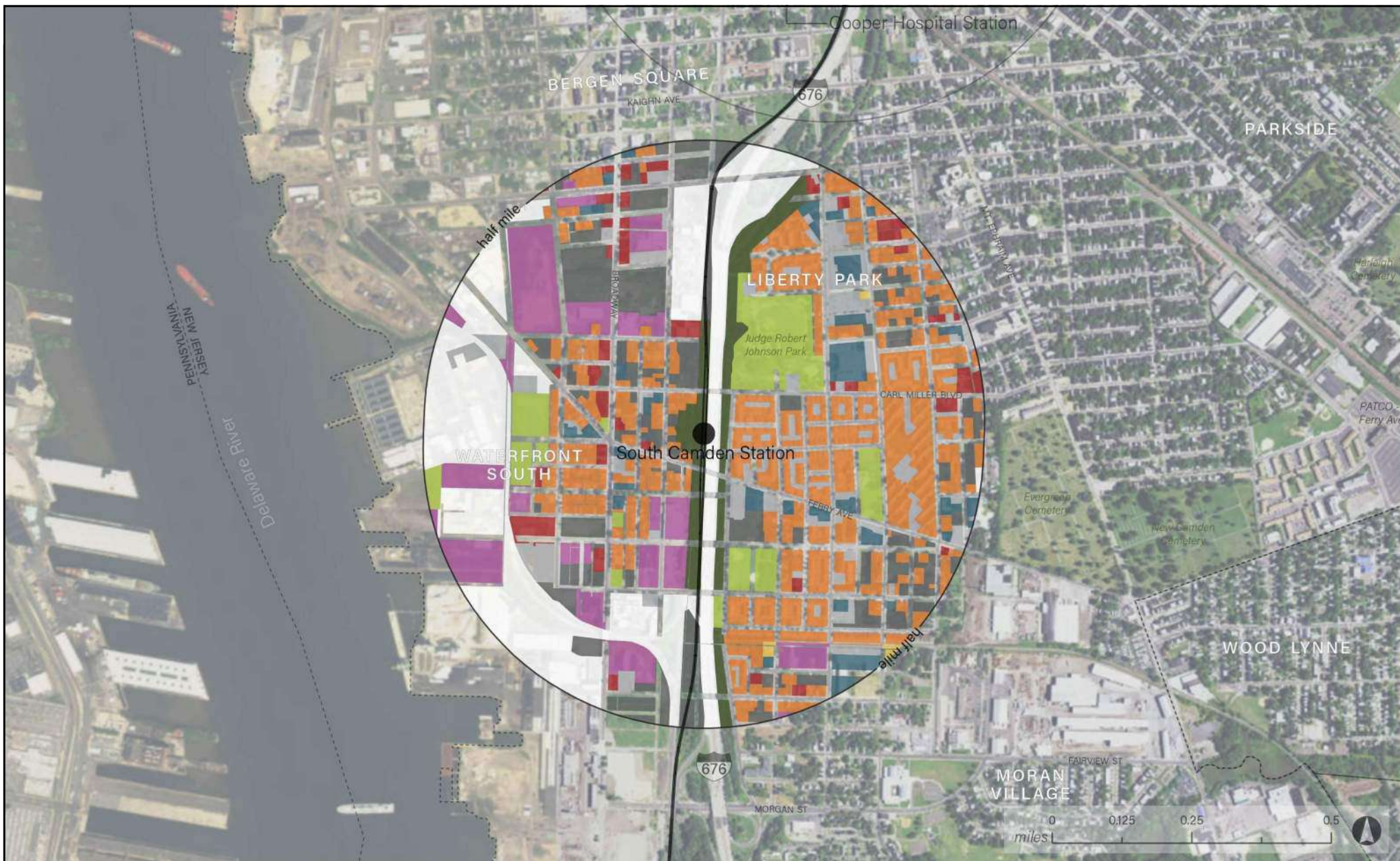


Figure 2-9: Existing Land Use - South Camden Station



Legend		Land Use		Land Use, continued	
●	Station		Low Density Residential		Parking
—	Rail line		High Density Residential		Undeveloped
- - -	Municipal boundaries		Commercial		Transportation
			Industrial		
			Open Space/Recreation		
			Agriculture		
			Institutional		

Source: DVRPC, 2015; GCL Project Team, 2020.

Gloucester City Station, Gloucester City

The proposed Gloucester City Station would be located between Cumberland and Market Streets, adjacent to South Filmore Street in Gloucester City. Existing land use classifications within ½ mile of the proposed Gloucester City Station are presented on Figure 2-10, “Existing Land Use – Gloucester City Station.” The land use composition within ½ mile of the proposed station is broken down by percentage of in Table 2.3-4, “Proposed Gloucester City Station Area (Land Use Composition).”

Table 2.3-4: Proposed Gloucester City Station Area (Land Use Composition)

Gloucester City Station Area Land Use Categories	Land Use Composition (%)
Residential: High Density	28.5%
Residential: Low Density	18.7%
Open Space	8.1%
Undeveloped	7.9%
Industrial	6.9%
Commercial	6.4%
Transportation	6.1%
Water	5.9%
Parking	4.6%
Institutional	4.1%
Wooded	2.8%
Agriculture	0.1%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Higher-density residential is the primary land use and accounts for a quarter of the land coverage for the ½ mile area surrounding the proposed station. There are four neighborhood parks or playgrounds located within ½ mile of the station area: Paul Street Playground, Washington Street Play Lot, Martin Lake, and Johnson Park are located east of the proposed station, and Middlesex Neighborhood Park, Proprietors Park, and the Gloucester City Marina are located to the west. Commercial uses are located west of the station along Broadway (CR 551), and include professional offices, restaurants, specialty retail, and automotive services. Cold Pack Storage, a major fruit distribution center, as well as several large industrial facilities, such as GAF Building Materials and John Jeffries, which are located southwest of the proposed station. At the western edge of the ½ mile station area, Blueknight Energy Partners is located on a tract of manufacturing/industrial land. There are also a number of institutional uses in the area including the Gloucester City Municipal Office and Public Library, both located north of the site, Gloucester City Municipal Court, County Government Office, Water Plant, Gloucester City Historical Society, post office, banks, churches, cemeteries, St. Mary’s Grade School, the Cool Springs Elementary School, and Gloucester Catholic High School. The Gloucester City Middle School is located just west of the proposed station.

The ½ mile area surrounding the proposed station location is zoned Residential Medium, Residential Low, Retail and Commercial Services, and Park/Greenway.



Figure 2-10: Existing Land Use - Gloucester City Station



Legend		Land Use		Land Use, continued	
●	Station		Low Density Residential		Parking
—	Rail line		High Density Residential		Undeveloped
- - -	Municipal boundaries		Commercial		Transportation
			Industrial		
			Open Space/Recreation		
			Agriculture		
			Institutional		

Source: DVRPC, 2015; GCL Project Team, 2020.

Crown Point Road Station, Westville Borough

The proposed Crown Point Road Station would be in Westville Borough, adjacent to New Jersey Route 45. Existing land use classifications within ½ mile of the proposed Crown Point Station are presented on Figure 2-11, “Existing Land Use – Crown Point Road Station.” The percentage of land use composition is identified in Table 2.3.5, “Proposed Crown Point Road Station Area (Land Use Composition).”

Table 2.3-5: Proposed Crown Point Road Station Area (Land Use Composition)

Crown Point Road Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	38.8%
Wooded	12.0%
Undeveloped	10.7%
Water	10.0%
Transportation	6.9%
Open Space	5.8%
Commercial	4.4%
Industrial	3.5%
Parking	3.0%
Institutional	2.5%
Residential: High Density	2.3%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Most of the ½ mile area surrounding the proposed station area is single-family residential, water, or wooded. The proposed station is adjacent to several multi-family residential properties. The Parkview Elementary School is located two blocks from the proposed station location. A post office, bank, and Kelsch Associates (a social services organization) are located adjacent to the proposed station location. Other institutional uses include the Westville Borough Police Department, located to the north, and to the south of the proposed station is the headquarters of Services to Overcome Drug Abuse Among Teenagers, Inc. (SODAT) of New Jersey, which is a non-profit drug/alcohol outpatient agency. The Thomas West Park, Park Avenue Baseball Field, and Westville Borough Park are located within ½ mile of the station area. Five churches are located within the proposed station area. Neighborhood recreational land uses are located throughout the station area, including the Iron Workers Union recreational area, located directly west from the proposed station, and the Westville Boat Launch, located on Big Timber Creek.

Commercial uses include various retail establishments, a convenience store, restaurants, and bars. NJDCA has designated 2.5 percent of the land within the ½ mile station area of the proposed station as being in need of redevelopment, with the largest identified area located to the west of the station. Two smaller outlying parcels located to the northeast and southwest of the station are also identified as being in need of redevelopment.

The ½ mile radius around the proposed Crown Point Road Station lies within Westville Borough. Parcels within this zone are designated Residential, Business, and Parks and Conservation.



Figure 2-11: Existing Land Use -
Crown Point Rd Station



Legend		Land Use		Land Use, continued	
●	Station	Yellow	Low Density Residential	Grey	Parking
—	Rail line	Orange	High Density Residential	Black	Undeveloped
- - -	Municipal boundaries	Red	Commercial	White	Transportation
		Purple	Industrial		
		Green	Open Space/Recreation		
		Light Green	Agriculture		
		Dark Blue	Institutional		

Source: DVRPC, 2015;
GCL Project Team, 2020.

Red Bank Avenue Station, Woodbury

The proposed Red Bank Avenue Station would be in Woodbury, on Red Bank Avenue between Green Street and Washington Avenue. Existing land use classifications within ½ mile of the proposed Red Bank Avenue Station are presented on Figure 2-12, “Existing Land Use – Red Bank Avenue Station.” The percentage of land use composition is identified in Table 2.3-6, “Proposed Red Bank Avenue Station Area (Land Use Composition).”

Table 2.3-6: Proposed Red Bank Avenue Station Area (Land Use Composition)

Red Bank Avenue Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	44.7%
Institutional	9.7%
Parking	8.9%
Open Space	8.1%
Commercial	7.2%
Water	7.0%
Wooded	6.4%
Residential: High Density	4.3%
Transportation	3.1%
Undeveloped	0.5%
Agriculture	0.1%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Nearly half of the ½ mile area surrounding the proposed station is single-family residential, with some multi-family residential uses located to the east of the proposed station. Other land use types within the station area include professional offices and commercial uses including eating establishments, automotive repair and service, specialty retail, and convenience markets. Most of these land uses are situated between New Jersey Route 45 and the proposed GCL alignment. Potential transit-supportive development areas are located to the adjacent east and west of the proposed station site. The Military and Veterans Affairs Department, Woodbury Lake Park, and Stewart Lake Park are located in close proximity of the proposed station. The station would be within close proximity to commercial, institutional, and both single- and multi-family residential land uses. Several health care facilities are located within the ½ mile area, including the Inspira Medical Center located west of the proposed station. There are a number of other institutional uses that also exist in the area. The Evergreen Avenue Elementary School, as well as Durand Academy and Community Services, a private special needs school, are located southeast of the proposed station. A post office and Woodbury Junior–Senior High School are located to the southwest and Walnut Street Elementary School is located west of the proposed station. Several churches and banks are also located within the ½ mile area. County government offices and services are located to the immediate south of Broad Street Lake, including Gloucester County Courthouse, Gloucester County Superior Court, Gloucester County Sheriff Department, and the Gloucester County Historical Museum and Library.

The ½ mile radius around the proposed Red Bank Avenue Station consist of parcels zoned Commercial, Planned Apartment, Medical Hospital, Residential, and Professional Office Overlay.



Figure 2-12: Existing Land Use - Red Bank Ave Station



Legend		Land Use		Land Use, continued	
●	Station	■	Low Density Residential	■	Parking
—	Rail line	■	High Density Residential	■	Undeveloped
- - -	Municipal boundaries	■	Commercial	■	Transportation
		■	Industrial		
		■	Open Space/Recreation		
		■	Agriculture		
		■	Institutional		

Source: DVRPC, 2015; GCL Project Team, 2020.

Woodbury Station, Woodbury

The proposed Woodbury Station would be in the City of Woodbury on Green Avenue, south of Cooper Street. It would be adjacent to St. Patrick Church and the Holy Angels Catholic Elementary School and surrounded by a mix of land uses (See Figure 2-13, “Existing Land Use – Woodbury Station”). The percentage of land use composition is identified in Table 2.3-7, “Proposed Woodbury Station Area (Land Use Composition).”

Table 2.3-7: Proposed Woodbury Station Area (Land Use Composition)

Woodbury Station Area Land Use Categories	Land Use Composition (%)
Residential: Low—Density	37.4%
Parking	11.0%
Commercial	10.4%
Institutional	9.6%
Wooded	6.8%
Water	6.0%
Transportation	5.0%
Residential: High Density	4.4%
Undeveloped	4.4%
Open Space	4.3%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Relatively dense, single-family residential neighborhoods and commercial uses along New Jersey Route 45 are the predominant uses within the ½ mile station area. These commercial uses include automotive retail and services, pharmacies, personal services, restaurants, and specialty retail.

A post office, Woodbury Junior-Senior High School, and county government offices are located northwest of the proposed station and to the immediate south of Broad Street Lake. Government services include the Gloucester County Courthouse, Gloucester County Superior Court, Gloucester County Sheriff Department, and the Gloucester County Historical Museum and Library. The Evergreen Avenue Elementary School and Durand Academy and Community Services are located northeast of the proposed station. Several churches and other institutional uses are located throughout the station area. Recreational uses include: Rotary Park, which is located south of the proposed station; Hendricksen Park, which is located to the eastern extent of the ½ mile area; Woodbury Lake Park; and Wing/Dickerson Park.

The ½ mile area around the proposed Woodbury Station area is divided into several zoning districts including Residential for single-family dwellings, Commercial, Professional Office Overlay, and Planned Apartment Districts.



Figure 2-13: Existing Land Use - Woodbury Station



Legend		Land Use		Land Use, continued	
●	Station		Low Density Residential		Parking
—	Rail line		High Density Residential		Undeveloped
- - -	Municipal boundaries		Commercial		Transportation
			Industrial		
			Open Space/Recreation		
			Agriculture		
			Institutional		

Source: DVRPC, 2015; GCL Project Team, 2020.

Woodbury Heights Station, Woodbury Heights Borough and Deptford Township

The ½ mile surrounding the proposed Woodbury Heights Station straddles two municipalities: Woodbury Heights Borough to the north and east, and Deptford Township to the south and west (see Figure 2-14, “Existing Land Use – Woodbury Heights Station”). The proposed Woodbury Heights Station would be located along West Jersey Avenue, at the intersection with Elm Avenue. The percentage of land use composition is identified in Table 2.3.8, “Proposed Woodbury Heights Station Area (Land Use Composition).”

Table 2.3-8: Proposed Woodbury Heights Station Area (Land Use Composition)

Woodbury Heights Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	55.2%
Wooded	25.2%
Open Space	4.0%
Undeveloped	4.0%
Commercial	3.3%
Institutional	3.1%
Transportation	2.5%
Parking	2.1%
Residential: High Density	0.4%
Water	0.1%
Note: Totals do not add to 100 percent due to rounding	

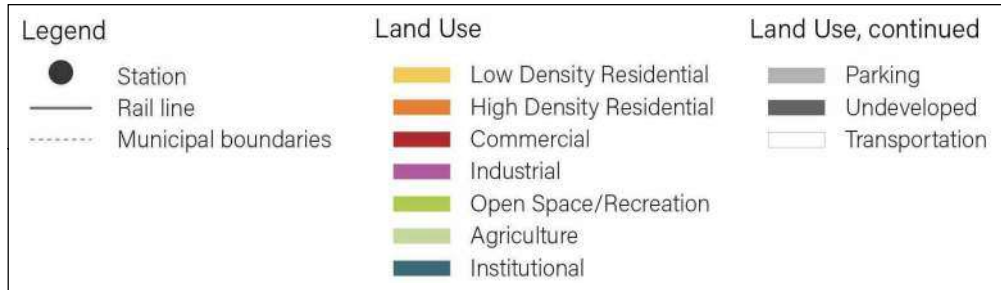
Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The station would be surrounded primarily by single-family residential neighborhoods, with wooded areas to the east. The ½ mile area surrounding the proposed station is predominantly residential with other land uses including commercial, institutional, recreational, and manufacturing. St. Margaret’s Church and Regional School is to the west of the proposed station, and Woodbury Heights Elementary School is directly adjacent to the east of the proposed station. Woodbury Heights Fire Department is situated at the northern limit of the ½ mile station area. Veterans’ Park is located directly to the northwest of the proposed station, while two additional parks (Woodbrook Park and Oak Valley Little League Complex) are located south of the proposed station.

Within ½ mile of the proposed station, within Woodbury Heights Borough, parcels are designated Residential and Age-Restricted Residential. Within Deptford Township, the parcels within ½ mile radius of the proposed station are designated Institutional, Multi-Family Residential, or High Density Residential.



Figure 2-14: Existing Land Use - Woodbury Heights Station



Source: DVRPC, 2015; GCL Project Team, 2020.

Wenonah Station, Wenonah Borough

The proposed Wenonah Station would be located along North East and North West Avenues, between Mantua Avenue and Poplar Street (see Figure 2-15, “Existing Land Use – Wenonah Station”). The percentage of land use composition is identified in Table 2.3-9, “Proposed Wenonah Station Area (Land Use Composition).”

Table 2.3-9: Proposed Wenonah Station Area (Land Use Composition)

Wenonah Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	65.3%
Wooded	25.3%
Open Space	2.4%
Institutional	2.1%
Commercial	1.7%
Water	1.6%
Undeveloped	1.1%
Parking	0.3%
Transportation	0.1%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Within ½ mile radius of the proposed station area, surrounding land uses mostly consist of single-family residential or wooded areas. The station would be adjacent to the existing Wenonah Community Center. The proposed station is surrounded by a grid street network of residential land uses, as well as the Wenonah Elementary School, Wenonah Public Library, a post office, and commercial uses that are situated along the intersection of Wenonah and West Avenues. Wenonah Park is located at the intersection of Mantua and East Avenues and two other recreational parks are located at the western (Lisle Field) and southern (Langston Field) extents of the ½ mile station area. Wenonah Lake, a public lake owned by the Borough of Wenonah, is located north of the proposed station. A small number of commercial and community supportive land uses are located at the farthest reaches of the ½ mile area.

Most of the land within ½ mile of the proposed Wenonah Station lies within Wenonah Borough; small portions are in Deptford and Mantua Townships. Within Wenonah, land is zoned for Residential, Low Density Residential, Professional Office, Institutional, Commercial, Parks and Conservation, and Senior Citizen Overlay. Portions of the station area in Deptford and Mantua Townships are zoned for Medium Density Residential Districts.



Figure 2-15: Existing Land Use -
Wenonah Station



Legend		Land Use		Land Use, continued	
●	Station		Low Density Residential		Parking
—	Rail line		High Density Residential		Undeveloped
- - -	Municipal boundaries		Commercial		Transportation
			Industrial		
			Open Space/Recreation		
			Agriculture		
			Institutional		

Source: DVRPC, 2015;
GCL Project Team, 2020.

Mantua Boulevard Station, Mantua Township

The proposed Mantua Boulevard Station would be on Mantua Boulevard (CR 676) (see Figure 2-16, “Existing Land Use – Mantua Blvd Station”). The percentage of land use composition is identified in Table 2.3-10, “Proposed Mantua Boulevard Station Area (Land Use Composition).”

Table 2.3-10: Proposed Mantua Boulevard Station Area (Land Use Composition)

Mantua Boulevard Station Area Land Use Categories	Land Use Composition (%)
Wooded	45.8%
Residential: Low Density	16.9%
Agriculture	12.2%
Open Space	11.0%
Undeveloped	5.8%
Industrial	4.3%
Commercial	1.8%
Parking	1.4%
Water	0.7%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The proposed station is surrounded by agricultural and wooded land, as well as commercial and residential areas. A single-family residential neighborhood is located to the immediate southeast of the proposed station and additional single-family residential land uses are also located to the northeast and northwest.

The areas south and west of the proposed Mantua Boulevard Station within the ½ mile station area are subject to Mantua Township’s Zoning ordinance. Most of the proposed station area is Light Industrial or Low, Medium, or High Density Residential. The areas to the north and east of the proposed station fall within Deptford Township. This area is comprised of Low Density Residential and Age-Restricted Institutional Districts.



Figure 2-16: Existing Land Use - Mantua Blvd Station



Legend	Land Use	Land Use, continued
● Station	Low Density Residential	Parking
— Rail line	High Density Residential	Undeveloped
- - - Municipal boundaries	Commercial	Transportation
	Industrial	
	Open Space/Recreation	
	Agriculture	
	Institutional	

Source: DVRPC, 2015; GCL Project Team, 2020.

Sewell Station, Mantua Township

The proposed Sewell Station would be on Center Street between East and West Atlantic Avenues (see Figure 2-17, “Existing Land Use – Sewell Station”). The percentage of land use composition is identified in Table 2.3-11, “Proposed Sewell Station Area (Land Use Composition).”

Table 2.3-11: Proposed Sewell Station Area (Land Use Composition)

Sewell Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	49.8%
Wooded	32.9%
Agriculture	6.9%
Open Space	3.7%
Undeveloped	2.9%
Commercial	1.3%
Institutional	1.3%
Parking	0.8%
Residential: High Density	0.2%
Water	0.2%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The area around the proposed station is a predominantly higher-density, single-family residential area. In addition to the residential land uses, which account for roughly one-half of the land area, wooded and agricultural land combined account for approximately 40 percent of the land area. A small percentage of the station area, generally along Center Street, contains commercial, institutional, or recreational uses. A post office, church, and the Sewell Elementary School are located east of the proposed station. Commercial uses are primarily retail and located to the immediate south and southwest of the proposed station. Two municipal parks are located northwest (Wescott Field) and southeast (Sewell Park and Mantua Community Center) of the proposed station. Tall Pines State Preserve is located approximately ½ mile north of the proposed station location.

The ½ mile area surrounding the proposed Sewell Station is designated as Neighborhood Commercial, High-Density Residential, Medium-Density Residential, Apartment/Townhouse, or Community Commercial Districts.



Figure 2-17: Existing Land Use - Sewell Station



Legend		Land Use		Land Use, continued	
●	Station		Low Density Residential		Parking
—	Rail line		High Density Residential		Undeveloped
- - - - -	Municipal boundaries		Commercial		Transportation
			Industrial		
			Open Space/Recreation		
			Agriculture		
			Institutional		

Source: DVRPC, 2015; GCL Project Team, 2020.

Mantua-Pitman Station, Mantua Township

The proposed Mantua-Pitman Station would be located on Lambs Road (CR 635) south of Woodbury-Glassboro Road (CR 553) in Mantua Township (see Figure 2-18, “Existing Land Use – Mantua – Pitman Station”). The percentage of land use composition is identified in Table 2.3-12, “Proposed Mantua-Pitman Station Area (Land Use Composition).”

Table 2.3-12: Proposed Mantua-Pitman Station Area (Land Use Composition)

Mantua-Pitman Station Area Land Use Categories	Land Use Composition (%)
Wooded	44.0%
Residential: Low Density	19.6%
Transportation	8.1%
Industrial	7.3%
Commercial	6.6%
Undeveloped	3.7%
Agriculture	3.2%
Parking	3.2%
Open Space	2.1%
Institutional	1.5%
Residential: High Density	0.4%
Water	0.3%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The proposed station would be located adjacent to East Coast Steel, a steel fabricating facility. A large (approximately 500,000 sf) vacant former manufacturing site (Former Sony digital media production plant) is located across Lambs Road from the proposed station. Other uses near the proposed station include low-density single-family residential, transportation, commercial, manufacturing, and agriculture uses. Campbell’s Auto Express, a third-party trucking/logistics company, is located approximately ½ mile south of the proposed station area. Wooded land is the prominent land use in this area, comprising nearly half of the land within the ½ mile station area.

This proposed station is in the southern portion of Mantua Township, adjacent to the boundary with Pitman Borough. The portions of the proposed station area in Mantua Township’s zoning code are zoned Industrial, Highway Commercial, Community Commercial, Low-Density Residential, Medium-Density Residential, High-Density Residential, Apartment/Townhouse Residential, and Agriculture Residential.



Figure 2-18: Existing Land Use - Mantua - Pitman Station



Legend	Land Use	Land Use, continued
● Station	Low Density Residential	Parking
— Rail line	High Density Residential	Undeveloped
- - - - Municipal boundaries	Commercial	Transportation
	Industrial	
	Open Space/Recreation	
	Agriculture	
	Institutional	

Source: DVRPC, 2015; GCL Project Team, 2020.

Pitman Station, Pitman Borough

The proposed Pitman Station would be located north of Pitman Avenue and adjacent to Broadway in Pitman Borough (see Figure 2-19, “Existing Land Use – Pitman Station”). The percentage of land use composition is identified in Table 2.3-13, “Proposed Pitman Station Area (Land Use Composition).”

Table 2.3-13: Proposed Pitman Station Area (Land Use Composition)

Land Use Categories	Land Use Composition (%)
Residential: Low Density	78.7%
Commercial	4.2%
Open Space	4.0%
Parking	3.4%
Institutional	3.2%
Wooded	2.1%
Residential: High Density	1.9%
Transportation	1.6%
Industrial	0.7%
Undeveloped	0.2%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

The proposed station is primarily surrounded by single-family residential areas. Commercial uses near the proposed station include health clubs, specialty retail, grocery, financial institutions, and a post office. Ballard Park, Pitman Borough Municipal Building, and McCowan Memorial Library are located to the immediate west of the proposed station. Shertel Park and McBurney Field, and the WCK Walls Elementary School are located west of the Broadway corridor. To the north are Pitman Middle School and a manufacturing company. Pitman High School is located north of the proposed station just beyond the ½ mile radius. Several churches are also located within the ½ mile radius.

The ½ mile area surrounding the proposed Pitman Station is subject to Pitman Borough’s Zoning ordinance, which designates most of the area as Commercial, Residential, or Historic Residence District.

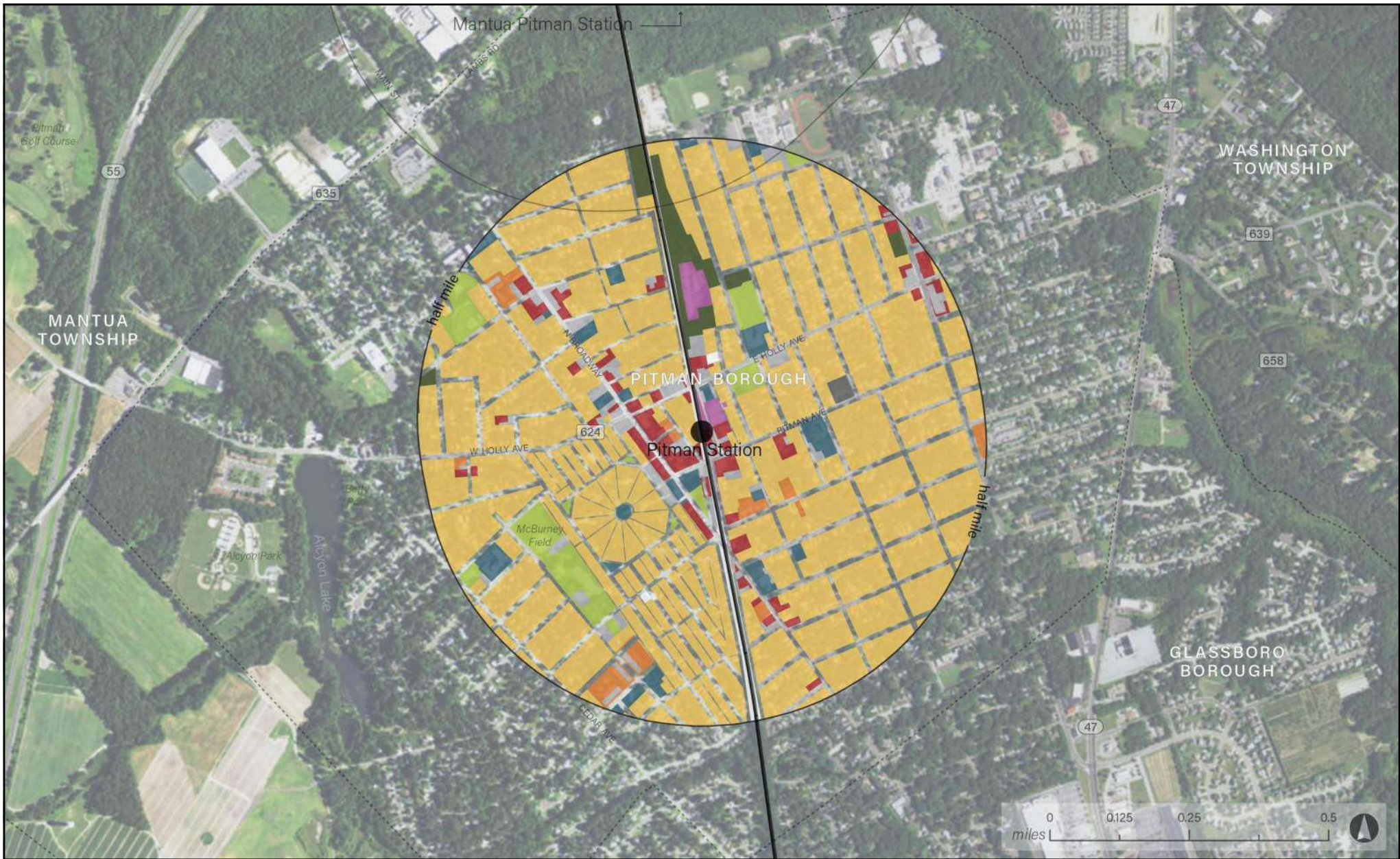
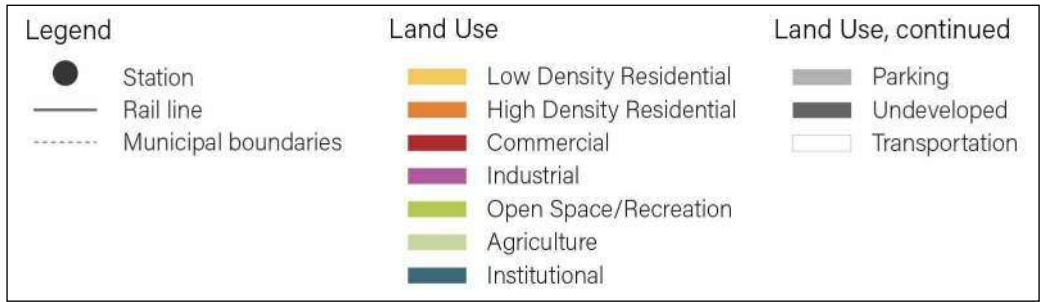


Figure 2-19: Existing Land Use - Pitman Station



Source: DVRPC, 2015; GCL Project Team, 2020.

Rowan University Station, Glassboro Borough

The proposed Rowan University Station would be located on the Rowan University campus adjacent to Mullica Hill Road (U.S. Route 322). As shown on Figure 2-20, “Existing Land Use – Rowan University Station,” the ½ mile area surrounding the proposed station contains primarily educational and single-family residential land uses. Existing student housing (Triad Apartments) and Rowan Surface lot F are to the west of the proposed station, and Rowan University Business Hall and Surface lots A and A-1 are to the east. Most campus buildings, athletic facilities, and campus parking are located to the east of the proposed station. The percentage of land use composition is identified in Table 2.3-14, “Proposed Rowan University Station Area (Land Use Composition).”

Table 2.3-14: Proposed Rowan University Station Area (Land Use Composition)

Rowan University Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	34.2%
Institutional	22.4%
Open Space	13.4%
Wooded	9.9%
Parking	9.5%
Residential: High Density	2.9%
Agriculture	2.6%
Transportation	2.3%
Undeveloped	2.0%
Commercial	0.6%
Water	0.2%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Glassboro High School is located to the north, and J. Harvey Rodgers Elementary School is located southwest of the proposed station. Bowe Park is located at the northern extent of the station area. Off-campus multi-family residential uses associated with the university campus, limited low-density commercial areas, and wooded lands are also found within the station area, primarily to the west.

The ½ mile area surrounding the proposed Rowan University Station is subject to Glassboro Borough’s Zoning ordinance, which designates most of the area within ½ mile radius as Public, Single-Family, Medium Density Residential, Garden Apartment and Townhouse, or Low Density Residential Districts. A small number of commercial properties are zoned Highway Business.



Figure 2-20: Existing Land Use - Rowan University Station



Legend	Land Use	Land Use, continued
● Station	Low Density Residential	Parking
— Rail line	High Density Residential	Undeveloped
- - - - Municipal boundaries	Commercial	Transportation
	Industrial	
	Open Space/Recreation	
	Agriculture	
	Institutional	

Source: DVRPC, 2015; GCL Project Team, 2020.

Glassboro Station, Glassboro Borough

The proposed Glassboro Station would be located between Main Street and Academy Street, south of High Street in an area surrounded primarily by single-family residential development (see Figure 2-21, “Existing Land Use – Glassboro Station”). The Glassboro Town Square, a substantial recent redevelopment project, is located north of the proposed station area. The percentage of land use composition within this area is identified in Table 2.3-15, “Proposed Glassboro Station Area (Land Use Composition).”

Table 2.3-15: Proposed Glassboro Station Area (Land Use Composition)

Glassboro Station Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	42.8%
Institutional	12.0%
Commercial	10.2%
Wooded	9.3%
Parking	8.1%
Undeveloped	7.1%
Residential: High Density	4.1%
Open Space	3.0%
Transportation	2.1%
Industrial	0.8%
Agriculture	0.3%
Water	0.2%

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Pockets of multi-family residential, commercial, manufacturing, or institutional uses are located within ½ mile of the station. Owens Park, a municipal park, is located to the adjacent west of the proposed station. Other institutional uses include the Glassboro Municipal Building and waste removal facility, Heritage Glass Museum, Glassboro Veterans of Foreign Wars (VFW), and several churches. Commercial land uses include a specialty construction industry, a bus company, service uses, and an automotive retail establishment.

The ½ mile area surrounding the proposed Glassboro Station is subject to Glassboro Borough’s zoning ordinance, which designates most of the area as Central Business (commercial), Medium Density and High Density Residential, or Industrial/Light Industrial.

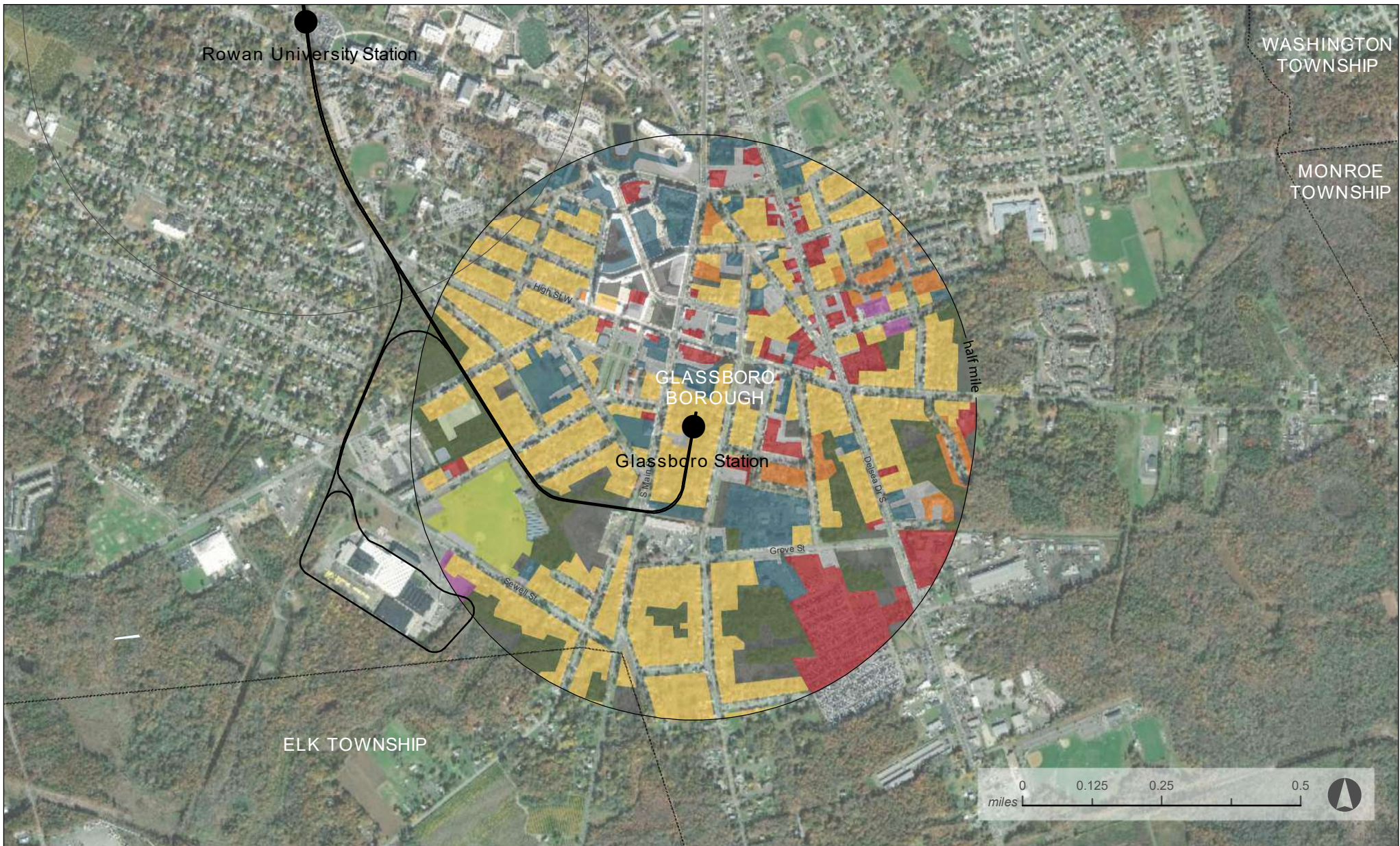


Figure 2-21: Existing Land Use - Glassboro Station



Legend

- Station
- Rail line
- Municipal boundaries

Land Use

- Low Density Residential
- High Density Residential
- Commercial
- Industrial
- Open Space/Recreation
- Agriculture
- Institutional

Land Use, continued

- Parking
- Undeveloped
- Transportation

Source: DVRPC, 2015; GCL Project Team, 2020.

2.3.2.1. Vehicle Maintenance Facilities

Vehicle Maintenance Facility (VMF), Woodbury Heights Borough

The ½ mile area surrounding the proposed VMF in Woodbury Heights Borough straddles two municipalities: Woodbury Heights Borough to the north and east and Deptford Township to the south and west. The proposed VMF would be located on a former light industrial site bounded by Chestnut Avenue to the south, Academy Avenue to the east, the proposed GCL alignment to the west, and a vacant wooded area to the north. As shown on Figure 2-22, “Existing Land Use – Woodbury Heights VMF,” the VMF would be surrounded by single-family residential neighborhoods, with a wooded area and Woodbury Heights Elementary School to the north. The ½ mile area surrounding the proposed facility is predominantly residential or wooded with other land uses including commercial, institutional, recreational, and manufacturing. The percentage of land use composition is identified in Table 2.3-16, “Proposed Vehicle Maintenance Facility – Woodbury Heights (Land Use Composition).”

Table 2.3-16: Proposed Vehicle Maintenance Facility – Woodbury Heights (Land Use Composition)

Woodbury Heights VMF Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	59.8%
Wooded	23.6%
Open Space	5.3%
Institutional	2.8%
Undeveloped	2.4%
Parking	1.6%
Water	1.4%
Commercial	1.2%
Transportation	1.1%
Industrial	0.8%
Residential: High Density	0.1%
Note: Totals do not add to 100 percent due to rounding	

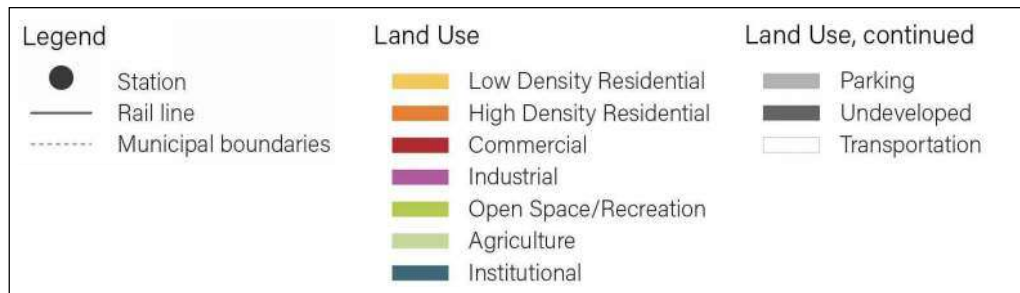
Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

St. Margaret’s Church and Regional School, Gateway Regional High School, and the Woodbury Heights Elementary School are important local institutional uses in the area. Two parks (Woodbrook Park and Oak Valley Little League Complex) are located south of the proposed facility, while Veterans’ Park is located north of the proposed facility. An electronic manufacturing design services company is located at the eastern extent of the proposed facility area.

Within the portion of the ½ mile area of the proposed VMF that is in Woodbury Heights, parcels are designated Residential and Age-Restricted Residential. Within Deptford Township, the parcels falling within the ½ mile area of the proposed facility are designated Multi-family Residential, High Density Residential, Institutional, and Light Industrial.



Figure 2-22: Existing Land Use - Woodbury Heights VMF



Source: DVRPC, 2015; GCL Project Team, 2020.

Vehicle Maintenance Facility (VMF), Glassboro Borough

The proposed Glassboro VMF would be located on Sewell Street, on the Route 55 Industrial Center site in Glassboro, south of the proposed Glassboro Station, adjacent to the municipal boundary with Elk Township. As shown on Figure 2-23, “Existing Land Use – Glassboro VMF,” this area is surrounded primarily by single-family residential neighborhoods to the north, and open space to the south, east, and west. Owens Field, a municipal park, is located across Sewell Street from the proposed facility. The ½ mile area surrounding the proposed station is predominantly wooded, residential, or agricultural, with other land uses including commercial, utility, and institutional uses. The percentage of land use composition is identified in Table 2.3-17, “Proposed Vehicle Maintenance Facility – Glassboro (Land Use Composition).”

Table 2.3-17: Proposed Vehicle Maintenance Facility – Glassboro (Land Use Composition)

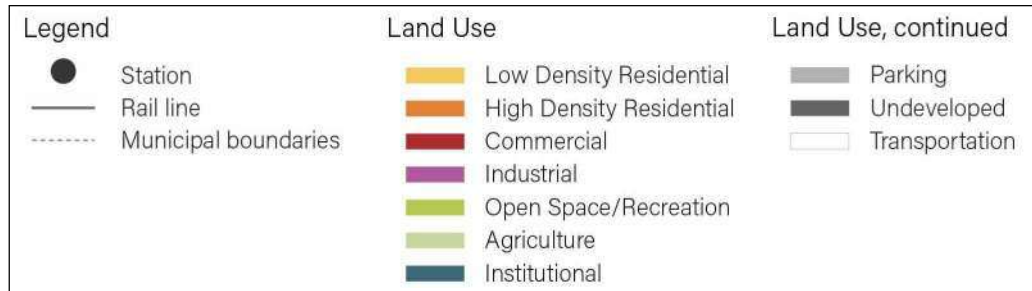
Glassboro VMF Area Land Use Categories	Land Use Composition (%)
Residential: Low Density	33.5%
Wooded	33.1%
Agriculture	6.6%
Undeveloped	6.6%
Industrial	4.3%
Transportation	3.7%
Institutional	3.3%
Residential: High Density	3.1%
Parking	2.3%
Open Space	2.1%
Commercial	1.3%
Water	0.2%
Note: Totals do not add to 100 percent due to rounding	

Source: Delaware Valley Regional Planning Commission, 2015 Digital Land Use Survey

Within Glassboro Borough, parcels within the ½ mile area of the proposed facility are predominantly designated as Medium Density Residential, Industrial, or Public. Within the Elk Township portion of the ½ mile area of the proposed VMF, parcels are designated predominantly Moderate Density Residential or Light Manufacturing, with small areas designated as Rural Environmental Residential.



Figure 2-23: Existing Land Use - Glassboro VMF



Source: DVRPC, 2015; GCL Project Team, 2020.

2.3.3. Hazardous Materials

The study area for hazardous materials assessment includes the area within a 300-foot radius from the proposed GCL alignment. A report summarizing any known or potential environmental areas of concern (AOCs) within the hazardous materials study area was prepared in 2014. In December 2017, this summary report was supplemented by an Environmental Data Resources, Inc. (EDR) DataMap Environmental Atlas and additional data from NJDEP. A description of the data collection methodology and database is contained in Attachment 4, "Hazardous Materials Technical Report."

The EDR DataMap Environmental Atlas report and NJDEP identified a total of 380 sites within the 300-foot radius area. The full list of the 380 sites is included in Appendix 4-A, "Complete Table of Known or Potential Contaminated Sites Expected to be Impacted by the Proposed Alignment," of Attachment 4, "Hazardous Materials Technical Report." The EDR report is also included as Appendix 4-B, "EDR Report," of Attachment 4, "Hazardous Materials Technical Report."

2.3.4. Transportation

2.3.4.1. Highway Network (Existing Conditions)

The highway network in the corridor study area is under the jurisdiction of various regional, State, and local agencies, including the New Jersey Department of Transportation (NJDOT), New Jersey Turnpike Authority (NJTA), Delaware River Port Authority (DRPA), and County and municipal agencies. NJDOT oversees highways in New Jersey; DRPA operates and maintains highways and bridges that cross the Delaware River in the study area; and the counties and local municipalities maintain County and local roadways. Major roadways within the study area are summarized below.

Major freeways include the following:

- **I-676** – A north-south freeway providing access to downtown City of Camden and several major highways via its connection to U.S. Route 30, and continuing access to Pennsylvania via the Benjamin Franklin Bridge.
- **I-76** – An east-west freeway providing access from Camden County to Pennsylvania via the Walt Whitman Bridge.
- **I-295** – A northeast-southwest freeway that provides access to inner-ring suburbs between Trenton, New Jersey, and Wilmington, Delaware.
- **New Jersey Turnpike** – A northeast-southwest freeway parallel to I-295 with more distantly spaced interchanges, which provides access between northern Delaware and the New York metropolitan area. The existing Turnpike ingress and egress points do not provide access to any roadways within the study area.

2.3.4.2. Traffic

Summary

The existing conditions are intended to estimate a baseline level of traffic operations, which provides a high-level screening tool to identify intersections that may require mitigation under future conditions. An

initial screening of roadways and key intersections near the GCL corridor that were likely to be affected was performed to select the intersections for a detailed traffic analysis. The screening categorized the roadways and intersections based on several characteristics, such as nearest proposed station, presence of at-grade rail crossing, jurisdiction of the roadway, signalization of the intersection, and a perceived level of congestion. A total of 42 intersections were selected for a detailed traffic analysis, which was conducted according to several different methodologies. A list of the key intersections can be found in Appendix 5-E, Synchro Results,” of Attachment 5, “Traffic Analysis Technical Report,” dated May 2020. Results are summarized according to each of the various analysis methodologies.

Traffic Volumes

Existing Conditions

Vehicular traffic was manually counted on Tuesdays, Wednesdays, and Thursdays in order to accurately capture typical weekday traffic patterns and volumes within the project area. A morning peak period (7:00 A.M. – 9:00 A.M.) and an evening peak period (4:00 P.M. – 6:00 P.M.) were selected based on preliminary assessment of available data. The turning movement counts (TMC) of the 42 key intersections were compiled from a variety of methods. Sixteen of the intersections were counted in 2013 and were recounted in October 2017; the 2017 counts included 30-minute counts during each A.M. and P.M. peak period. These intersections which were selected for recounts in 2017 due to field observations of modifications to roadways and intersections (the remaining 21 intersections counted in 2013 were not recounted as no changes or modifications to the roadways and intersections have occurred since then). These 30-minute counts were doubled to create peak-hour volumes. Five key intersections not counted in 2013 have also been analyzed due to land use changes along the corridor and were counted during the full 2-hour A.M. and P.M. peak periods.

Automatic Traffic Recorders (ATR) were used to observe traffic volumes over 48-hour periods. They were placed primarily along roadways with adjacent at-grade railroad track crossings and between key intersections. These intersections were selected based on their proximity to proposed GCL stations and whether a given at-grade crossing was estimated to have a large impact on the surrounding area. Eleven locations counted previously have been recounted, and four new locations were added.

Growth rates were calculated for each modeling district using a comparison of previous-year and 2017 volumes for TMC and ATR locations within each given district along the corridor where data is available. For TMC and ATR locations in each district where counts were conducted previously but not in 2017, these growth rates were applied to establish base-year 2017 volumes.

Future No-Action Condition

Future year No-Action scenarios were developed to estimate future background traffic levels without the GCL. This was developed to be used as a comparison to traffic with the GCL for a 2025 opening-day and a 2040 design-year scenario. A description of the regional transportation modeling used to develop the traffic growth and patterns is provided in Section 3, “Transportation Trends,” of Attachment 5, “Traffic Analysis Technical Report.” The district-level growth factors shown in Table 2.3-18, “A.M./P.M. Future-Year Growth Factors (Growth from 2017),” were applied to create a 2025 opening-day and a 2040 design-year scenario. Ridership forecasts on existing transit services were calculated for the No-Action condition and can be found in Attachment 6, “Transit Analysis Technical Report.”

Table 2.3-18: A.M./P.M. Future-Year Growth Factors (Growth from 2017)

Modeling District	2025 No-Action		2040 No-Action	
	A.M.	P.M.	A.M.	P.M.
Camden	1.004	1.015	1.019	1.029
South Camden	0.952	0.995	0.969	1.012
Gloucester City	0.884	0.953	0.903	0.969
Westville	1.020	1.011	1.044	1.034
Woodbury	1.071	1.060	1.105	1.090
Woodbury Heights	1.025	1.039	1.079	1.094
Wenonah	1.063	1.073	1.153	1.155
Pitman	1.063	1.052	1.124	1.102
Glassboro	1.085	1.089	1.188	1.178

Source: DVRPC's Glassboro-Camden Line Regional Model, 2017; STOPS Model, 2018

Intersection Analysis

Existing Conditions

The methodology for evaluating localized traffic impacts focuses on identifying significant impacts in the operation of roadway intersections, primarily using the Level-of-Service (LOS) metric. Significant impacts are defined using delays and associated LOS calculated in accordance with the Transportation Research Board's Highway Capacity Manual (HCM). This analysis provides a quantitative measure to characterize operational conditions within a traffic stream, generally in terms of such service measures-of-effectiveness (MOEs) as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six LOS are defined for each facility with letters A to F designating each category, where LOS A represents the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and drivers' perceptions of those conditions. LOS A through LOS D is considered acceptable, and LOS E or LOS F is considered unacceptable.

The key intersections in the traffic study were primarily analyzed using Synchro[®], a traffic capacity analysis software, consistent with guidance contained within the HCM to determine delay-based LOS. This analysis included 25 signalized intersections and 14 unsignalized intersections. The traffic impacts at the WRTC were examined using a VISSIM simulation model, which was selected as the appropriate methodology to capture the complexities of light rail, bus transit, private vehicle, and bicycle/pedestrian traffic at the transit hub.

At-grade rail crossings were analyzed to estimate delays resulting from the addition of light rail trains and the associated blockages using an Excel-based queuing model to determine maximum queue lengths and average delays per vehicle, converted to LOS.

Of the 25 signalized intersections analyzed using Synchro, four intersections currently operate with unacceptable LOS E or LOS F during at least one peak hour, while the other intersections operate at an acceptable LOS D or better. The overall intersection delays and LOS are listed in Table 2.3-19, "Existing Conditions Overall Intersection Results." The intersection of Broadway Boulevard and Delsea Drive (New Jersey 47) in Westville and the intersection of Woodbury Glassboro Road and Lambs Road in Mantua operate at a LOS F during the A.M. peak hour. During the A.M. and P.M. peak hours, the intersection of East Barber Avenue and Evergreen Avenue in Woodbury performs with overall LOS E and F, respectively.

14 intersections analyzed within the study area are unsignalized, all of which perform with adequate LOS A or B under existing conditions. Delay values are not provided for these locations, as the values are low. These intersection results are also listed in Table 2.3-19, "Existing Conditions Overall Intersection Results."

The three intersections within the VISSIM study area largely perform with an acceptable LOS under existing conditions. Results of the VISSIM model analysis under existing conditions for three intersections in Camden along MLK Boulevard are shown in Table 2.3-20, "Existing Conditions VISSIM Results along MLK Boulevard." Along MLK Boulevard, the southbound approach at Haddon Avenue performs with LOS E in the A.M. peak hour, however the overall intersection performs with an acceptable LOS D.

Table 2.3-19: Existing Conditions Overall Intersection Results

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
Haddon Avenue at Cooper Plaza Camden	1,259	B	14.1	1,429	C	31.6
Broadway at Ferry Avenue-Jasper Street South Camden	538	B	15.2	785	B	18.2
N. Broadway at Hudson Street Gloucester City	312	B	19.6	352	C	20.2
S. Broadway (CR 551) at Monmouth Street Gloucester City	734	B	19.7	672	B	17.7
Market Street (CR 537 S.) at S. Broadway (CR 551) Gloucester City	1,360	C	28.9	1,032	C	26.9
S. Broadway (CR 551) at Koehler Street Gloucester City	293	B	11.7	533	B	12.9
Broadway (CR 551) at Delsea Drive (New Jersey 47) Westville	1,712	F	276.4	1,738	B	13.1
Broadway Boulevard (CR 551) at E. Olive Street Westville	850	B	15.7	984	B	15.1
N. Broad Street at Edith Avenue Woodbury	895	A	3.6	1,265	A	6.0
E. Red Bank Avenue at N. Evergreen Avenue (CR 650) Woodbury	1,632	B	19.1	2,294	D	40.4
E. Red Bank Avenue at N. Broad Street (New Jersey 45) Woodbury	2,232	C	30.4	2,222	C	26.9
Cooper Street (CR 534) at S. Broad Street (New Jersey 45) Woodbury	2,082	D	38.0	2,172	D	36.5
Cooper Street (CR 534) at S. Evergreen Avenue (CR 553) Woodbury	1,598	C	32.4	2,459	D	46.7
S. Broad Street (NJ 45) at E. Barber Avenue Woodbury	1,064	C	25.9	1,956	C	32.9
E. Barber Avenue at S. Evergreen Avenue (CR 553) Woodbury	1,842	E	66.7	2,214	F	97.2
Mantua Boulevard (CR 676) at Center Street Sewell	1,496	B	12.7	1,860	B	17.8
Tylers Mill Road at Glassboro Road Mantua	2,382	C	31.8	2,564	C	24.6
Lambs Road at Main Street Mantua	726	B	14.6	1,026	B	13.6

Table 2.3-19: Existing Conditions Overall Intersection Results (Continued)

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
Woodbury Glassboro Road and Lambs Road Mantua	1,975	F	98.8	2,461	D	47.6
Broadway (CR 551) at Holly Avenue Pitman	649	B	15.1	1,013	B	17.3
Pitman Avenue (CR 639) at S. Broadway (CR 553A) Pitman	436	A	6.3	638	A	8.9
Bowe Boulevard at Carpenter Street (CR 682) Glassboro	1,406	B	16.3	1,723	B	16.7
Mullica Hill Road (U.S. 322) at Bowe Boulevard Glassboro	1,858	F	189.6	2,292	F	111.0
Delsea Drive (New Jersey 47) at High Street (U.S. 322) Glassboro	1,683	C	27.3	2,189	C	27.7
High Street E. at S. Main Street (CR 553) Glassboro	1,402	C	26.2	1,794	D	43.2
Master Street at Ferry Avenue South Camden	517	A	Unsig.	576	A	Unsig.
Broadway (CR 551) at Duncan Avenue Westville	556	A	Unsig.	596	A	Unsig.
N. Broad Street at Park Avenue Woodbury	1,313	A	Unsig.	1,622	A	Unsig.
E. Barber Avenue at Railroad Avenue Woodbury	754	A	Unsig.	890	B	Unsig.
Cooper Street (CR 534) at Railroad Avenue Woodbury	643	A	Unsig.	1,309	A	Unsig.
Elm Avenue (652) at W. Jersey Avenue Woodbury Heights	876	B	Unsig.	952	B	Unsig.
N. East Avenue at E. Mantua Avenue (CR 632) Wenonah	868	A	Unsig.	809	A	Unsig.
Atlantic Avenue at Center Street Mantua	622	A	Unsig.	1,006	A	Unsig.
Tylers Mill Road at Main Street Mantua	525	A	Unsig.	852	A	Unsig.
S Broadway (CR 551) at Laurel Avenue Pitman	453	A	Unsig.	741	A	Unsig.
Bowe Boulevard at N. Campus Drive Glassboro	1,027	A	Unsig.	1,446	A	Unsig.
Ellis Street at Sewell Street Glassboro	596	A	Unsig.	712	A	Unsig.
High Street at Academy Street Glassboro	695	A	Unsig.	604	A	Unsig.
Main Street at Union Street/Church Street Glassboro	636	B	Unsig.	736	B	Unsig.

Source: GCL Project Team Traffic Analysis, 2017.

Table 2.3-20: Existing Conditions VISSIM Results along MLK Boulevard

Intersection	Approach	A.M. Peak Hour			P.M. Peak Hour		
		Volume	Delay(s)	LOS	Volume	Delay(s)	LOS
Haddon Ave	EB	481	27.8	C	909	24.1	C
	SB	401	55.5	E	577	51.2	D
	WB	1,172	45.6	D	403	33.8	C
	NB	511	50.2	D	673	36.5	D
	Total	2,565	44.7	D	2,562	35.0	C
Cooper Hospital Driveway/S. 6 th Street	NB	158	38.8	D	153	38.1	D
	EB	324	6.2	A	845	7.8	A
	WB	1,007	17.7	B	418	18.9	B
	Total	1,489	17.4	B	1,416	14.4	B
Broadway	NB	219	18.5	B	252	20.1	C
	EB	296	14.3	B	783	16.4	B
	SB	253	21.5	C	311	23.1	C
	WB	770	25.3	C	321	20.9	C
	Total	1,538	21.6	C	1,667	19.1	B

Future No-Action Condition

Relatively low growth in population and employment is expected in the communities near the northern end of the GCL alignment. As a result, traffic conditions are not expected to degrade significantly at the intersections and roadways in this portion of the study area. However, towards the southern portion of the study area, where traffic volumes are projected to grow nearly 20 percent by 2040, LOS drops to E or F at selected intersections. Often, projects evaluating future traffic scenarios presume that improvements to the transportation network will occur regardless of the project. During the modeling process, for the No-Action scenarios, traffic signal splits were optimized, but cycle lengths were not adjusted. It is recognized that plans to improve roadway geometry or additional changes to signal timings may arise, however, no plans have been identified for these intersections.

A potential U.S. 322 by-pass is in preliminary concept planning that would traverse around downtown Glassboro. While the proposed project could potentially reduce through traffic along Mullica Hill Road, which has an at-grade crossing with the proposed GCL, the horizon year for the bypass is unknown.

The results of the No-Action scenario at the analysis intersections are presented in Table 2.3-21, "Opening Year 2025 No-Action Condition Overall Intersection Results," for 2025 and Table 2.3-22, "Future Year 2040 No-Action Condition Overall Intersection Results," for 2040. Failing intersections include the intersection of Broadway Boulevard and Delsea Drive (New Jersey 47) in Westville, which continues to operate at a LOS F during the A.M. peak hour in both 2025 and 2040 due to the northbound right-turn movement, where a queue persists throughout most of the peak hour. The intersection of E. Barber Avenue and S. Evergreen Avenue in Woodbury degrades from LOS E to LOS F in the A.M. peak hour by 2025, and delays continue to mount by 2040. Overall LOS in the A.M. peak hour at the intersection of Mullica Hill Road (U.S. 322) and Bowe Boulevard in Glassboro, which is a LOS F under existing conditions, stays at LOS F through 2025 and 2040. A reduction in delay is realized in 2025 by implementing signal timing optimization, but a substantial increase in delay is seen in 2040, due in large part to the growth proposed at Rowan University. The eastbound approach of this intersection is particularly sensitive to traffic growth.

Table 2.3-21: Opening Year 2025 No-Action Condition Overall Intersection Results

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
Haddon Avenue and Cooper Plaza Camden	1,259	B	15.1	1,444	C	23.4
Broadway and Ferry Avenue-Jasper St South Camden	538	B	15.0	785	B	18.2
N Broadway at Hudson Street Gloucester City	312	B	19.6	352	C	20.2
S. Broadway (CR 551) at Monmouth Street Gloucester City	734	B	19.7	803	B	17.7
Market Street (CR 537 S) at S. Broadway (CR551) Gloucester City	1360	C	28.9	1,032	C	26.9
S. Broadway (CR 551) at Koehler Street Gloucester City	293	B	11.7	533	B	12.9
Broadway Boulevard (CR 551) at Delsea Drive (New Jersey 47) Westville	1,747	F	257.6	1,756	B	12.1
Broadway Boulevard (CR 551) at E. Olive Street Westville	867	B	15.9	994	B	15.1
N. Broad Street at Edith Avenue Woodbury	920	A	3.6	1,277	A	6.0
E. Red Bank Avenue at N. Evergreen Avenue (CR 650) Woodbury	1,678	C	21.9	2,315	D	42.6
E. Red Bank Avenue at N. Broad Street (New Jersey 45) Woodbury	2,388	C	33.1	2,356	C	28.5
Cooper Street (CR 534) at S. Broad Street (New Jersey 45) Woodbury	2,228	D	39.7	2,302	D	38.0
Cooper Street (CR 534) at S. Evergreen Avenue (CR 553) Woodbury	1,678	B	17.5	2,482	D	49.0
S. Broad Street (NJ 45) at E. Barber Avenue Woodbury	1,094	C	31.0	1,974	C	33.0
E. Barber Avenue at S. Evergreen Avenue (CR 553) Woodbury	1,971	F	80.2	2,346	F	104.4
Mantua Boulevard (CR 676) at Center Street Sewell	1,586	B	13.9	1,953	B	19.9
Tylers Mill Road at Glassboro Road Mantua	2,525	C	34.1	2,692	C	25.2
Lambs Road at Main Street Mantua	754	B	14.8	1,046	B	13.7
Woodbury Glassboro Road and Lambs Road Mantua	2,094	C	33.8	2,584	C	31.2
Broadway Boulevard (CR 551) at Holly Avenue Pitman	673	B	15.2	1,032	B	17.4
Pitman Avenue (CR 639) at S. Broadway (CR 553A) Pitman	462	A	6.3	670	A	9.1
Bowe Boulevard at Carpenter Street (CR 682) Glassboro	1,499	B	16.4	1,853	B	15.8
Mullica Hill Road (U.S. 322) at Bowe Boulevard Glassboro	2,025	F	122.1	2,498	F	126.0
Delsea Drive (New Jersey 47) at High Street (U.S. 322) Glassboro	1794	C	27.4	2,354	C	29.9

Table 2.3-21: Opening Year 2025 No-Action Condition Overall Intersection Results (Continued)

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
High Street E. at S. Main Street (CR 553) Glassboro	1529	C	21.6	1,955	C	32.9
Master Street and Ferry Avenue South Camden	517	A	Unsig.	576	A	Unsig.
Broadway Boulevard (CR 551) at Duncan Avenue Westville	567	A	Unsig.	601	A	Unsig.
N. Broad Street at Park Avenue Woodbury	1,350	A	Unsig.	1,637	A	Unsig.
E. Barber Avenue at Railroad Avenue Woodbury	807	A	Unsig.	944	B	Unsig.
Cooper Street (CR 534) at Railroad Avenue Woodbury	660	A	Unsig.	1,322	A	Unsig.
Elm Avenue (CR 652) at W. Jersey Avenue Woodbury Heights	821	A	Unsig.	910	B	Unsig.
N. East Avenue at E. Mantua Avenue (CR 632) Wenonah	600	A	Unsig.	707	A	Unsig.
Atlantic Avenue at Center Street Mantua	647	A	Unsig.	1,025	A	Unsig.
Tylers Mill Road at Main Street Mantua	545	A	Unsig.	868	A	Unsig.
S. Broadway (CR 551) at Laurel Avenue Pitman	470	A	Unsig.	755	A	Unsig.
Bowe Boulevard at N. Campus Drive Glassboro	1,114	A	Unsig.	1,576	A	Unsig.
Ellis Street at Sewell Street Glassboro	635	A	Unsig.	765	A	Unsig.
High Street at Academy Street Glassboro	741	A	Unsig.	651	A	Unsig.
Main Street at Union Street/Church Street Glassboro	678	B	Unsig.	792	B	Unsig.

Source: GCL Project Team Traffic Analysis, 2018

Table 2.3-22: Future Year 2040 No-Action Condition Overall Intersection Results

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
Haddon Avenue and Cooper Plaza Camden	1,284	B	15.3	1,472	C	24.2
Broadway and Ferry Avenue-Jasper Street South Camden	538	B	15.0	792	B	18.3
N Broadway at Hudson Street Gloucester City	312	B	19.6	352	C	20.2
S. Broadway (CR 551) at Monmouth Street Gloucester City	734	B	19.7	803	B	17.7
Market Street (CR 537 S) at S. Broadway (CR551) Gloucester City	1,360	C	28.9	1,032	C	26.9
S. Broadway (CR 551) at Koehler Street Gloucester City	293	B	11.7	533	B	12.9
Broadway Boulevard (CR 551) at Delsea Drive (New Jersey 47) Westville	1,780	F	185.8	1,791	B	12.5
Broadway Boulevard (CR 551) at E. Olive Street Westville	884	B	16.1	1,013	B	15.3
N. Broad Street at Edith Avenue Woodbury	945	A	3.6	1,312	A	6.1
E. Red Bank Avenue at N. Evergreen Avenue (CR 650) Woodbury	1,723	C	22.1	2,380	D	40.9
E. Red Bank Avenue at N. Broad Street (New Jersey 45) Woodbury	2,456	D	35.6	2,422	C	29.9
Cooper Street (CR 534) at S. Broad Street (New Jersey 45) Woodbury	2,289	D	43.5	2,367	D	42.3
Cooper Street (CR 534) at S. Evergreen Avenue (CR 553) Woodbury	1,687	B	18.2	2,551	D	48.7
S. Broad Street (New Jersey 45) at E. Barber Avenue Woodbury	1,124	D	43.5	2,029	C	34.0
E. Barber Avenue at S. Evergreen Avenue (CR 553) Woodbury	2,026	E	58.3	2,413	E	70.0
Mantua Boulevard (CR 676) at Center Street Sewell	1,675	B	14.9	2,046	C	22.5
Tylers Mill Road at Glassboro Road Mantua	2,667	D	45.2	2,821	C	27.9
Lambs Road at Main Street Mantua	812	B	15.0	1,094	B	13.9
Woodbury Glassboro Road and Lambs Road Mantua	2,212	D	36.9	2,707	C	32.5
Broadway Boulevard (CR 551) at Holly Avenue Pitman	727	B	15.4	1,080	B	17.8
Pitman Avenue (CR 639) at S. Broadway (CR 553A) Pitman	488	A	6.9	702	A	9.2
Bowe Boulevard at Carpenter Street (CR 682) Glassboro	1,645	B	18.3	1,998	B	16.6
Mullica Hill Road (U.S. 322) at Bowe Boulevard Glassboro	2,212	F	119.1	2,705	F	105.0

Table 2.3-22: Future Year 2040 No-Action Condition Overall Intersection Results (Continued)

Intersection Municipality	A.M. Peak Hour			P.M. Peak Hour		
	Volume	LOS	Delay (sec)	Volume	LOS	Delay (sec)
Delsea Drive (New Jersey 47) at High Street (U.S. 322) Glassboro	1,969	C	29.9	2,539	C	32.2
High Street E. at S. Main Street (CR 553) Glassboro	1,669	C	25.1	2,117	D	40.1
Master Street and Ferry Avenue South Camden	517	A	Unsig.	582	A	Unsig.
Broadway Boulevard (CR 551) at Duncan Avenue Westville	578	A	Unsig.	614	A	Unsig.
N. Broad Street at Park Avenue Woodbury	1386	A	Unsig.	1,683	A	Unsig.
E. Barber Avenue at Railroad Avenue Woodbury	830	B	Unsig.	969	B	Unsig.
Cooper Street (CR 534) at Railroad Avenue Woodbury	733	A	Unsig.	1,358	A	Unsig.
Elm Avenue (CR 652) at W. Jersey Avenue Woodbury Heights	860	A	Unsig.	961	B	Unsig.
N. East Avenue at E. Mantua Avenue (CR 632) Wenonah	649	A	Unsig.	764	A	Unsig.
Atlantic Avenue at Center Street Mantua	682	A	Unsig.	1,072	A	Unsig.
Tylers Mill Road at Main Street Mantua	574	A	Unsig.	909	A	Unsig.
S. Broadway (CR 551) at Laurel Avenue Pitman	495	A	Unsig.	790	A	Unsig.
Bowe Boulevard at N. Campus Drive Glassboro	1,222	A	Unsig.	1,706	A	Unsig.
Ellis Street at Sewell Street Glassboro	697	A	Unsig.	827	A	Unsig.
High Street at Academy Street Glassboro	794	A	Unsig.	700	A	Unsig.
Main Street at Union Street/Church Street Glassboro	720	B	Unsig.	853	B	Unsig.

Source: GCL Team Traffic Analysis, 2018

For the WRTC VISSIM analysis area, LOS results are reported by approach for the three signalized intersections along MLK Boulevard, as shown in Table 2.3-23, “2025 No-Action VISSIM Results at MLK Boulevard Intersections,” and Table 2.3-24, “2040 No-Action VISSIM Results at MLK Boulevard Intersections.” No signal timing changes were assumed within the VISSIM analysis area to maintain the complex light rail signal pre-emption system.

Minimal changes in delay result when comparing existing 2017 conditions to the 2025 and 2040 No-Action results during both the A.M. and P.M. peak hours. The maximum change in delay for any approach at the three intersections is approximately three seconds, and the maximum change in overall intersection delay is approximately two seconds. LOS results change but are coincidental because the small changes in delay cross thresholds between LOS categories.

Overall intersection LOS at the Haddon Avenue intersection changes from C to D between 2017 and 2025 and stays at D through 2040. The southbound approach at this intersection operates at LOS E in 2017 and 2025 but improves to LOS D in 2040. The westbound approach at the Cooper Hospital Driveway

intersection changes from LOS B in 2017 to LOS C in 2025 but changes to back to LOS B in 2040. This improvement in LOS between 2025 and 2040 would result from an improvement in the number of vehicles that could be processed at the intersection due to Actuated Signal Timing, which permits the amount green time to vary per signal cycle. The westbound approach at the Broadway intersection changes from LOS C in 2017 to LOS B in 2025 but changes back to LOS C in 2040.

Table 2.3-23: 2025 No-Action VISSIM Results at MLK Boulevard Intersections

Intersection	Approach	A.M. Peak Hour			P.M. Peak Hour		
		Volume	Delay (sec)	LOS	Volume	Delay (sec)	LOS
Haddon Ave	EB	481	27.9	C	925	23.1	C
	SB	401	55.5	E	590	53.3	D
	WB	1,172	45.6	D	412	33.8	C
	NB	511	50.2	D	684	36.9	D
	Total	2,565	44.7	D	2,611	35.2	D
Cooper Hospital Driveway/ S. 6 th Street	NB	158	38.7	D	157	38.8	D
	EB	324	6.2	A	863	7.5	A
	WB	1007	17.7	B	422	23.3	C
	Total	1,489	17.4	B	1,442	15.5	B
Broadway	NB	219	18.5	B	259	20.2	C
	EB	296	14.3	B	800	16.5	B
	SB	253	21.5	C	316	23.3	C
	WB	770	25.2	C	323	18.4	B
	Total	1,538	21.5	C	1,698	18.7	B

Source: GCL Project Team Traffic Analysis, 2018

Table 2.3-24: 2040 No-Action VISSIM Results at MLK Boulevard Intersections

Intersection	Approach	A.M. Peak Hour			P.M. Peak Hour		
		Volume	Delay (sec)	LOS	Volume	Delay (sec)	LOS
Haddon Avenue	EB	494	24.7	C	939	26.0	C
	SB	410	53.7	D	599	52.7	D
	WB	1,195	44.6	D	416	34.0	C
	NB	525	47.3	D	693	38.1	D
	Total	2,624	42.8	D	2,647	36.5	D
Cooper Hospital Driveway/ S. 6 th Street	NB	163	39.4	D	158	38.7	D
	EB	332	6.2	A	870	7.8	A
	WB	1,027	17.7	B	431	19.0	B
	Total	1,522	17.5	B	1,459	14.5	B
Broadway	NB	225	19.0	B	260	20.4	C
	EB	303	14.5	B	808	16.0	B
	SB	259	21.9	C	319	23.1	C
	WB	784	23.3	C	328	21.2	C
	Total	1,571	20.8	C	1,715	19.0	B

Source: GCL Project Team Traffic Analysis, 2018

Roadway At-Grade Crossings

Existing Conditions

There are 39 existing at-grade roadway crossings along the proposed GCL alignment. Existing rail operations are limited to infrequent freight rail operations, which generally operate between eight and 10 trains per day, causing a blockage of approximately three to five minutes per train, particularly north of Woodbury. Due to the infrequent and random nature of the blockages, the existing delay per vehicle averaged throughout the day is low.

A screening process was applied to analyze the 39 GCL at-grade crossings to identify locations with the highest potential impact on vehicular traffic and that warrant additional analysis based on the future with the GCL. The screening process was based on the daily traffic volumes, peak-hour volumes, distance to the nearest intersection, and the presence of a traffic signal within 500 feet. Using the data available, 16 locations were identified as having high potential impacts. The at-grade crossings selected for a detailed analysis with the GCL, are indicated by bold text in Table 9, "Grade Crossing Inventory and Screening," in Attachment 5, "Traffic Analysis Technical Report."

Future No-Action Condition

Railroad freight operations are currently relatively infrequent from the perspective of grade crossing closures (less than one per hour), and this frequency is not anticipated to increase to a significantly higher level. Therefore, with no GCL light rail operations, the frequency of grade crossing closures would remain at a similar order of magnitude into the future, and the projected increase in traffic volumes in the future would account for nearly all additional projected delay.

2.3.4.3. Pedestrian and Bicycle Facilities

Summary

The GCL corridor traverses areas of varying environments, including urban, suburban, and rural. The existing pedestrian and bicycle access to station areas is often consistent with the degree of cycling and pedestrian activity typically present in the surrounding context. The existing bicycle and pedestrian connections to the proposed station areas were examined to understand where nonmotorized traffic is presently accommodated and where unmet demand may exist.

Pedestrian Facilities

Existing Conditions

The GCL Project Team evaluated the accommodations for pedestrians at each proposed station. The evaluation included a review of presence of sidewalks, crosswalks, and pedestrian signals along roadways and at intersections approaching or in the vicinity of station areas. The facility inventory also included an identification of locations where specific needs were apparent to improve accessibility and safety for pedestrians traveling to/from the station areas. The results of the pedestrian facility inventory are detailed in Table 25, "Pedestrian Facility Summary," in Attachment 5, "Traffic Analysis Technical Report."

Future No-Action Condition

Conditions in the future without the proposed GCL are expected to generally resemble existing conditions. (For info regarding multi-use/parkland trails, please refer to Section 2.4.8, “Parklands”; see also Section 3.3.4.3, “Pedestrian and Bicycle Access,” and Section 3.5.3.2, “Total Impacts to Parklands.”)

Bicycle FacilitiesExisting Conditions

Study area roadways within ¼ miles of each proposed station area were analyzed using the Bicycle Level of Traffic Stress (LTS) method. This metric is described in more detail in Attachment 5, “Traffic Analysis Technical Report.” Based on an analysis of the criteria, the LTS for a given roadway segment is classified into one of four categories, as described below.

- **LTS 1 (Most Users)** – Suitable for almost all cyclists, including children. On LTS 1 links, cyclists are either physically separated from traffic or on a shared street with low speed differential.
- **LTS 2 (Most Adults)** – Suitable for most adults but demands more attention than might be expected from children. Similar cross-sections to LTS 1 but with more likeliness for interaction with motor vehicles.
- **LTS 3 (Enthusiastic Riders)** – Welcoming level for many people currently riding bikes in the country. Cyclists either ride in an exclusive on-street lane next to moderate-speed vehicular traffic or on shared lanes on non-multi-lane streets.
- **LTS 4 (Experienced Riders)** – Suitable only for the most experienced riders or not suitable for any riders. Roadway is characterized by high vehicular travel speeds, multiple vehicular travel lanes, and/or a lack of dedicated bicycle facilities.

The results of the LTS analysis area listed are shown in Table 24, “Roadway Bicycle LTS,” in Attachment 5, “Traffic Analysis Technical Report.”

Future No-Action Condition

Conditions in the future without the proposed GCL are expected to generally resemble existing conditions. (For info regarding multi-use/parkland trails, please refer to Section 2.4.8, “Parklands”; see also Section 3.3.4.3, “Pedestrian and Bicycle Access,” and Section 3.5.3.2, “Total Impacts to Parklands.”)

2.3.4.4. Public Transit**Public Transit Network**Existing Conditions

Two agencies operate and maintain public transit systems serving southern New Jersey: NJ TRANSIT and DRPA’s PATCO. NJ TRANSIT is the nation’s third largest provider of bus, light rail transit and commuter rail. As New Jersey’s public transportation corporation, NJ TRANSIT operates within a service area covering 5,325 square miles in New Jersey, New York and Pennsylvania. NJ TRANSIT operates approximately 250 bus lines and 11 rail lines statewide, accommodating about 223 million passenger trips

each year. PATCO operates a single rapid transit line between Lindenwold, New Jersey and Philadelphia, Pennsylvania via the Benjamin Franklin Bridge through downtown Camden, New Jersey. Existing public transit operations include heavy rail, light rail, commuter rail, bus, and ferry services. Major routes within the existing transit network in the study area are summarized below. Additional information on the existing public transit network and changes to the network can be found in Attachment 6, “Transit Analysis Technical Report.”

PATCO Speedline – PATCO Speedline is a 14.2-mile heavy rail operation, serving the northern and eastern edges of the regional study area. It connects Center City Philadelphia and Lindenwold, New Jersey with 13 stations, four in Center City Philadelphia and nine in New Jersey, and provides 24-hour rail service seven days a week. PATCO connects with the NJ TRANSIT River LINE at the WRTC in the City of Camden and with NJ TRANSIT bus lines at stations in Camden and Lindenwold.

NJ TRANSIT River LINE – The River LINE light rail system provides service from Trenton to the City of Camden, where riders can transfer to PATCO or NJ TRANSIT bus services. The line is 34 miles in length and has 21 station stops. Typical service frequency is approximately 15 minutes during peak periods and 30 minutes during off peak periods.

NJ TRANSIT Atlantic City Line – The Atlantic City Line is a commuter rail line providing service between Atlantic City and Philadelphia 30th Street Station, stopping at nine stations. It makes 12 eastbound trips and 12 westbound trips daily with an average duration of approximately 95 minutes. The Atlantic City line connects with River LINE service at the Pennsauken Transit Center and with the PATCO Speedline at Lindenwold.

RiverLink Ferry Service – The RiverLink Ferry provides seasonal service across the Delaware River, linking the Camden Waterfront with Penn’s Landing in Philadelphia. The ferry is owned and operated by the Delaware River Waterfront Corporation. The RiverLink Ferry terminal in Camden is within walking distance to connections with other transit services, including the NJ TRANSIT River LINE via the Aquarium Station and both the River LINE and PATCO via the WRTC. The ferry is not included in the DVRPC modeling efforts due to seasonal activity and comparatively low ridership.

NJ TRANSIT Bus Services – Approximately 30 bus lines operate within the region, providing service between Southern New Jersey and the WRTC. Roughly half of these provide continuing service to Central Philadelphia to Race Street, Arch Street, and the Greyhound Terminal located at Filbert Street and 9th Street. Five routes (401, 402, 408, 410, 412) provide service parallel to all or part of the GCL corridor, serving the communities targeted by this project. The numerous bus services that operate through the WRTC continue to destinations in Camden, Gloucester, Salem, Cumberland, Atlantic and Cape May counties.

Bus service frequencies vary by geography and time of day, with some bus lines running as frequently as five per hour and others as infrequently as two or three total trips per day.

Local Shuttles – Within the study area, several local shuttles provide transit services in the area immediately surrounding some stations. These are a combination of reservation-based and scheduled bus services. Additional information on the shuttle services can be found in Attachment 5, “Traffic Analysis Technical Report.” Shuttles are not included in the DVRPC modeling efforts due to comparatively low ridership.

Future No-Action Condition

The following section describes the changes to the Southern New Jersey public transportation network expected to occur between the present and the introduction of the GCL service. These include both small

changes resulting from the introduction of the GCL, as well as any modifications to transit service expected to occur regardless of the GCL.

PATCO Speedline – No changes or expansion to PATCO service are planned during the study period through 2040.

NJ TRANSIT Bus Services – No significant changes or expansion to regular NJ TRANSIT bus service are planned during the study period through 2040. The GCL Project Team and NJ TRANSIT have developed several small routing changes in the GCL station areas to make transfers more convenient between the GCL and regional bus routes:

- **South Camden** – Route 450 realigned to serve the station via 6th Street; no changes to routes 401/402/410/412
- **Woodbury (Red Bank)** – Station area redevelopment plan (being developed by the municipality) will include transfer facilities between GCL light rail service and NJ TRANSIT routes 401/402/410/412, 455, and 463

No changes were proposed at other station locations, as bus routes either pass directly by the proposed stations or do not serve the nearby area at all.

NJ TRANSIT River LINE – No changes or expansion to River LINE service are planned during the study period through 2040. The proposed GCL service plan and proposed modifications to the WRTC are configured to not interrupt current River LINE operations.

NJ TRANSIT Atlantic City Line – No changes or expansion to Atlantic City Line service are planned during the study period through 2040.

Transit Ridership

Existing Conditions

The 2015 Base Year model (e.g., “existing conditions”) estimates the following ridership levels for the regional public transit services. When discussing current ridership levels on public transit routes in the region, the 2015 Base Year model is used to provide an appropriate comparison to the No-Action and Build models for the Forecast Year 2040.

- **PATCO** – approximately 36,000 daily trips
- **River LINE** – approximately 9,600 daily trips
- **NJ TRANSIT buses** – approximately 78,000 daily trips

Future No-Action Condition

Table 2.3-25, “Projected Transit Services Daily Boardings – No-Action Condition (2040),” summarizes the ridership levels projected by the No-Action condition 2040 model. Daily ridership forecasts are provided for River LINE and PATCO, as well as NJ TRANSIT bus routes including the five bus routes parallel to the GCL corridor (Corridor Buses) and the remaining routes serving WRTC (Regional Buses).

Table 2.3-25: Projected Transit Services Daily Boardings – No-Action Condition (2040)

System / Routes		Daily Boardings
		2040 No-Action
NJ Transit	Regional Buses	72,428
	Corridor Buses	10,864
	Bus Total	83,292
	River LINE	9,941
PATCO	Speedline	36,532

Source: GCL Project Team, 2020

NJ TRANSIT River LINE and PATCO ridership levels are expected to grow modestly (approximately eight percent and five percent, respectively) between the current year forecast and the 2040 forecast. This reflects the limited projected population and employment growth in Camden County and the planned maintenance of current transit service levels included in the model. NJ TRANSIT bus ridership is forecast to grow by about eight percent across all routes.

2.4. HUMAN RESOURCES

2.4.1. Summary

- Cultural Resources** – There are 11 historic districts and six historic individual properties within the area of potential effects (APE); five of the properties have been listed in the National Register and State Register, and 12 of the properties have been determined eligible for listing in the National Register and State Register. Additionally, 11 historic properties—six individual historic properties and five properties that contribute to eligible historic districts—have been recommended eligible for listing in the National Register. With regards to archaeological resources, a series of Phase IA archaeological surveys determined that a total of 19 locations will require Phase IB investigations, but further information is required for a complete evaluation of both architectural and archaeological resources, as outlined below.
- Socio-Economic Conditions** – The existing socio-economic conditions with respect to population, housing, and employment were considered at three geographic levels: the county, the GCL corridor, and the station areas. Overall trends in the proposed GCL corridor are slightly inconsistent with trends observed in each county as a whole for each metric. An assessment of these socio-economic characteristics is provided below and in Attachment 3, “Man-Made Resources Technical Report.”
- Neighborhood Character** – The GCL corridor would travel through various neighborhoods, populations, and land uses including high- to low- density residential and commercial, industrial, historic communities, suburban communities, and rural lands. The study area for the assessment of neighborhoods includes all neighborhoods, cities, boroughs, and townships located adjacent to the proposed GCL corridor; individual neighborhood characteristics are described in detail below.
- Environmental Justice** – As described below, 18 of the 26 neighborhoods in the proposed GCL corridor include communities of concern. The majority of environmental justice communities,

both low-income and minority, are concentrated in the northern portion of the environmental justice study area, in and around the city of Camden. Further, 13 of the 15 transit-dependent neighborhoods are within the city of Camden, while the remaining two are located in Gloucester City and Woodbury.

- **Community Facilities** – Community services and facilities located within the GCL corridor include 91 religious institutions, 36 schools, 12 government facilities, nine police departments or stations, seven fire departments or stations, six libraries, two medical centers, and one YMCA facility. The highest concentration of community facilities is clustered in and around Camden City, particularly the more densely developed areas. Religious institutions, schools, government facilities, libraries, and police and fire departments were all found throughout the neighborhoods and community services study area.
- **Safety and Security** – Public safety within the GCL corridor is provided by the police departments, fire departments, and emergency response units of the municipalities along the corridor. NJ TRANSIT and DRPA/PATCO provide law enforcement on transit vehicles for current transit services, including those that utilize the existing WRTC, as well as at other transit stations and at park-and-ride lots. Additional safety and security measures include station and vehicle surveillance, on-board video cameras, roving fare inspection, blue light emergency phones located throughout platforms and facilities, and passenger assistance non-emergency phones located on platforms.
- **Parklands** – A total of 93 existing parkland resources were identified within the parklands study area, along with five multi-use trails. Of the 93 parkland resources, a total of 57 are in municipalities that have accepted Green Acres funding and are therefore encumbered by Green Acres' restrictions and compensation requirements. Additional information on existing parklands and multi-use trails, as well as legal and regulatory requirements, are provided below and in Attachment 9, "Parklands Technical Report."
- **Aesthetic Features** – Urbanized areas characterize Camden County and much of northern Gloucester County, while the southern extent of Gloucester County is characterized by large expanses of natural areas, such as wetlands, wooded areas, and waterbodies, as well as farmland. However, these general land use and development patterns are not as readily apparent within the immediate vicinity of the proposed project where residential communities and light industry have historically developed alongside passenger service that had previously been provided in this rail corridor. The project area is generally void of scenic vistas; it is a distinct part of the landscape, but it is visible primarily from adjacent properties, beyond which views are generally interrupted by intervening buildings, highway infrastructure, and trees.
- **Air Quality** – The proposed project is within the Southwest Zone, one of five distinct climate regions in New Jersey, which has the highest average daily temperatures in the State and, without sandy soils, tends to have relatively high nighttime minimum temperatures. This region is characterized by comparatively little precipitation, its prevailing southwest winds, and a notably long growing season. The air quality data collected at monitors near and within the project's study area for the years 2014-2016 demonstrate that, with the exception of O₃, all pollutants monitored are below the applicable National Ambient Air Quality Standards (NAAQS).
- **Noise and Vibration** – Twenty-seven representative measurement sites were identified within the proposed GCL study area corridor and were chosen as receptors for the noise impact assessment. Seventeen of these 27 sites are in communities where there would be a likelihood of increased

noise exposure from daily project-related service operations, which could be related to their proximity to the proposed track and at-grade crossings.

2.4.2. Cultural Resources

This section describes the historic architectural and archaeological resources within the APE of the proposed GCL. Applicable State of New Jersey legislation governing the protection of historic resources includes Chapter 268 of the New Jersey State Register Law of 1970 and EO215. A summary of the studies completed and an outline of the studies and tasks that need to be performed in order to complete the EO215 process are provided herein. Further information and relevant agency correspondence, reports, and submittals can be found in Attachment 7, “Cultural Resources Technical Report.”

Background research for an original reconnaissance survey and three subsequent addendums indicates that there are 11 historic districts and six historic individual properties within the APE; five of the properties have been listed in the National Register and State Register (three historic districts; two historic individual properties) and 12 of the properties (eight historic districts; four historic individual properties) have been determined eligible for listing in the National Register and State Register. Additionally, a total of 17 intensive-level forms were submitted to the New Jersey Historic Preservation Office (NJ HPO) for review on March 11, 2020; 11 historic properties—six individual historic properties and five properties that contribute to eligible historic districts—have been recommended eligible for listing in the National Register, while the remaining six have been recommended not eligible.

With regards to archaeological resources, a series of Phase IA archaeological surveys from 2013 through 2018 determined that a total of 19 locations will require Phase IB investigations. The 19 locations are considered moderately to highly sensitive for the presence of precontact and historical archaeological resources.

2.4.2.1. Architectural Resources

Historic Districts

Background research for the original reconnaissance survey and the three subsequent addendums noted that there are 11 historic districts within the APE; three of the districts have been listed in the National Register and State Register, and eight of the districts have been determined eligible for listing in the National Register and State Register. The 11 historic districts are as follows:

- Noreg Village Historic District (Brooklawn Borough, Camden County; Eligible)
- Cooper Plaza Historic District (Camden City, Camden County; Eligible)
- Cooper Plaza Historic District Extension (Camden City, Camden County; Eligible)
- South Camden Historic District (Camden City, Camden County; Listed)
- NY Shipbuilding Corporation Historic District (Camden City, Camden County; Eligible)
- Millville & Glassboro Railroad Historic District (Glassboro Borough, Gloucester County to Millville City, Cumberland County; Eligible)
- New Jersey State Teachers College at Glassboro Historic District (Glassboro Borough, Gloucester County; Eligible)

- Wenonah Historic District (Wenonah Borough, Gloucester County; Eligible)
- Newton Historic District (Woodbury City, Gloucester County; Listed)
- Woodbury Historic District (Woodbury City, Gloucester County; Eligible)
- Green Era Historic District (Woodbury City, Gloucester County; Listed)

Five historic properties have been determined to contribute to an eligible historic district and have been recommended eligible for listing in the National Register. Four of these properties are located within the National Register-eligible Woodbury Historic District, and one property is located within the State Register-listed and National Register-eligible Green Era Historic District; each property is described briefly herein.

- **85 Aberdeen Place, Woodbury** – The property consists of a circa-1913 two-and-one-half-story, wood frame vernacular dwelling and a circa-1950 one-story, wood frame garage on a 0.09-acre lot located at the southwest corner of Aberdeen Place and Railroad Avenue in the city of Woodbury, Gloucester County, New Jersey. The property is located within the National Register-eligible and locally designated Woodbury Historic District.
- **86 Aberdeen Place, Woodbury** – The property consists of a circa-1925, two-story, wood frame vernacular dwelling and a circa-1925, one-story, wood frame garage on a 0.12-acre lot located at the northwest corner of Aberdeen Place and Railroad Avenue in the city of Woodbury, Gloucester County, New Jersey. The property is located within the National Register-eligible and locally designated Woodbury Historic District.
- **77 East Centre Street, Woodbury** – The property consists of a circa-1925 two-story, wood frame dwelling; a circa-1950, one-story, concrete block garage; and a modern pre-fabricated shed on a 0.24-acre lot located at the southwest corner of E. Centre Street and Railroad Avenue in the city of Woodbury, Gloucester County, New Jersey. The property is located within the National Register-eligible Woodbury Historic District.
- **78 East Centre Street, Woodbury** – The property consists of a circa-1920 two-story, wood frame vernacular dwelling and a circa-1925 one-story, wood frame garage on a 0.23-acre lot located at the northwest corner of E. Centre Street and Railroad Avenue in the city of Woodbury, Gloucester County, New Jersey. The property is located within the National Register-eligible Woodbury Historic District.
- **7 N. Evergreen, Woodbury** – The property consists of a circa-1910 two-story, wood frame dwelling and a circa-1920 one-story, wood frame garage on a 0.3-acre lot located at the northwest corner of N. Evergreen Avenue and Cooper Street in the city of Woodbury, Gloucester County, New Jersey. The property is located within the State Register-listed and National Register-eligible Green Era Historic District.

Individual Properties

Background research for the original reconnaissance survey and the three subsequent addendums noted that there are six historic individual properties within the APE; two of the properties have been listed in the National Register and State Register, and four of the properties have been determined eligible for listing in the National Register and State Register. The six historic properties are as follows:

- Brooklawn Traffic Circle (Brooklawn Borough, Camden County; Eligible)

- South Jersey Gas, Electric & Traction Company Building (Camden City, Camden County; Listed)
- Bartholomew Roman Catholic Church (Camden City, Camden County; Eligible)
- Glassboro Train Station (Glassboro Borough, Gloucester County; Eligible)
- Jesse Chew House (Mantua Township, Gloucester County; Listed)
- Wenonah Train Station (Wenonah Borough, Gloucester County; Eligible)

Six individual historic properties have been recommended eligible for listing in the National Register, each of which are described briefly herein.

- ***John G. Whittier School, 740 Chestnut Street, Camden*** – The property consists of a 1910-11 three-story brick school building with 1922 and 2017 additions on a 1.57-acre lot occupying the block bounded by Chestnut, S. 8th, Sycamore, and Maurice streets in Camden City, Camden County, New Jersey.
- ***Owens Illinois Glass Company, 70 Sewell Street, Glassboro*** – The property is comprised of six tax parcels totaling approximately 34.1 acres and is situated on the southwest side of Sewell Street in Glassboro, Gloucester County. The extant 1918 industrial plant housed a glass bottle factory from 1918 to 1929, and later functioned as a metal and plastic bottle closure (bottle cap) factory from 1937 to 1995. The plant consists of the original 1918 core (which included a furnace room, manufacturing plant, storehouse, wooden box shop, and machine shop), as well as several mid- to late-twentieth-century additions. Five small ancillary buildings/structures are also present on the property: a circa-1953 fire pump house; a circa-1953 water tank; a circa-1953 railroad siding; a circa-1960 utility meter building; and a circa-1980 garage. The property currently houses the Route 55 Industrial Center.
- ***J.R. Quigley Company Office and Store, 811 Market Street, Gloucester*** – The property consists of a 1929 two-story, brick, detached commercial building (currently in use as a church) on a 0.34-acre lot at the northwest corner of Market Street and Washington Avenue in Gloucester City, Camden County, New Jersey. The property is currently recommended individually eligible as a rare, intact, local example of an Art Deco-style commercial building.
- ***Sewell Train Station, 782 Atlantic Avenue, Sewell (Mantua Township)*** – The property consists of a circa-1888 two-story, wood frame, Stick-style railroad station on a 0.33-acre lot located on the northwest corner of Atlantic Avenue and Center Street in the unincorporated community of Sewell, Mantua Township, Gloucester County, New Jersey. It is also recommended eligible as a contributing feature to the proposed West Jersey Railroad Main Line Historic District – Camden to Glassboro.
- ***856 Main Street, Sewell (Mantua Township)*** – The property consists of a circa-1920, two-story, stone-clad, wood frame, Colonial Revival-style dwelling; a circa-1920, one-story, cinderblock animal shelter (possibly a former dog kennel); and a modern, one-story, wood frame playhouse on a 3.2-acre lot located on the southwest side of Main Street at the intersection with Tylers Mill Road in Mantua Township, Gloucester County, New Jersey.
- ***400 North Woodbury Road, Pitman*** – The property consists of a circa-1961, one-story industrial complex comprised of five connected blocks of buildings; two outbuildings; two car parking lots; and a tractor trailing loading bay with parking on a 76.61 acre lot located at the southwest corner of N Woodbury Road and Lambs Road in Pitman Borough, Gloucester County, New Jersey. The

property is recommended eligible for its role in the industrial history development of Pitman and Gloucester County.

2.4.2.2. Archaeological Resources

In accordance with NJ HPO, a total of 19 locations will require Phase IB investigations. The 19 locations are considered moderately to highly sensitive for the presence of precontact and historical archaeological resources. Table 2.4-1, "Phase IB Recommendations by Test Area," provides a summary of these areas and recommendations for Phase IB investigations.

Table 2.4-1: Phase IB Recommendations by Test Area

TA	Location	Size (acres)	Phase IB Recommendations	Ownership
1	Camden	0.40	2 backhoe trenches and up to 10 shovel test pits (STPs) GPR	Corporate
2	Camden	6.43	Monitoring, 40 backhoe trenches, and up to 50 STPs	Public
3	Camden	1.6	4 backhoe trenches and up to 10 STPs	Corporate
4	Camden	0.4	10 STPs	Public
5	Westville Borough	1.6	30 STPs	Corporate
6	Woodbury Heights	6.71	115 STPs	Corporate
7	Wenonah Borough	1.7	30 STPs	Railroad ROW
8	Mantua Township	5.5	95 STPs	Private
9	Mantua Township	0.43	10 STPs	Local
10	Mantua Township	13.0	221 STPs	Private
11	Glassboro Borough	0.29	8 STPs	Public
12	Glassboro Borough	2.3	40 STP	Corporate
13	Glassboro Borough	1.8	34 STPs	Private
14	Glassboro Borough	4.0	68 STPs	Private
15	Woodbury	0.1	4 STPs	Railroad ROW
16	Woodbury	TBD	10-20 STPs	Public and Private
17	Mantua Township	TBD	10-20 STPs	Private
18	Camden	3.0	4-6 Backhoe Trenches and GPR	Unknown
19	Woodbury	1.0	GPR	Private

2.4.3. **Socio-Economic Conditions**

The socio-economic conditions assessment focuses on population, housing, and employment. The existing socio-economic characteristics were considered at three geographic levels including the county, the GCL corridor, and the station areas. The county level analysis covers the counties of Camden and Gloucester. The corridor analysis includes a review of socio-economic conditions for all census tracts located within or adjacent to the proposed GCL alignment (socioeconomics study area). The station area analysis includes all area of Traffic Analysis Zones (TAZ) within a ½ mile of each proposed individual station and two proposed sites for VMFs. These station and facility areas include all areas within a ½ mile radius of each of the transit stations, and two potential sites for two VMFs. Beyond population, housing, and employment, the area surrounding the proposed GCL contains many cultural and social resources, such

as parks and recreational facilities and historical, archeological, and architectural features. These social and cultural resources are the backdrop for population, housing, and employment trends and impacts.

2.4.3.1. Population, Housing, and Employment

Counties

The proposed alignment of the GCL traverses Gloucester and Camden counties which are within the 11 county Philadelphia-Camden-Wilmington, Pennsylvania-New Jersey-Delaware-Maryland Metropolitan Statistical Area (MSA). From 2000 to 2010, this MSA experienced a 4.9 percent growth in population. In 2010, the MSA was ranked the fifth largest in the United States with a population of 5,965,343.

Camden and Gloucester Counties both experienced growth in income and housing units, but where Gloucester also experienced growth in population and households, Camden experienced a decline. Both counties saw jobs among residents increase between 2010 and 2018, with most employed in the Education, Health, and Social Services sector (approximately 25 percent). Other dominant industries employing Camden and Gloucester County residents include Retail, Manufacturing, Professional Services, and Arts, Entertainment, Recreation, Accommodation, and Food Services.

Between 2010 and 2017, County Business Pattern data showed a growth in the number of employees located in both Gloucester County and Camden County. In both Camden and Gloucester County, the employment sectors with the most employees were Retail Trade and Health Care and Social Assistance. These employment sectors grew 2.2 and 21.9 percent, respectively, in Gloucester County, and grew 6.2 percent and 16.8 percent, respectively, in Camden County. In both counties the Retail sector and the Healthcare sector had the largest and second-largest number and percentage of employment establishments.

More than three-quarters of workers in both counties drove alone to work (75.9 percent in Camden County, 88.6 percent in Gloucester County) followed by carpooling (9.9 percent in Camden County, 8.2 percent in Gloucester County). In Camden County, the number of workers who drove to work decreased (7.6 percent change), whereas in Gloucester County more workers commuted by driving (2.6 percent change). Further, significantly more workers in Camden used public transportation (7.9 percent) than Gloucester County (2.6 percent). However, the number of workers taking public transportation to work in Camden County declined between 2000 and 2010 (6.8 percent change) and increased in Gloucester County (13.3 percent change). In both Camden and Gloucester counties, approximately two percent of workers walked to work, which declined between 2000 and 2010 (7.6 percent change in Camden County and 10.3 percent change in Gloucester County). In both counties, the number of employees working at home constituted a small percentage (2.3 percent in Camden County and 2.6 percent in Gloucester County) but increased significantly between 2000 and 2010 (26.6 percent change in Camden and 37.8 percent change in Gloucester). Additional information is provided in Attachment 3, "Man-Made Resources Technical Report."

GCL Corridor

Overall trends in the proposed GCL corridor are slightly inconsistent with trends observed in each county as a whole for each metric. Between 2010 and 2018, total population increased in Gloucester County and decreased in Camden County; it declined by 1.7 percent in the socioeconomics study area. The number of houses and households both declined in the socioeconomics study area and the percentage of vacant houses increased slightly between 2010 and 2018. Between 2000 and 2010, there was a 0.1 percent

decrease in the total number of workers in the socioeconomics study area, balancing losses in the Manufacturing, Construction, and Public Administration sectors and gains in the Arts, Entertainment, Recreation, Accommodation, and Food Services sector.

In 2010, census tracts in the socioeconomics study area (all census tracts that intersect ½ mile radius of the limit of disturbance [LOD]) included 132,401 people and represented 16.6 percent of the Camden and Gloucester County populations. The median age was 36.1. Between 2010 and 2018, total population in the socioeconomics study area declined by 1.7 percent.

In 2000, a total of 53,771 housing units were located in the socioeconomics study area. By 2018, the total number of housing units for census tracts within the socioeconomics study area declined slightly, by 0.07 percent. In 2010, 9.8 percent of the housing units within the corridor were vacant. This increased to 11.75 percent of housing units in 2018. U.S. Census data indicate a 2.5 percent decrease in total households between 2010 and 2018 within the socioeconomics study area. In 2018, the census tracts containing the highest number of households were located within Fairview in Camden County, and Mantua Township in Gloucester County.

Between 2010 and 2018, there was a 0.1 percent decrease in the total number of workers residing within the socioeconomics study area. The socioeconomics study area lost 60 workers, which is a result of various fluctuations in workers across industries. The socioeconomics study area experienced significant losses in the Manufacturing sector, the Construction sector, and the Public Administration sector at 13.1 percent (727 workers), 13.2 percent (461 workers), and 12.9 percent (314 workers) decreases, respectively. However, the socioeconomics study area simultaneously experienced gains in various industries, most notably a 38.3 percent (1,605 workers) gain in the Arts, Entertainment, Recreation, Accommodation, and Food Services sector. In both 2010 and 2018, the Education, Health, and Social Services sector employed the most residents, employing over one quarter of the workforce over this time period. Retail Trade was the second most dominant industry of employed workers in both 2010 and 2018, employing 12.8 and 13.5 percent of the workforce, respectively.

Attachment 3, “Man-Made Resources Technical Report,” includes additional information and detailed breakdown.

Transit Stations and Vehicle Maintenance Facility Areas

Data from the DVRPC regional travel model indicates a current estimated population of 128,384, comprised of 45,951 households, and 70,825 employed residents within the ½ mile area surrounding the aggregate of proposed stations and VMF sites. Table 2.4-2, “Population, Housing, and Employment within ½ mile of Proposed Stations and Vehicle Maintenance Facilities, 2015,” provides existing population, household, and employment estimates within the ½ mile radius of each proposed station and VMF site. Some of the proposed station and VMF areas overlap the same TAZ which accounts for the discrepancy between individual station and VMF area data identified in the table and the aggregate totals for the station and VMF area findings mentioned above.

Table 2.4-2: Population, Housing, and Employment within ½ mile of Proposed Stations and Vehicle Maintenance Facilities, 2015

Proposed Station & Vehicle Maintenance Facility (VMF) Area (1/2-mile radius)	Population	Households	Employment
WTRC (existing station)	19,483	6,224	27,066
Cooper Hospital	17,099	5,113	21,792
South Camden	14,570	5,203	8,238
Gloucester City	15,775	5,558	5,150
Crown Point Road	11,383	4,436	3,876
Red Bank Avenue	17,355	6,907	10,903
Woodbury	13,732	5,757	10,414
Woodbury Heights	8,233	3,064	2,515
VMF #1	15,058	5,422	3,709
Wenonah	9,521	3,347	2,151
Mantua Boulevard	5,439	1,939	1,222
Sewell	5,022	1,740	1,949
Mantua-Pitman	12,214	4,663	4,663
Pitman	8,898	3,389	2,481
Rowan University	11,416	3,303	5,123
Glassboro	11,015	3,160	5,186
VMF Site #2	9,342	2,479	4,281

Source: DVRPC (VISSIM Model) Traffic Analysis Zone (TAZ) projections for proposed station areas, 2017

Several major employers of Camden and Gloucester Counties are located within the ½ mile areas surrounding the proposed stations:

- **Rutgers University – Camden** – Rutgers University is a national research university and the largest institute of higher education in New Jersey, with three regional campuses located in Camden, Newark, and New Brunswick. Approximately 1,355 employees are employed at the Rutgers University – Camden campus.
- **American Water – Camden** – American Water, a water and wastewater services company, has recently relocated its corporate headquarters from Voorhees, New Jersey to a parcel on the Camden waterfront. The new headquarters now employs over 600 people.
- **L-3 Communications – Camden** – L-3 Communications is a prime defense contractor in intelligence, surveillance, and reconnaissance and other government services. Approximately 1,075 employees are employed at the Camden Waterfront facility.
- **Cooper Hospital – Camden** – The main campus of Cooper Hospital is located in Camden and serves as the clinical campus of the Cooper Medical School of Rowan University. The hospital employs more than 630 physicians. The hospital is adjacent to Cooper Plaza and the Lanning Square neighborhood. Recent expansion of the hospital includes the construction of a medical tower and new medical school.
- **Subaru – Camden** – The automaker moved their U.S. corporate headquarters from Cherry Hill, New Jersey to a 13 acre parcel in Camden adjacent to Campbell Soup Company. The campus, called Knight’s Crossings, opened in 2018. Subaru employs over 500 workers at this location.
- **Campbell Soup Company – Camden** – The world headquarters and principal executive offices of the Campbell Soup Company, located in Camden, employs 1,582 administrative and sales employees.

- **Holtec – Camden** – The energy company opened a technology campus which includes a corporate office and manufacturing plant on a 50 acre parcel on the South Camden waterfront in early 2018. Presently Holtec is hosting approximately 400 employees.
- **Delaware Valley Wholesale Florist – Sewell** – The Delaware Valley Wholesale Florist corporate headquarters employs 500 employees and is the eighth largest employer in Gloucester County.
- **Rowan University – Glassboro** – Rowan University is the third largest employer in Gloucester County. The university employs approximately 1,483 employees and enrolls approximately 14,000 students.

2.4.4. Neighborhood Character

The GCL corridor generally spans south from the city of Camden through the northwest section of Camden County and into the northern section of Gloucester County, ending just south of Glassboro. The proposed GCL corridor would travel through various neighborhoods, populations, and land uses including high to low density residential and commercial, industrial, historic communities, suburban communities, and rural lands. The neighborhoods and community services study area for the assessment of neighborhoods includes all neighborhoods, cities, boroughs, and townships located adjacent (within ½ mile) to the proposed GCL corridor.

Table 2.4-3, “Summary of GCL Corridor Neighborhoods,” presents demographics on each neighborhood along the proposed GCL corridor. Due to the fact that several neighborhoods and boroughs have unofficial boundaries, the census tract in which they are located are used to calculate median income and average home value. Population is calculated using 2014-2018 American Community Survey Five-Year Estimates at the neighborhood and block level. For those neighborhoods with more than one census tract associated with it, the average of all the incomes is calculated.

Table 2.4-3: Summary of GCL Corridor Neighborhoods

Census Tract	Neighborhood	Population	Median Income	Average Home Value
6007	Cooper Point	1,497	\$27,708	\$80,700
6008	Pyne Point	5,270	\$19,520	\$82,500
6103	Cooper Grant/Central Water Front	2,151	\$32,000	\$123,100
6104	Central Business District/Lanning Square	4,939	\$29,063	\$91,600
6002	Gateway	1,933	\$25,705	\$62,700
6004	Bergen Square	2,904	\$19,621	\$71,400
6014	Parkside	4,623	\$34,549	\$86,300
6016	Liberty Park	2,649	\$23,638	\$68,200
6015	Whitman Park	4,932	\$19,011	\$67,700
6018	Waterfront South	1,206	\$29,229	\$55,600
6017	Centerville	3,146	\$12,443	\$73,400
6019	Morgan Village	2,727	\$23,995	\$77,300
6020	Fairview	6,478	\$31,427	\$69,500
6110 6051 6052	Gloucester City	11,246	\$59,040	\$130,367
6053	Brooklawn	2,023	\$63,897	\$134,600

Table 2.4-3: Summary of GCL Corridor Neighborhoods (Continued)

Census Tract	Neighborhood	Population	Median Income	Average Home Value
6070	Western Bellmawr	4,480	\$42,384	\$152,700
5001	Westville	4,185	\$53,986	\$148,700
5002.01	Verga	2,427	\$76,964	\$172,300
5010.01	Woodbury	9,929	\$60,722	\$163,733
5010.02				
5010.03				
5009	Woodbury Heights	2,993	\$82,188	\$200,700
5011.07	Oak Valley	4,394	\$78,553	\$168,200
5011.06	Jericho	3,882	\$67,092	\$203,600
5008	Wenonah	2,225	\$122,159	\$273,700
5007.02	Sewell	5,907	\$95,724	\$236,900
5013.01	Pitman	8,830	\$72,667	\$180,700
5013.02				
5013.03				
5014.02	Glassboro	15,106	\$55,817	\$186,650
5014.03				
5014.04				
5014.06				

Source: 2014-2018 American Community Survey

Individual neighborhood characteristics are described below:

- Cooper Point** – The Cooper Point neighborhood is located in the northwestern part of the City of Camden and encompasses a mix of uses including single- and multi-family residential, light industrial, and institutional (a school, a church, and a park) uses. The neighborhood includes sidewalks throughout and is within walking distance to many downtown amenities within the City of Camden.
- Pyne Point** – The Pyne Point neighborhood is located in the northwestern part of the City of Camden and encompasses a mix of land uses including both single- and multi-family residential, neighborhood retail, light industrial, and institutional (four parks, four schools, and several religious institutions) uses. Pyne Point is within walking distance to many of the City of Camden’s downtown amenities.
- Cooper Grant** – Cooper Grant, a historically industrial neighborhood, is located in the northwestern part of the City of Camden and encompasses a mix of land uses including single- and multi-family residential, retail, and commercial. The proximity to downtown has made it a popular area for redevelopment, particularly in recent years with the construction of American Water’s headquarters and several other office and residential buildings. This neighborhood includes several entertainment venues including Adventure Aquarium, Wiggins Waterfront Park and marina, and a BB&T concert and entertainment venue.
- Central Business District** – The Central Business District (CBD) is located in downtown Camden just north of Dr. Martin Luther King (MLK) Boulevard and encompasses mainly office, governmental and light commercial, light industrial, transportation (City Hall and Broadway PATCO stations) and institutional (police stations, a fire station, three colleges and universities, several schools and religious institutions, and a park) uses. The area is considered pedestrian friendly.
- Lanning Square** – Lanning Square is located just south of the CBD in downtown Camden and encompasses mainly single-family residences, light commercial, neighborhood retail, and

institutional (several religious institutions, a few parks, one school, and the Cooper University Medical Center) land uses. Lanning Square contains sidewalks throughout and is within walking distance of many downtown amenities.

- **Central Waterfront** – The area of Central Waterfront is located in the northwestern part of the City of Camden, on the banks of the Delaware River and encompasses mainly industrial and vacant land with a small area of residential along Mt. Vernon Street. The neighborhood is home to community facilities including three churches, a school, and a park.
- **Gateway** – The Gateway neighborhood is located in the central area of the City of Camden and encompasses single- and multi-family residential, institutional (churches, schools, and a large park along the Cooper River), office, and commercial uses. There is a large concentration of commercial uses along Haddon Avenue.
- **Bergen Square** – The Bergen Square neighborhood is located in the central area of Camden and encompasses residential (primarily single-family), commercial (neighborhood retail scattered throughout the area), and institutional (several schools, churches, and a park) land uses.
- **Parkside** – The Parkside neighborhood is located in the eastern central area of the City of Camden and encompasses many single-family residential, commercial (mainly along Haddon Avenue, and institutional (three schools, several churches, and a cemetery) land uses. Parkside includes the 72-acre Farnham Park, which recently underwent a \$1 million renovation. Sidewalks can be found throughout Parkside.
- **Liberty Park** – The Liberty Park neighborhood is located in the central part of the City of and encompasses mainly single-family residences with some multi-family residential along Atlantic Avenue as well as South 8th Street. Liberty Park also includes some neighborhood retail along Mt. Ephraim Avenue. Liberty Park has three churches, two parks, and three schools. Sidewalks can be found throughout the neighborhood.
- **Whitman Park** – The Whitman Park neighborhood is located north of Ferry Avenue. The southern portion of the neighborhood is composed of multi-family residential, surface parking lots, and a cemetery, while the northern portion includes mainly single-family and light industrial uses. The neighborhood is divided by the PATCO rail line. Two schools, one park, and several churches can also be found within this neighborhood. Whitman Park includes sidewalks throughout.
- **Waterfront South** – This neighborhood located along the Delaware River is celebrated as a Federal and State historic district having housed Camden’s largest employer during World War II, the New York Shipbuilding Company and the homes of many of the company’s workers. The proximity of the neighborhood to the CBD of Camden has made it a popular area for revitalization and infill housing. The neighborhood is composed of mainly industrial uses but includes single-family residential, commercial, institutional (several parks and churches and has plans for a large community center in the historic Star Theater building) and vacant/undeveloped land.
- **Centerville** – The Centerville neighborhood is located in the central area of Camden and encompasses primarily by multi-family residential uses, with few single-family residences. The area also contains industrial uses (primarily along the existing railway corridor), with neighborhood retail scattered throughout. Centerville includes several community facilities such as a school, two parks, several churches, a cemetery, and a library.
- **Morgan Village** – Morgan Village is located in the southeastern part of the City of Camden and encompasses several different land uses including single- and multi-family residential with

industrial uses located in the northeastern portion of the neighborhood. The neighborhood also contains community facilities including two parks, three schools, and a few religious institutions.

- **Fairview** – Fairview is located in the southern part of Camden and encompasses primarily residential (single-family and multi-family) with some neighborhood retail scattered throughout. The neighborhood also includes two schools, two parks, and three churches. Historically, the area was built to provide housing for ship builders and is one of the first Federally-funded planned communities in the United States. It is now classified as a historic area and was placed on the National Register of Historic Places.
- **Gloucester City** – Gloucester City is located in the northwestern portion of Camden County. Most of the community's retail and commercial space is located along North Broadway and South Broadway, with neighborhood retail scattered throughout the surrounding areas. Many construction and redevelopment projects are planned throughout the City, specifically in the North King Street, South Port, West Market Street, and Sixth Street areas. Gloucester's historic district is located in the western portion of the city, roughly between Mercer Street and Jersey Avenue along King and South Burlington Streets. Single-family residential is the dominant land use of the city with industrial uses being found in the western area of the city along the Delaware River, as well as along Crescent Boulevard near Gloucester City High School. Office and institutional uses can also be found in the downtown area of the city. Gloucester City includes numerous community facilities including over ten parks, several religious institutions, a marina and fishing pier, four schools, a few cemeteries, a police and fire department, and a library. The north-central area of the city encompasses a few of the parks and includes a greenway, bike paths, and trails.
- **Brooklawn** – Brooklawn is a borough of Camden County and located in the northwestern part of the county and encompasses predominantly single-family residential, with some multi-family residences and light industrial uses scattered throughout. Commercial uses can be found along Crescent Boulevard. Brooklawn contains a few community facilities including one school, one church, a police department, and several small parks.
- **Western Bellmawr** – Western Bellmawr in the borough of Camden County, encompasses single-family residential with multi-family residential located in the western and northwestern part of the area. Commercial uses can be found along County Road 551, while industrial uses can be found at the southern intersection of I-76 and I-295. Community facilities in the neighborhood include two schools, three churches, a marina, and a few small parks/recreation fields.
- **Westville** – Westville located in Gloucester County, New Jersey encompasses mainly single-family residential, with some industrial uses located between Gateway Boulevard and Crown Point Road, as well as along Harvard Avenue in the southern portion of Westville. Neighborhood retail and light commercial uses can be found scattered throughout. Westville also shares a large industrial campus with West Deptford township; the industrial site is located in the western portion of Westville. Several religious institutions, a library, an elementary school, police and fire departments, and several parks (including the Wheelabrator Wildlife Refuge and Butterfly Garden) are also located within this neighborhood.
- **Verga** – Verga is an unincorporated community within the township of West Deptford, encompassing mainly industrial uses, with single-family residential and light commercial uses scattered throughout. Just north of Crown Point Road is the Coastal Eagle Point Plant, a large industrial campus, which sits on the bank of Delaware River. There are three churches, two

schools, and several parks located in the Verga community. A portion of the Wheelabrator Wildlife Refuge and Butterfly Garden is included in Verga.

- **Woodbury** – Woodbury is the County seat for Gloucester County. It encompasses predominantly single-family residential uses, as well as multi-family residences, commercial uses (mainly along North Broad and South Broad Streets, and in the southern area along Mantua Pike), office and governmental uses in the downtown area, and a rail yard in the southern portion of the city. Woodbury includes police and fire departments, two libraries, several parks and religious institutions, four schools, one university, and a YMCA.
- **Woodbury Heights** – The Borough of Woodbury Heights is located in Gloucester County and encompasses mainly single-family residential, with commercial uses focused around Mantua Pike. Light industrial uses can be found scattered throughout the area. Woodbury Heights contains several community facilities, including three schools, two parks, three churches, and fire and police departments.
- **Oak Valley** – The Oak Valley neighborhood is an unincorporated community within Deptford Township in Gloucester County and encompasses mainly single-family residential; commercial uses can be found along Mantua Pike. A fire and police department, a church, two schools, and several parks/recreational areas can be found within this neighborhood.
- **Jericho** – Jericho is a small neighborhood located in the Deptford Township of Gloucester County and encompasses mostly single-family residences, along with some undeveloped/wooded land. Jericho contains three churches and several parks.
- **Wenonah** – Wenonah is a borough in northeastern Gloucester County and encompasses mainly of single-family residential. Neighborhood retail can be found scattered along the “main street” area of Wenonah, along West and East Avenues. Wenonah contains a fire and police station, a library, one school, and four churches. Over 21 percent of Wenonah’s land area is conservation land, which is protected by ordinance from development.
- **Sewell** – Sewell is an unincorporated community within Mantua Township in Gloucester County and encompasses a mix of single- and multi-family residential, commercial and light industrial uses, as well as areas of undeveloped/wooded lands. Most of the commercial establishments can be found along Glassboro Road. The community includes five churches, one school, a cemetery, and several parks/recreational areas.
- **Pitman** – Pitman is a borough in central Gloucester County and encompasses single- and multi-family residential with industrial uses located in the northeastern portion of the neighborhood. Commercial uses are mainly located along Main Street and neighborhood retail is scattered throughout the area. Pitman also contains community facilities including three schools, several religious institutions, a police and fire department, a theater, one library, and over ten parks, including the Alcyon Lake Park which offers trails, an arboretum, a butterfly garden, and a boat ramp.
- **Glassboro** – Glassboro is a borough located in the central portion of Gloucester County. Single-family residential is the dominant land use of the area with multi-family residences also being present throughout the borough. Industrial uses are found in the southern area along the Delsea Drive, as well as near the intersection of Sewell and Ellis Streets. Office and governmental uses can be found in the downtown area. Most of the community’s retail and commercial is located along Delsea Drive, with smaller, neighborhood retail scattered throughout the surrounding areas. Many construction and redevelopment projects are planned throughout the borough,

specifically around the Rowan University campus and in downtown Glassboro. Glassboro includes numerous community facilities including several religious institutions, six schools, including Rowan University, four cemeteries, a police and fire department, and two libraries. The area also contains several parks including the Glassboro Fish and Wildlife Management area.

2.4.5. Environmental Justice

The environmental justice study area is defined as any census tract partially or wholly within a ½ mile of the proposed alignment for the GCL. The 2010 U.S. census tract boundaries were used. The environmental justice study area is shown on Figures 2-24a – 2-24c, “Neighborhoods.”

Data was collected at the census tract level for the environmental justice study area and for Camden and Gloucester counties for comparative purposes (including for minority households, transit-dependent populations, and low-income households). Entire counties were selected as the appropriate comparison tool because of the potential regional influence of the proposed project and because it best represents the regional project area.

U.S. Department of Transportation (DOT) Order (5610.2) on Environmental Justice provides clear definitions of the four minority groups addressed by Executive Order 12898. These groups are:

- **Black** – a person having origins in any of the black racial groups of Africa;
- **Hispanic** – a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
- **Asian American** – a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands; and
- **American Indian and Alaskan Native** – a person having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition.

To determine the total number of minority residents in each neighborhood, the number of Black, Hispanic, Asian American, and American Indian or Alaskan Natives were tallied and added together for each census tract within each neighborhood. Because Hispanic residents may be of any race, people of any ethnic group could categorize themselves as Hispanic or non-Hispanic. In addition, concentrations of transit-dependent populations, such as the elderly, children, and households without a vehicle, were identified. Concentrations of minorities and other special population groups near the project corridor were identified through analysis of the 2014-2018 American Community Survey Five-Year Estimates at both the county and census tract level. The individual tract data were compared to the countywide data to determine if any of the tracts would qualify as having large concentrations of one or more special populations. These concentrations are referred to as communities of concern.

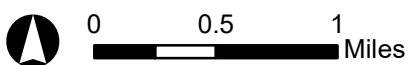
Communities of concern were identified as those census tracts with either a large concentration of minority residents or median income levels substantially lower than the countywide median income. A tract was categorized as having a community of concern if:

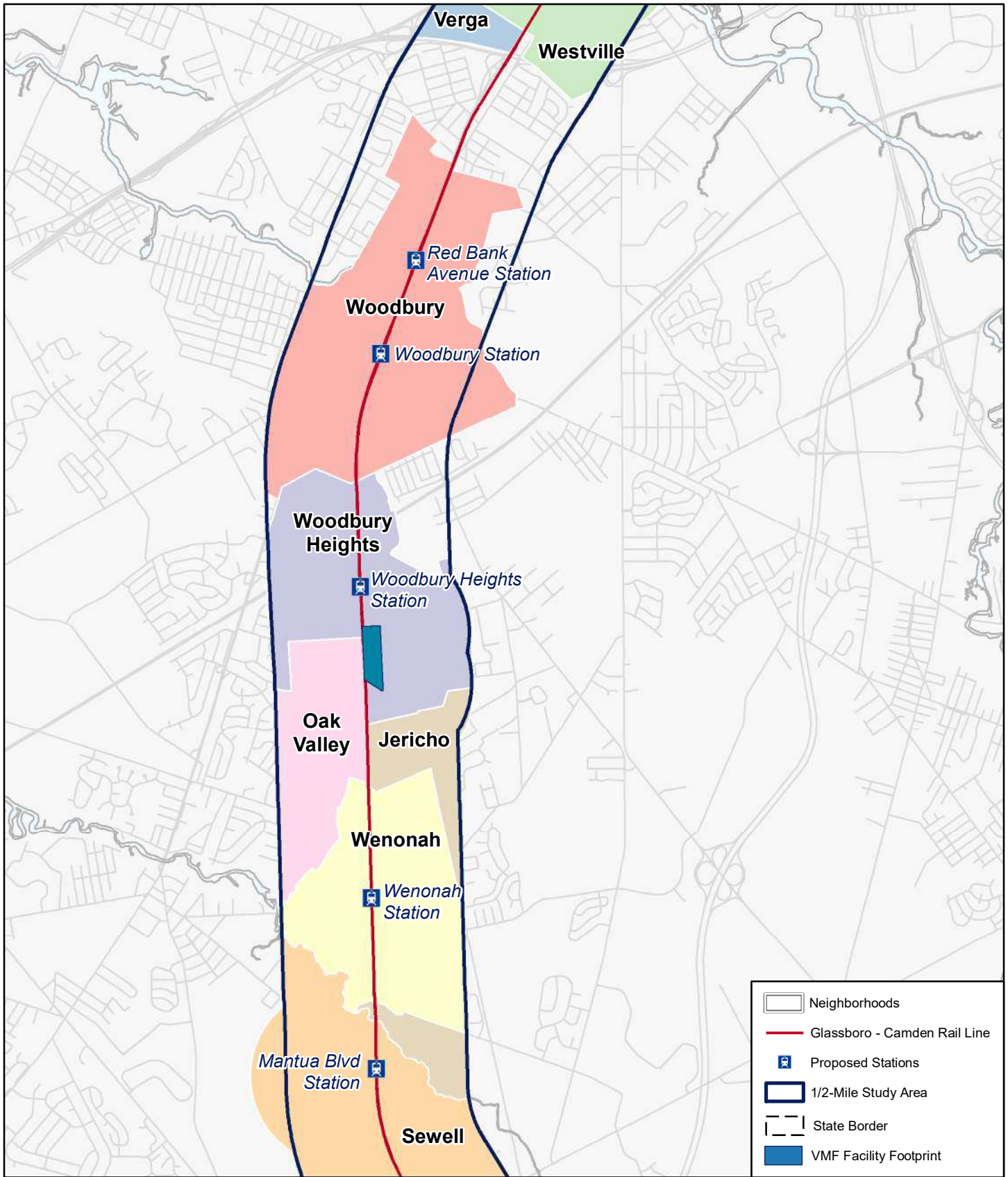
- Minority population within that tract is greater than or equal to 49 percent of total tract population; or
- Median income for that tract is less than \$53,694 (80 percent of the 2018 Camden County median income) or less than \$68,128 (80 percent of the 2018 Gloucester County median income).



Source: U.S. Census Bureau TIGER/Line Shapefiles; STV Incorporated, 2019.

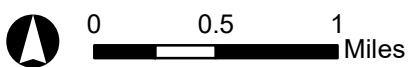
Figure 2-24a

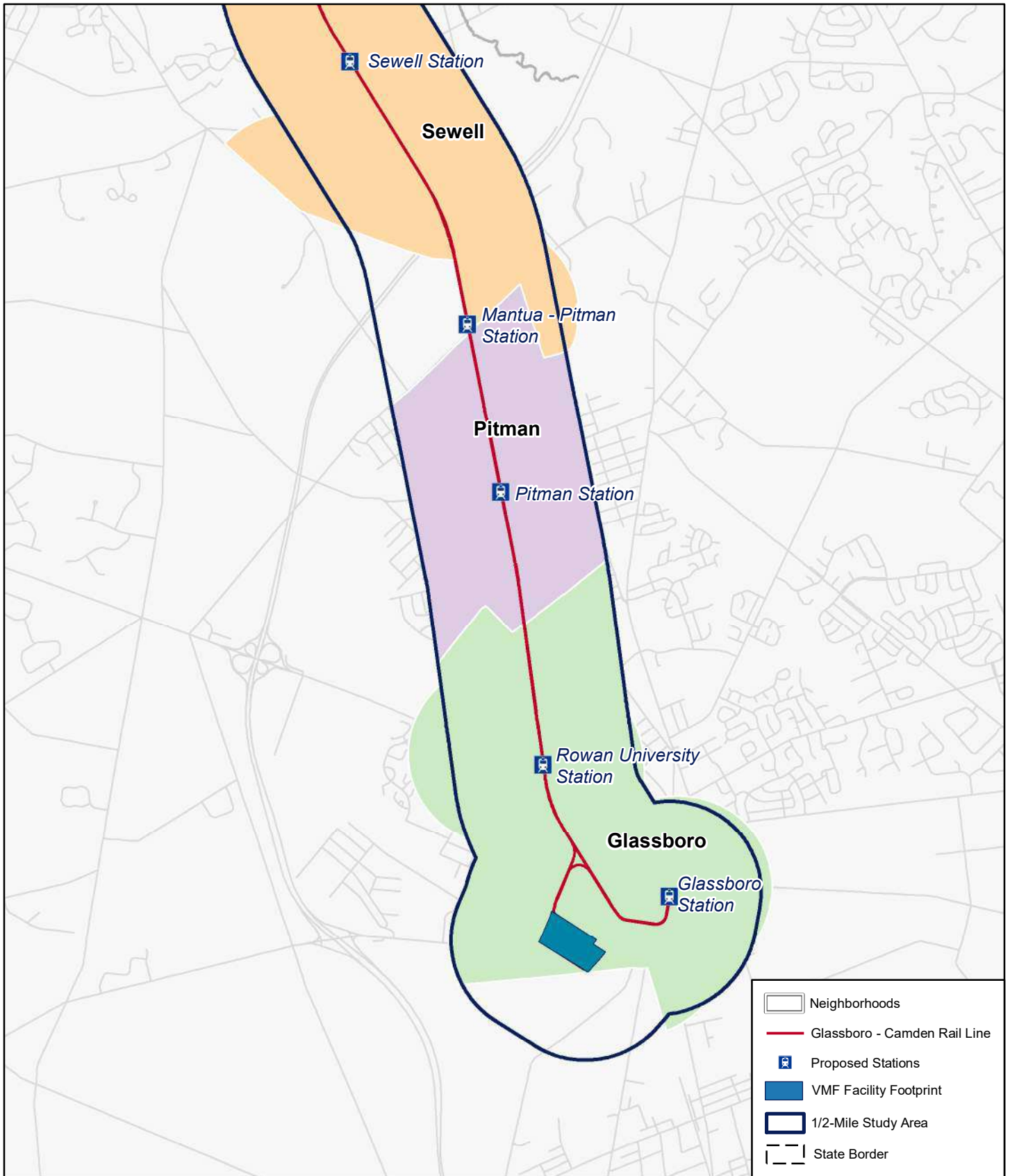




Source: U.S. Census Bureau TIGER/Line Shapefiles; STV Incorporated, 2019.

Figure 2-24b





Source: U.S. Census Bureau TIGER/Line Shapefiles; STV Incorporated, 2019.

Figure 2-24c

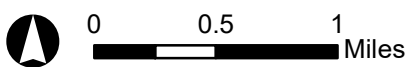


Table 2.4-4, “Communities of Concern within the Study Area,” lists the 2010 census tracts, populated with 2014-2018 American Community Survey Five-Year Estimates, that are located within the ½-mile environmental justice study area and indicates whether high concentrations of minority and/or low-income residents are present. This information is also shown on Figure 2-25a, “Potential Environmental Justice Communities,” and Figure 2-25b, “Potential Environmental Justice Communities.” In addition, the median household incomes listed in the following table are based on census tracts.

As shown in Table 2.4-4, “Communities of Concern within the Study Area,” 18 of the 26 neighborhoods in the GCL corridor include communities of concern. The majority of environmental justice communities, both low-income and minority, are concentrated in the northern portion of the environmental justice study area, in and around the city of Camden. However, low-income communities are also dispersed throughout the environmental justice study area, particularly in the other urban centers such as Woodbury and Glassboro, although these communities tended to be less severely low-income as those communities in the northern portion of the environmental justice study area near Camden. Minority communities are also found elsewhere in the environmental justice study area; however, these communities were less concentrated than those identified in Camden County.

Table 2.4-4: Communities of Concern within the Study Area

Census Tracts	Associated Neighborhood	Total Population (Census Tract)	Total Minority Population	% Minority Population	Median Household Income	Communities of Concern	
						Minorities	Low-Income
6007	Cooper Point	1,497	1,109	74%	\$27,708	●	●
6008	Pyne Point	5,270	3,997	76%	\$19,520	●	●
6103	Cooper Grant/ Central Water Front	2,151	1,338	62%	\$32,000	●	●
6104	Central Business District/Lanning Square	4,939	3,610	73%	\$29,063	●	●
6002	Gateway	1,933	1,686	87%	\$25,705	●	●
6004	Bergen Square	2,904	2,467	85%	\$19,621	●	●
6014	Parkside	4,623	4,195	91%	\$34,549	●	●
6016	Liberty Park	2,649	2,322	88%	\$23,638	●	●
6015	Whitman Park	4,932	4,154	84%	\$19,011	●	●
6018	Waterfront South	1,206	837	69%	\$29,229	●	●
6017	Centerville	3,146	2,886	92%	\$12,443	●	●
6019	Morgan Village	2,727	2,469	91%	\$23,995	●	●
6020	Fairview	6,478	5,207	80%	\$31,427	●	●
6110	Gloucester City	6,274	1,803	29%	\$53,652		●
6051		2,115	111	5%	\$57,946		
6052		2,857	522	18%	\$65,521		
6053	Brooklawn	2,023	351	17%	\$63,897		
6070	Western Bellmawr	4,480	755	17%	\$42,384		●
5001	Westville	4,185	648	15%	\$53,986		●
5002.01	Verga	2,427	167	7%	\$76,964		
5010.01	Woodbury	2,114	613	29%	\$83,165		
5010.02		4,315	2,550	59%	\$31,064	●	●
5010.03		3,500	1,118	32%	\$67,938		●
5009	Woodbury Heights	2,993	172	6%	\$82,188		
5011.07	Oak Valley	4,394	473	11%	\$78,553		
5011.06	Jericho	3,882	1,657	43%	\$67,092		●

Table 2.4-4: Communities of Concern within the Study Area (Continued)

Census Tracts	Associated Neighborhood	Total Population (Census Tract)	Total Minority Population	% Minority Population	Median Household Income	Communities of Concern	
						Minorities	Low-Income
5008	Wenonah	2,225	172	8%	\$122,159		
5007.02	Sewell	5,907	478	8%	\$95,724		
5013.01	Pitman	3,527	345	10%	\$80,375		
5013.02		2,753	99	4%	\$71,125		
5013.03		2,550	207	8%	\$66,500		●
5014.02	Glassboro	3,406	1,056	31%	\$47,227		●
5014.03		3,837	1,110	29%	\$84,534		
5014.04		3,197	838	26%	\$26,250		●
5014.06		4,666	1,461	31%	\$65,257		●

Source: American Community Survey, 2014-2018; U.S. EPA Environmental Justice Mapper, 2019

In addition to communities of concern, special populations of interest for this analysis include transit-dependent populations, such as the elderly, children, zero-car households, and low-income populations. Table 2.4-5, "Transit-Dependent Populations in the GCL Corridor," includes the first three indicators for transit dependency.

The threshold for the transit-dependent categories is if the percentage of the population of a particular group within a tract is at least 10 percent greater than the percentage of that population in the county. These criteria resulted in the following threshold values for transit dependency:

- The elderly population (age 65 and older) within a tract is greater than or equal to 25.0 percent (Camden County) and 24.9 percent (Gloucester County) of total tract population;
- The youth population (ages 0 to 17) within a tract is greater than or equal to 33.0 percent (Camden County) and 32.4 percent (Gloucester County) of total tract population;
- The percentage of zero-car housing units (based on occupied housing units) within a tract is greater than or equal to 21.4 percent (for Camden County) and 15.9 percent (for Gloucester County).

Data was collected at the census tract level and, where applicable, the weighted average was obtained for the neighborhood as a whole. GCL Corridor Transit-Dependent Neighborhood maps are included on Figure 2-25c, "Potential Environmental Justice Communities," Figure 2-25d, "Potential Environmental Justice Communities," and Figure 2-25e, "Potential Environmental Justice Communities." Further, 13 of the 15 transit-dependent neighborhoods are within the city of Camden, while the remaining two are located in Gloucester City and Woodbury.

Table 2.4-5: Transit-Dependent Populations in the GCL Corridor

Census Tract	Associated Neighborhoods	% Elderly	% Youth	% Zero-Car Housing Units	Median Household Income	Large Concentration of Transit-Dependent		
						Elderly	Youth	Zero-Car
Camden County		15%	23.00%	11.40%	\$67,118			
6007	Cooper Point	6.20%	36.90%	29.90%	\$27,708		●	●
6008	Pyne Point	13.10%	27.00%	60.00%	\$19,520			●
6103	Cooper Grant; Central Waterfront	18.70%	11.60%	32.30%	\$32,000			●
6104	Central Business District; Lanning Square	6.70%	20.30%	37.70%	\$29,063			●
6002	Gateway	11.70%	22.90%	39.20%	\$25,705			●
6004	Bergen Square	9.50%	41.30%	39.90%	\$19,621		●	●
6014	Parkside	11.70%	30.10%	30.10%	\$34,549			●
6016	Liberty Park	8.00%	39.80%	40.90%	\$23,638		●	●
6015	Whitman Park	11.50%	26.20%	28.70%	\$19,011			●
6018	Waterfront South	11.70%	20.30%	34.60%	\$29,229			●
6017	Centerville	11.10%	45.00%	58.60%	\$12,443		●	●
6019	Morgan Village	9.80%	28.30%	25.10%	\$23,995			●
6020	Fairview	5.20%	36.00%	32.80%	\$31,427		●	●
6110	Gloucester City	9.00%	29.00%	13.20%	\$53,652			●
6051		15.10%	19.40%	5.60%	\$57,946			
6052		12.30%	26.60%	9.40%	\$65,521			●
6053	Brooklawn	8.70%	20.80%	12.50%	\$63,897			
6070	Western Bellmawr	16.00%	21.10%	11.10%	\$42,384			
Gloucester County		14.90%	22.40%	5.90%	\$85,160			
5001	Westville	12.20%	24.50%	12.40%	\$53,986			
5002.01	Verga	15.50%	17.80%	8.60%	\$76,964			
5010.01	Woodbury	11.50%	24.50%	5.70%	\$83,165			
5010.02		18.70%	22.20%	32.50%	\$31,064			●
5010.03		10.90%	22.10%	15.00%	\$67,938			
5009	Woodbury Heights	16.20%	20.60%	2.90%	\$82,188			
5011.07	Oak Valley	14.60%	19.20%	3.90%	\$78,553			
5011.06	Jericho	18.40%	22.80%	4.30%	\$67,092			
5008	Wenonah	14.80%	24.80%	3.10%	\$122,159			
5007.02	Sewell	13.00%	24.50%	2.70%	\$95,724			
5013.01	Pitman	15.60%	20.90%	4.10%	\$80,375			
5013.02		11.90%	20.80%	12.00%	\$71,125			
5013.03		23.50%	20.40%	10.50%	\$66,500			
5014.02	Glassboro	10.90%	17.40%	10.90%	\$47,227			
5014.03		20.00%	19.40%	4.00%	\$84,534			
5014.04		3.30%	5.40%	10.30%	\$26,250			
5014.06		13.20%	21.50%	4.50%	\$65,257			

Source: 2014-2018 American Community Survey.

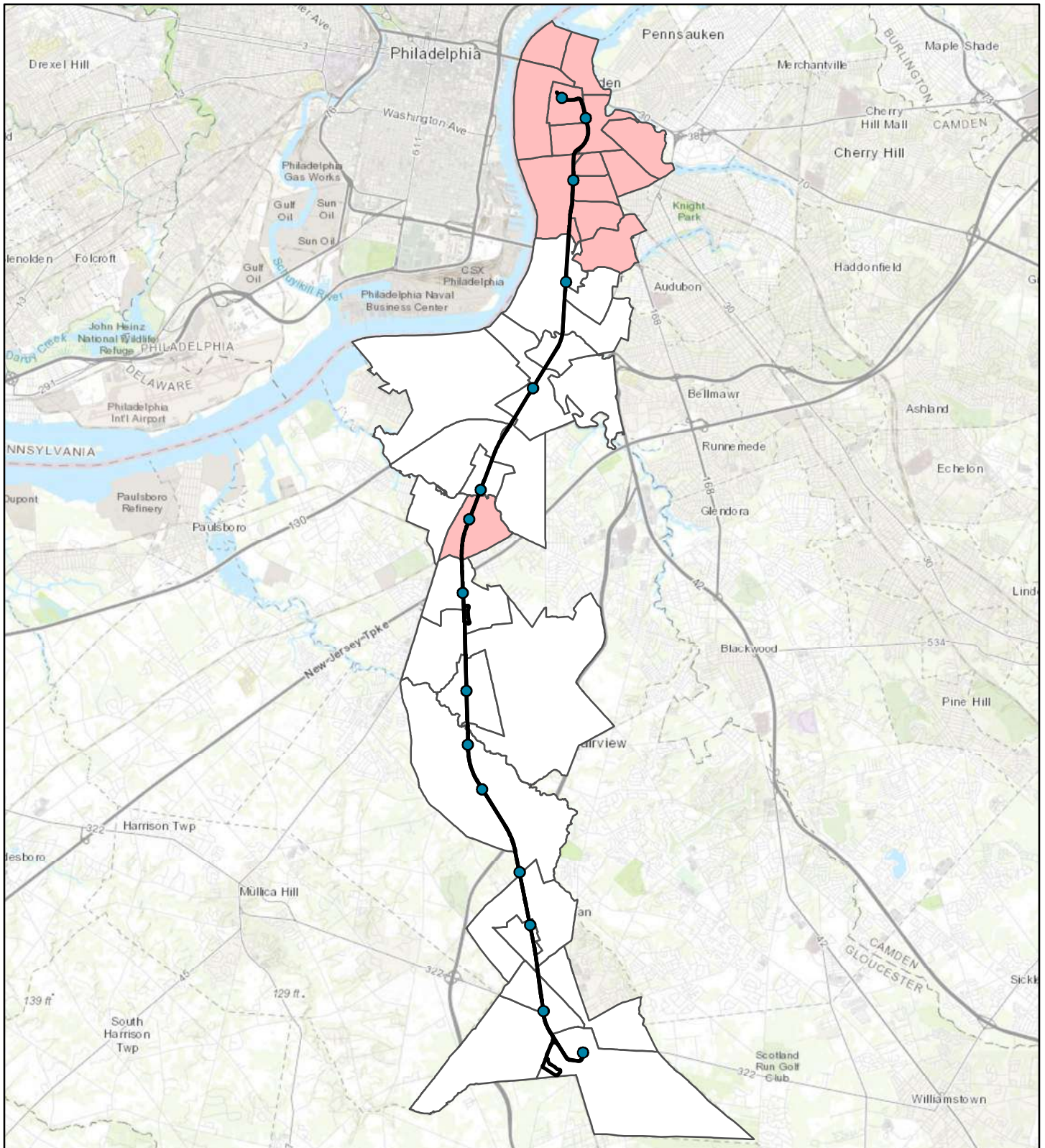





Figure 2-25a: Potential Environmental Justice Communities

-  Proposed GCL Alignment
-  Proposed GCL Station
-  Community of Concern: Minority

Source: American Community Survey, 2014-2018; GCL Project Team, 2020.



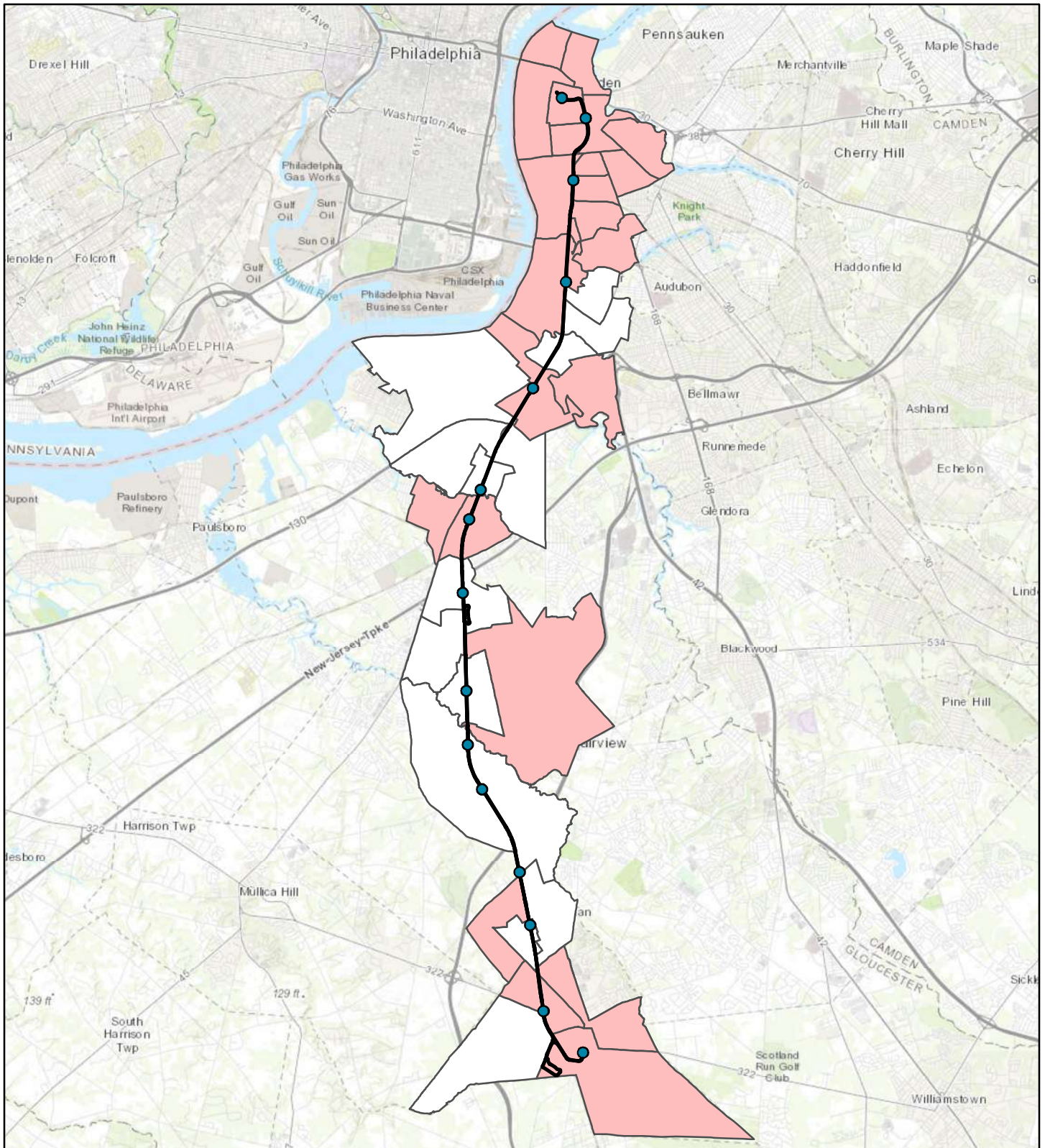
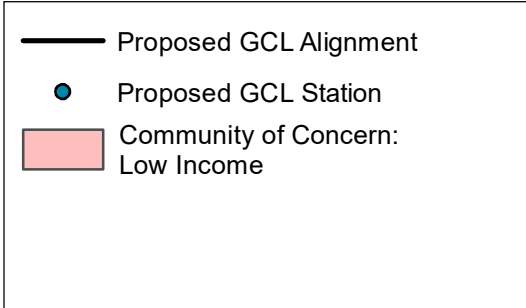


Figure 2-25b: Potential Environmental Justice Communities



Source: American Community Survey, 2014-2018; GCL Project Team, 2020.



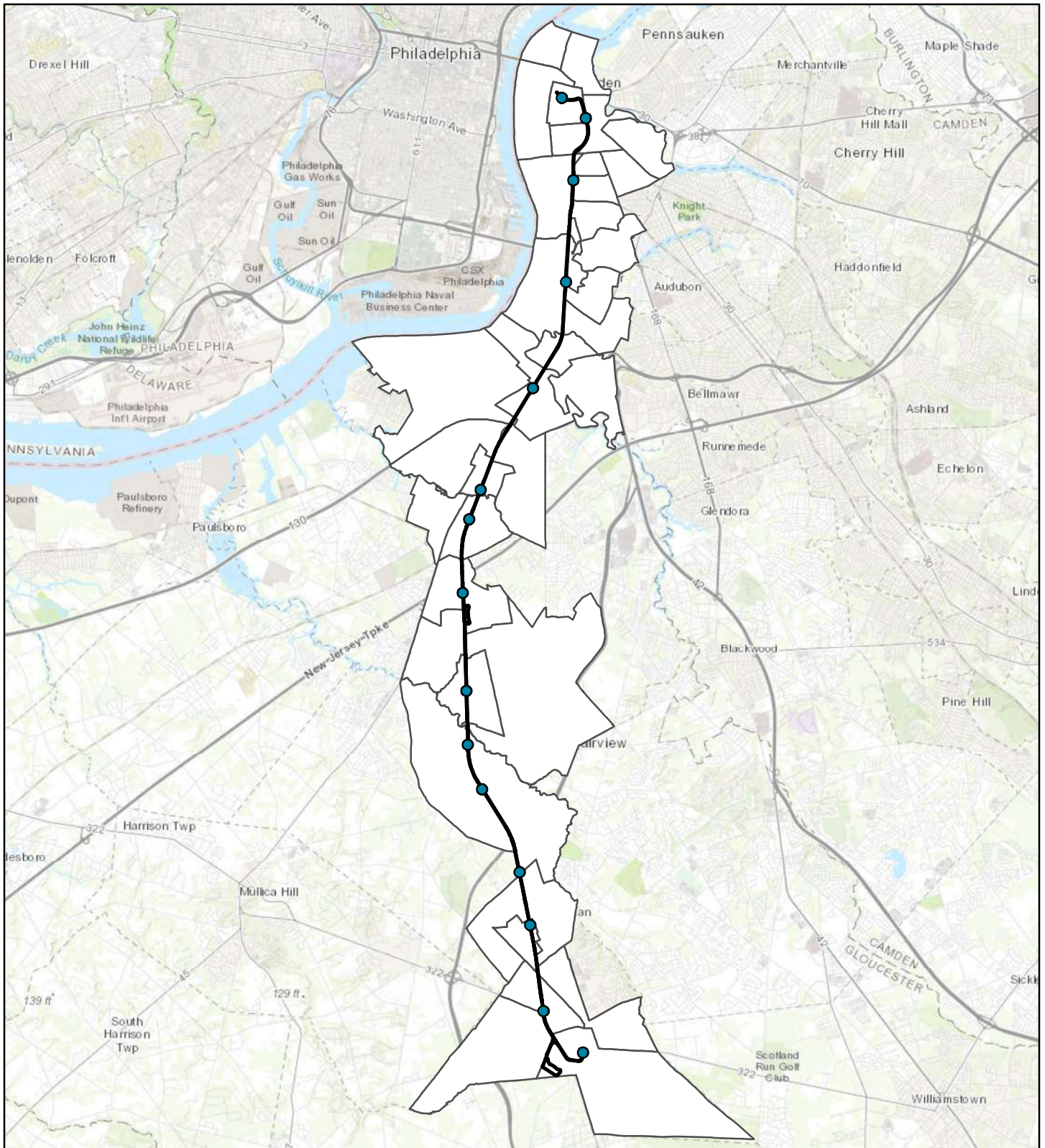
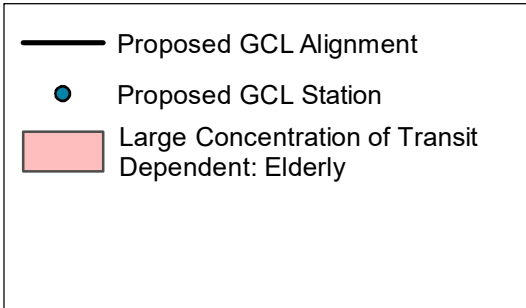


Figure 2-25c: Potential Environmental Justice Communities



Source: American Community Survey, 2014-2018; GCL Project Team, 2020.



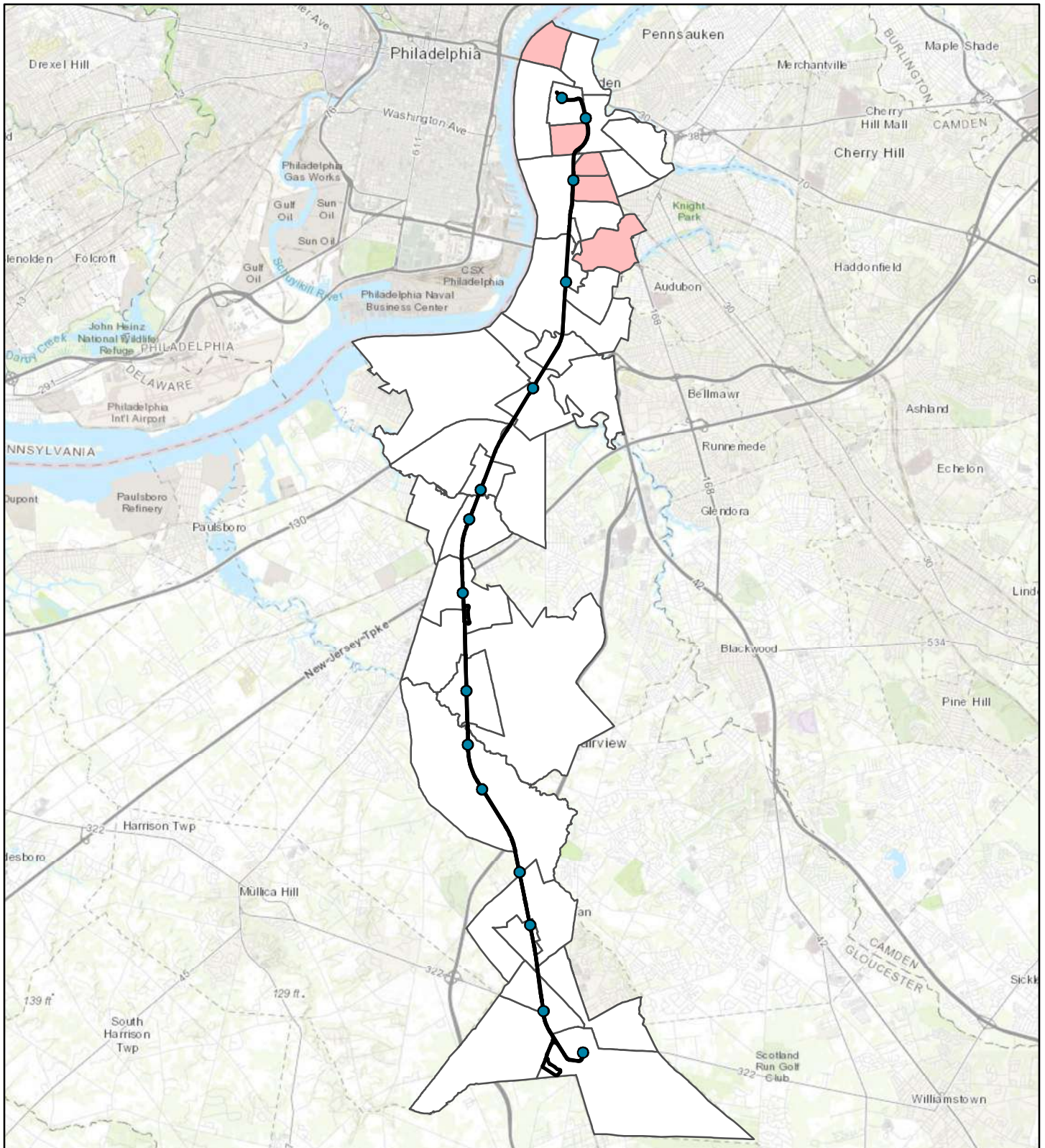





Figure 2-25d: Potential Environmental Justice Communities

-  Proposed GCL Alignment
-  Proposed GCL Station
-  Large Concentration of Transit Dependent: Youth

Source: American Community Survey, 2014-2018; GCL Project Team, 2020.



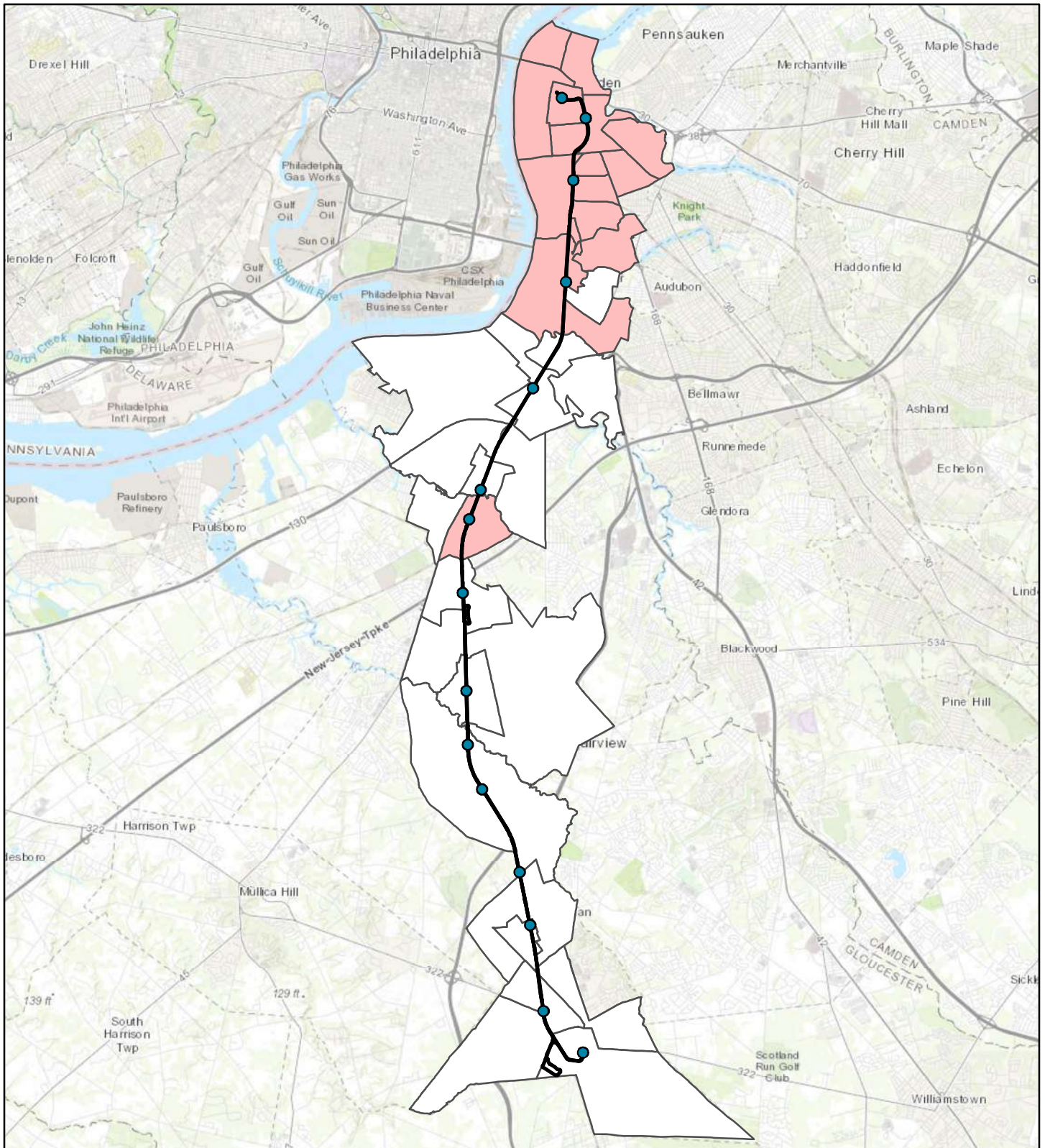
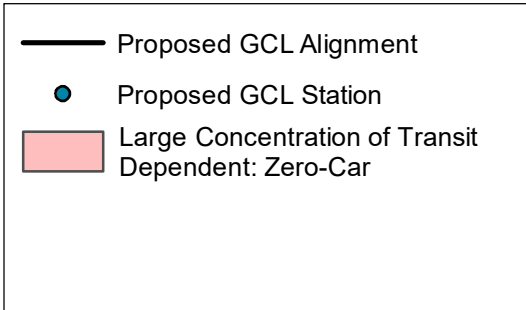


Figure 2-25e: Potential Environmental Justice Communities



Source: American Community Survey, 2014-2018; GCL Project Team, 2020.



2.4.6. Community Facilities

Community services/facilities and social service providers accommodate a range of social needs within a neighborhood or, in some cases, within a larger geographic area. These services and facilities range from, but are not limited to, educational, religious, and healthcare facilities to public libraries, police/fire stations, and post offices. Existing community facilities within ½ mile of the proposed GCL corridor have been identified.

Community services/facilities and social services are typically supported by local (private and public), State, or Federal organizations/entities. The evaluation of the impact of the proposed GCL on neighborhoods and communities includes consideration of the potential direct and indirect impacts of the proposed project on these services/facilities as these services/facilities contribute to the overall quality of life and sense of community in these areas. The number of community services/facilities provided typically corresponds to the density of development and proximity to neighborhoods. For example, more densely populated areas (i.e., Camden County) have more services/facilities. As density decreases from the center of Camden to the Camden-Gloucester County line, fewer services/facilities are present. Activity Centers, such as the Camden Waterfront area, also have an increase in services/facilities.

Services/facilities within ½ mile of the proposed GCL can be found in Table 40, “Community Services and Social Service Providers,” In Attachment 3, “Man-Made Resources Technical Report.” Community services/facilities located within the GCL corridor include 91 religious institutions, 36 schools, 12 government facilities, nine police departments or stations, seven fire departments or stations, six libraries, two medical centers, and one YMCA facility. The highest concentration of community facilities is clustered in and around Camden City, particularly the more densely developed areas such as the Central Business District/Lanning Square and Bergen Square neighborhoods. Religious institutions, schools, government facilities, libraries, and police and fire departments were all found throughout the neighborhoods and community services study area. Sewell Township, which contains both the proposed Mantua Boulevard and Sewell ~~GCL~~ stations, is the one notable exception, containing just one school (Sewell Elementary School) and one religious facility (Sewell Community Baptist Church).

2.4.7. Safety and Security

Public safety within the GCL corridor is provided by the police departments, fire departments, and emergency response units of the municipalities along the corridor. NJ TRANSIT and DRPA/PATCO provide law enforcement for transit vehicles for current transit services, including those that utilize the existing WRTC, as well as at other transit stations and at park-and-ride lots. Transit Police provide roving patrols at NJ TRANSIT and DRPA/PATCO facilities and on vehicles. Surveillance of transit stations and vehicles are conducted through monitoring of Closed Circuit Televisions (CCTVs) placed on each station platform and in park-and-ride facilities. On-board video cameras are also installed on trains to monitor passengers and provide a live feed that can be observed by police and operations personnel. Transit Police and fare inspectors provide roving fare inspection services on NJ TRANSIT and DRPA/PATCO vehicles and at stations. Blue light emergency phones are located on station platforms and throughout the park-and-ride facilities. Passenger assistance phones for non-emergency use are located on ticket vending machines that are also located on the station platforms.

2.4.7.1. Law Enforcement and Transit Services

Within NJ TRANSIT specifically, the New Jersey Transit Police Department (NJTPD) is a special unit with the primary mission of ensuring a safe and orderly environment within the transit system, promoting the

confidence of the riding public and enhancing the maximum use of the transit system. The NJTPD is the only transit policing agency in the country with statewide authority and jurisdiction. The current, authorized strength of the Department includes 220 sworn officers and 67 non-sworn members (which include Fare Enforcement Inspectors) serving the more than 400,000 commuters who use the NJ TRANSIT system daily. NJTPD officers spend the majority of their time patrolling buses, trains, and stations. In addition to patrolling vehicles and stations along the proposed GCL, NJTPD would also be responsible for providing for emergency response to all proposed stations. Should an incident occur, transit police would work with the local law enforcement with jurisdiction to apprehend criminals, if necessary.

The DRPA Police Department is a division of DRPA that provides police services on all DRPA properties and on the PATCO Speedline. It consists of 145 sworn law enforcement officers, 17 dispatchers, three Homeland Security members, and five administrative coordinators. The department has multiple units including K-9, Marine, Community, Vehicle, Bicycle, High Angle Rescue, and Professional Standards Unit.

The department's primary responsibilities consist of:

- Patrolling, providing safety, and preserving order upon the bridges, tunnels, approaches to the rapid transit system, facilities, and other property owned by the DRPA;
- Protecting life and property;
- Preventing, detecting, and investigating acts of terrorism;
- Preventing, detecting, and investigating violations of law and arresting or citing violators;
- Enforcing the laws of the Commonwealth of PA and State of New Jersey; and
- Enforcing all DRPA/PATCO rules and regulations.

In addition to the transit police, NJ TRANSIT and DRPA utilize Crime Prevention Through Environmental Design (CPTED) concepts within their facilities to deter criminal activity. The basic principle of CPTED is to increase natural surveillance by providing good sight lines and avoiding conditions such as tall landscaping and other features that can provide individuals with areas to hide or ways to obstruct mechanical methods of surveillance such as CCTV cameras.

2.4.7.2. Local Law Enforcement Services

Local law enforcement services in Camden County include the Police Department, the Sheriff's Office, and the Crime Prevention Unit. The Brooklawn Police Department provides police services within the borough of Brooklawn, in Camden County. In addition, the Rutgers University campus in Camden County has its own Police Department, and the Cooper University Hospital has a large force of security officers.

GCL Camden County corridor towns also provide Emergency Medical Services (EMS) with firefighters, emergency medical technicians, and Basic Life Support (BLS) ambulances. Virtua Health System provides Advanced Life Support (ALS) services in Camden County, and Cooper University Health Care provides ALS services for the City of Camden.

In Gloucester County, the Sheriff's Office—which includes a Field Services Bureau, a Criminal Identification Unit, and a Civil Process Unit—and the Gloucester City Police Department provide law enforcement services. The Gloucester City Police Department includes a Patrol Division, Detective Bureau, Fatal Accident Investigative Unit, and School Resource Officers. In addition, Rowan University in Glassboro has its own Department of Public Safety. Several municipalities and townships operate their own law enforcement within Gloucester County. Woodbury, Woodbury Heights, Westville, West Deptford,

Wenonah, Mantua, Pitman, and Glassboro are municipalities along the GCL corridor that each operate municipal police departments.

Gloucester County EMS is the first county-based EMS in the State of New Jersey and contains 19 member municipalities. It has a fleet of over 34 ambulances, multiple support vehicles, and 200 dedicated staff members responding from thirteen EMS stations. GCL Gloucester County municipalities that have not joined the County EMS include Deptford, Westville, and Woodbury Heights, which provide their own EMS. ALS in Gloucester County is provided by Inspira Health Network.

Additional information can be found in Attachment 8, "Safety and Security Technical Report."

2.4.8. Parklands

The study area for the parkland assessment comprises the area within 1,000 feet from the GCL alignment, station areas, and the two VMFs, and also includes all supporting infrastructure (i.e., traction power substations) and staging areas for construction. The methods used to identify publicly-owned parkland resources consisted of a review of GIS layers made available by the New Jersey Green Acres Program through the New Jersey Geographic Information Network (NJGIN),⁵ the U.S. National Parks Service for properties funded via the Land and Water Conservation Fund, land parcel and ownership information provided by Camden and Gloucester Counties, protected open space parcels and circuit trails from the DVRPC, and multi-use trails from the Wenonah Environmental Commission, as well as a visual observation using satellite imagery from Google and Bing. Following this inventory, municipalities within the parklands study area, which extends 1,000 feet from either side of the GCL's LOD), were consulted to confirm the official jurisdiction of each identified property.

A total of 93 existing parkland resources were identified within the parklands study area, along with five multi-use trails. Of the 93 parkland resources, a total of 57 are in municipalities that have accepted Green Acres funding and are therefore encumbered by Green Acres' restrictions and compensation requirements. Additional information on legal and regulatory requirements are provided in Attachment 9, "Parklands Technical Report." As Brooklawn Borough, Westville Borough, and Wenonah Borough have not used Green Acres funding, their 36 parkland resources are not encumbered by Green Acres' restrictions and compensation requirements. The existing parklands and multi-use trails are presented in Table 2.4-6, "Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area," and Table 2.4-7, "Multi-Use Trail Resources Located Within the GCL Study Area," below.

⁵ The "PRGRM_ENCMBRD_TYPE_CODE" field within the "State, Local and Nonprofit Open Space of New Jersey" shapefile, which was published by NJGIN on September 19, 2018, was used to identify individual parkland resources that are encumbered by Green Acres rules and regulations. However, if a local government unit has accepted Green Acres funding for any resource, then all its resources are encumbered by Green Acres' restrictions and compensation requirements.

Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
	CITY OF CAMDEN					
1	Roosevelt Plaza Located north of proposed alignment and across the street from Camden City Hall.	1.61 acres	City of Camden	Parcel contains a plaza, open green lawn, walking path, and benches.	Yes	No
2	Walt Whitman House Located south of the proposed alignment on the southeast corner of Dr. Martin Luther King Boulevard and S. 4 th Street	0.41 acres	NJDEP	Parcels contain grass open space	Yes	No
3	6th & Mickle Located south of proposed alignment on the north side of Cooper University Medical Center, just south of Dr. Martin Luther King Boulevard.	0.21 acres	Cooper Hospital	Parcel contains green space for Cooper University Medical Center.	Yes	No
4	Sheila L. Roberts Park Located west of proposed alignment and occupying the entire block bounded by S. 6 th Street, Auburn Street, Chambers Avenue, and Washington Street.	0.54 acres	City of Camden	Parcel contains a pedestrian park with benches and a children's playground.	Yes	No
5	Triangle Park Located within the proposed alignment and bounded by Haddon Avenue, Newton Avenue, and the I-676 overpass.	0.18 acres	City of Camden	Parcel contains trees and art panels honoring Dr. Bascom Waugh, the first African-American doctor at Cooper Hospital, and Dr. Lewis Coriell, founder of the Coriell Institute.	Yes	Yes
6	7th & Clinton Located west of proposed alignment on the southeast corner of S. 7 th Street & Clinton Street.	0.60 acres	City of Camden	Parcel contains a basketball court, park benches, and a spray pool.	Yes	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
7	8th & Spruce Basketball Court Located west of proposed alignment just east of Spruce Street Park on the south side of Spruce Street between S. 7 th Street & S. 8 th Street.	1.11 acres	Camden Board of Education	Parcel contains a basketball court that is open to the public. The rest of the parcel consists of two buildings and vehicular storage.	Yes	No
8	Spruce Street Park Located west of proposed alignment just west of 8 th & Spruce Basketball Court on the south side of Spruce Street between S. 7 th Street & S. 8 th Street.	0.12 acres	City of Camden	Parcel contains a playground.	Yes	No
9	Judge Robert Burke Johnson Park Located east of proposed alignment and roughly bounded by Thurman Street, S. 8 th Street, Carl Miller Boulevard, and I-676.	12.80 acres	City of Camden	Parcels contain multiple softball, football, and soccer fields, basketball courts, along with a playground and concession stand.	Yes	No
10	Isabel Miller Community Center Located east of proposed alignment and directly adjacent to Judge Robert Johnson Park, bordered by Carl Miller Boulevard and S. 8 th Street.	2.03 acres	City of Camden Bureau of Neighborhood Services	Parcel features outdoor swimming, diving and wading pools, as well as a community center housing a branch library, social services center, community meeting room, and health center.	Yes	No
11	6th & Ferry Located west of proposed alignment along S. 6 th Street between Ferry Avenue & Carl Miller Boulevard.	0.09 acres	City of Camden	Parcel contains a small grass field surrounded by trees.	Yes	No
12	Broadway & Ferry Park Located west of proposed alignment on the northwest corner of S. Broadway & Ferry Avenue.	0.18 acres	City of Camden	Parcel contains a small pedestrian park with benches.	Yes	No
13	Memorial Park Located west of proposed alignment along Broadway between Winslow Street and Jefferson Street, just south of the Camden Shipyard and Maritime Museum.	0.46 acres	City of Camden	Small park containing a monument which pays tribute to those who fought in World War II.	Yes	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
14	Staley Park Located east of proposed alignment and bounded by Master Street, Jefferson Street, S. 7 th Street, and Chelton Avenue.	4.14 acres	City of Camden	Parcel contains two softball/baseball fields, football field, a basketball court, concession stand, and playground.	Yes	No
	GLOUCESTER CITY					
15	Sherman Neighborhood Play Lot Located west of proposed alignment along N. Filmore Street between Sherman Street and Warren Street	0.53 acres	Gloucester City	Parcels contain a grass field, a swing set, and a slide	Yes	Yes
16	Three Corner Park Located west of proposed alignment on the eastern corner of Middlesex Street and N. Burlington Street.	0.22 acres	Gloucester City	Parcels contain a basketball court.	Yes	No
17	Paul Street Playground Located east of proposed alignment on the eastern corner of Paul Street & Hudson Street.	0.11 acres	Gloucester City	Parcel contains playground and benches.	Yes	No
18	Washington Street Play Lot Located east of proposed alignment in a residential neighborhood on the west side of Washington Street between Little Somerset Street and Somerset Street.	0.25 acres	Gloucester City	Parcel contains a grassy area with park benches and a swing set.	Yes	No
19	Thompson Street & Lane Avenue Park Located east of proposed alignment and bounded by Thompson Avenue and Lane Avenue/Koehler Street.	0.50 acres	Gloucester City	Parcel contains playground and benches.	Yes	Yes
	BOROUGH OF BROOKLAWN					
20	Wetlands, Ballfields, and Brooklawn Community Park Located west of proposed alignment and extending along Little Timber Creek from Timber Boulevard at New Jersey Road to Pershing Road at Chestnut Street.	13.38 acres	Brooklawn Borough	Parcel includes a baseball field, creekside trail, and Brooklawn Community Park (playground, basketball court, benches, gazebo).	No	No
21	Alice Costello Elementary School Located east of proposed alignment along Haakon Road between Bergen Street and Christiana Street.	1.62 acres	Brooklawn Board of Education	Public elementary school featuring two basketball courts.	No	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
22	Alice Costello School Field Located east of proposed alignment and roughly bounded by Costello Elementary, Bergen Street, Browning Lane, paved alley, and Christiana Street.	2.32 acres	Brooklawn Borough	Parcel includes a baseball field, softball field, and playground with benches.	No	No
23	New Jersey Road – East Located west of proposed alignment, just east of the bend in New Jersey Road.	0.08 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
24	New Jersey Road – Central Located west of proposed alignment at the bend in New Jersey Road, just west of New Jersey Road – East parcel.	0.13 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
25	New Broadway Located west of proposed alignment on the west side of Broadway near the trajectory of Pennsylvania Road, opposite the Chestnut Street & Pennsylvania Road parcel.	0.12 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
26	Chestnut Street & Pennsylvania Road Located west of proposed alignment on the east side of Chestnut Street at Pennsylvania Road, opposite the New Broadway parcel.	0.14 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
27	Pennsylvania Road – Northeast Located west of proposed alignment on the north side of Pennsylvania Road between Paris Avenue and Chestnut Street where the road bends, opposite the Pennsylvania Road – Southeast parcel.	0.10 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
28	Pennsylvania Road – Southeast Located west of proposed alignment on the south side of Pennsylvania Road between Paris Avenue and Chestnut Street where the road bends, opposite the Pennsylvania Road – Northeast parcel.	0.08 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
29	N. Wilson Avenue – North Located east of proposed alignment on the west side of N. Wilson Avenue near the trajectory of Marne Road, opposite the N. Wilson Avenue – South parcel.	0.09 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
30	N. Wilson Avenue – South Located east of proposed alignment on the east side of N. Wilson Avenue near the trajectory of Marne Road, opposite the N. Wilson Avenue – North parcel.	0.11 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
31	Memorial Park – West Traffic Circle Located east of proposed alignment and situated at intersection of N. and S. Wilson Avenues, Bergen Street, and Horton Avenue.	0.13 acres	Brooklawn Borough	Parcel includes a circular grass area with a central tree and paved paths.	No	No
32	Memorial Park Located east of proposed alignment between Bergen Street, Horton Avenue and S. Hannevig Avenue.	0.50 acres	Brooklawn Borough	Parcel contains war memorials and a 9/11 Memorial.	No	No
33	Memorial Park – East Traffic Circle Located east of proposed alignment and situated at intersection of Maude Avenue, Christiana Street, and Noreg Place.	0.24 acres	Brooklawn Borough	Parcel includes a circular grass area with a pair of benches.	No	No
34	New Broadway and Town Center Located west of proposed alignment and bounded by New Broadway and Town Center.	0.13 acres	Brooklawn Borough	Parcel includes a semi-circular grass area with paved path and a bus stop.	No	No
35	Marne Road Located west of proposed alignment on the west side of Marne Road at the bend in the road between Timber Boulevard and Paris Avenue.	0.07 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
36	N. Wilson Avenue and Old Broadway Located east of the proposed alignment on the southwest corner of N. Wilson Avenue and Old Broadway	0.12 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
37	New Broadway – South Located west of the proposed alignment on the east of New Broadway, southeast of the New Broadway Parcel	0.08 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
38	New Broadway – North Located west of the proposed alignment on the east of New Broadway, northeast of the New Broadway Parcel	0.08 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
39	Pennsylvania Road – Northwest Located west of proposed alignment on the north side of Pennsylvania Road between Paris Avenue and Timber Boulevard where the road bends, opposite the Pennsylvania Road – Southwest parcel.	0.07 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
40	Pennsylvania Road – Southeast Located west of proposed alignment on the south side of Pennsylvania Road between Paris Avenue and Timber Boulevard where the road bends, opposite the Pennsylvania Road – Northwest parcel.	0.05 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
41	New Jersey Road and Timber Boulevard Located west of the proposed alignment on the southeast corner of New Jersey Road, Timber Boulevard and Pershing Road	0.12 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
42	New Jersey Road – Northwest Located west of the proposed alignment on the north side of New Jersey Road between Pershing Road and Paris Avenue, directly across from New Jersey Road – Southwest parcel	0.13 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
43	New Jersey Road – Southwest Located west of the proposed alignment on the south side of New Jersey Road between Pershing Road and Paris Avenue, directly across from New Jersey Road – Northwest parcel	0.07 acres	Brooklawn Borough	Parcel includes sidewalks and a grass area located between private residences.	No	No
44	Wetlands and Ballfields Located west of proposed alignment and roughly bounded by Timber Boulevard, S. New Broadway, and Big Timber Creek.	8.57 acres	Brooklawn Borough	Parcel is primarily wetlands at the mouth of Big Timber Creek and contains a baseball field.	No	No
	BOROUGH OF WESTVILLE					
45	Michael Galbraith Park Located west of proposed alignment and roughly bounded by New Broadway, River Drive, and Big Timber Creek.	136.54 acres	Borough of Westville	Parcel contains benches, walking path and pier.	No	No
46	Park Avenue Baseball Field Located west of proposed alignment and bounded by Crown Point Road, Iron Workers Local 399 building, Gateway Boulevard, and Park Avenue.	5.99 acres	Borough of Westville	Parcel contains a concession stand and one baseball field.	No	No
47	Parkview Elementary School Located east of proposed alignment and bounded by High Street, Duncan Avenue, Thomas West Park, and Birch Avenue.	2.92 acres	Parkview School	Public elementary school parcel contains a portion of the paved path around the water feature within Thomas West Park.	No	No
48	Thomas West Park Located east of proposed alignment and roughly bounded by Parkview Elementary School, Duncan Avenue, Delsea Drive, and Oak Avenue.	9.45 acres	Borough of Westville	Parcel contains a water feature with fountain and paved walking path, four tennis courts, a basketball court, a playground, a gazebo, a memorial, and the clubhouse for the Westville Lions Club.	No	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
49	Westville Borough Park aka "Gateway Boulevard & Chestnut Street Park" Located west of proposed alignment and fronting Gateway Boulevard with Chestnut Street to the northeast.	16.72 acres	Borough of Westville	Parcel contains two multi-purpose recreational fields and a concession stand.	No	No
	WEST DEPTFORD TOWNSHIP					
50	Cleveland and Wilson Located west of proposed alignment in the northeastern corner of Wilson Avenue and Puritan Avenue.	1.06 acres	West Deptford Township	Parcel contains a playground.	Yes	No
	CITY OF WOODBURY					
51	Green Street Play Area Located west of proposed alignment at Green Street and Dare Street adjacent to the west side of the railroad ROW.	0.10 acres	City of Woodbury	Parcel contains a small playground for children between the ages of two and five.	Yes	No
52	Stewart Lake Park Located east of proposed alignment on the south side of E. Red Bank Avenue near Roosevelt Avenue, on the border of Woodbury and Deptford.	23.08 acres	City of Woodbury	Parcel contains playground, baseball field and basketball court.	Yes	No
	DEPTFORD TOWNSHIP					
53	Stewart Lake Frontage Located east of proposed alignment and south of Stewart Lake Park along Stewart Lake.	34.86 acres	Deptford Township	Parcels contain open space abutting Stewart Lake within Deptford Township.	Yes	No
	CITY OF WOODBURY					
54	Stewart Lake Frontage Located east of proposed alignment, opposite Stewart Lake Park behind the Lakeside Professional Campus.	18.52 acres	City of Woodbury	Parcels contain open space abutting Stewart Lake within the City of Woodbury.	Yes	No
55	Woodbury Lake Park Located on the east and west sides of proposed alignment, bordered by N. Broad Street, the county jail, N. Evergreen Avenue, and the lake.	31.52 acres	City of Woodbury	Parcels are primarily used for fishing and provide riparian access. Park is crossed by rail alignment.	Yes	Yes

Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area (Continued)

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
56	Woodbury High School Complex Located west of proposed alignment and bounded by Broad Street Lake, N. Broad Street, and the Woodbury High School track.	2.39 acres	Woodbury Board of Education	Parcel contains grass field and access to the water. Parcel is adjacent to the Woodbury High School building and sports complex.	Yes	No
57	Hester's Branch Located east of proposed alignment along the Hester's Branch Creek north of E. Barber Avenue and south of St. Patrick's Church.	4.92 acres	City of Woodbury	Parcel includes Hester's Branch Creek and wooded areas.	Yes	No
58	Rotary Park Located east of proposed alignment along Hester's Branch Creek between E. Barber Avenue and the rotary at Glassboro Road and S. Evergreen Avenue.	13.46 acres	City of Woodbury	Parcel is heavily vegetated and contains a basketball court and gazebo used for various functions.	Yes	No
59	Wing-Dickerson Park Located west of proposed alignment just north of Carpenter Street between Allens Lane and S. Barber Avenue.	1.63 acres	City of Woodbury	Parcel contains tennis courts and a playground, as well as basketball courts.	Yes	No
60	The Point Park Located west of proposed alignment on the southeast corner of S. Barber Avenue and E. Barber Avenue	0.08 acres	City of Woodbury	Parcel contains sidewalks and landscaped greenspace	Yes	No
61	Stuart Street Play Area Located west of proposed alignment on the southeast corner of Lafayette Avenue & Stuart Street, bordering the train tracks.	1.10 acres	City of Woodbury	Parcel contains a playground and a small field with a pick-up baseball diamond.	Yes	No
	BOROUGH OF WOODBURY HEIGHTS					
62	Veterans' Park Located west of proposed alignment adjacent to the rail ROW between Elm Avenue and Poplar Avenue.	0.77 acres	Borough of Woodbury Heights	Parcel contains a walking path and veterans' monument.	Yes*	Yes
63	Woodbury Heights Elementary School Located east of proposed alignment near the intersection at Academy Avenue and Asam Avenue.	9.23 acres	Woodbury Heights Board of Education	Public elementary school parcel contains a playground, basketball court, and baseball field.	Yes*	Yes

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
64	Helen Avenue Open Space Located east of proposed alignment on the south side of Helen Avenue near the Woodbury Heights Community Center and the Helen Avenue Sports Complex.	5.22 acres	Borough of Woodbury Heights	Parcel is heavily vegetated and abuts Hester's Branch to the east and private residences to the south and west.	Yes	No
	DEPTFORD TOWNSHIP					
65	Oak Valley Ball Fields Located west of proposed alignment along east side of Princeton Boulevard from Swarthmore Road to the Oak Valley Volunteer Fire Company complex.	19.71 acres	Deptford Township	Parcels contain three baseball fields, a concession stand, and a children's playground.	Yes*	No
66	Pond Frontage Located east of proposed alignment and across from Woodbrook Park Playground near the border with Woodbury Heights.	12.67 acres	Deptford Township	Parcels are heavily vegetated and abut a pond.	Yes	No
67	Woodbrook Park Playground Located east of proposed alignment at the northwestern end of Queen Avenue.	0.83 acres	Deptford Township	Parcels are heavily wooded and abut open space around the pond to the west.	Yes	No
68	Princeton Playground Located west of proposed alignment on the south side of Rutgers Avenue between Muhlenberg Avenue and Princeton Boulevard.	0.64 acres	Deptford Township	Parcels contain a playground and basketball court.	Yes	No
69	Wenonah Lake Located west of proposed alignment along the Wenonah Borough border and roughly bounded by Princeton Boulevard, the Oak Valley Volunteer Fire Company complex, Wenonah Lake, and Ogden Station Road.	4.29 acres	Deptford Township	Parcel contains heavily wooded area that abuts Wenonah Lake.	Yes	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
	BOROUGH OF WENONAH					
70	Wenonah Lake Located west of proposed alignment, beginning in the north at the Deptford Township border and running southward parallel to Mantua Creek.	65.78 acres	Borough of Wenonah	Multi-parcel park. Main parcel shares the property with the Public Works building and contains the lake, a volleyball court, and grass field. Other parcels contain the creek and function as easements for trails (Wenonah Lake Loop, Break Back Run, and Mantua Creek).	No	No
71	Wenonah Elementary School Located east of proposed alignment at the northwest corner of E. Elm Street at N. Clinton Avenue.	2.84 acres	Wenonah Board of Education	Public elementary school contains a soccer field, paved play areas, and a playground.	No	No
72	Wenonah Park Located east of proposed and bounded by Southeast Avenue, E. Mantua Avenue, S. Clinton Avenue, and E. Cherry Street.	3.10 acres	Borough of Wenonah	Parcel contains a passive grass field with many trees and a diagonal paved path.	No	No
73	Monongahela Brook Trail Open Space Located east of proposed alignment and running along Monongahela Brook.	44.58 acres	Borough of Wenonah	Parcels contain heavily vegetated areas and function as easements for Monongahela Brook Trail and other trails further to the east.	No	No
74	Mantua Creek Trail Open Space Located west of proposed alignment, abutting Mantua Creek and the borders of Deptford Township and Mantua Township.	14.11 acres	Borough of Wenonah	Parcels contain heavily vegetated areas and function as easements for the Mantua Creek Trail.	No	No
75	Cedar Field Located east of proposed alignment on the southwest corner of S. Clinton Avenue & E. Cedar Street.	3.37 acres	Borough of Wenonah	Parcel contains a baseball field, soccer field, playground, and basketball court.	No	Yes
	MANTUA TOWNSHIP					
76	Mantua Creek Trail Open Space Located west of proposed alignment, abutting Mantua Creek and borders of Deptford Township and Wenonah Borough.	3.59 acres	Mantua Township	Parcel contains heavily vegetated areas and abuts open space in Wenonah Borough that functions as an easement for the Mantua Creek Trail.	Yes*	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
	DEPTFORD & MANTUA TOWNSHIPS					
77	Tall Pines State Preserve Located east of proposed alignment on the southwest corner of Bark Bridge Road and Glassboro Road.	108.78 acres	NJDEP	Parcels contain Gloucester County's first State-owned park featuring extensive hiking and biking trails, as well as grounds for bird watching, on a former golf course. Deptford parcel consists of 59.27 acres while the Mantua portion is 49.75 acres.	Yes*	No
78	Chestnut Branch Park Located west of proposed alignment to the west of Mantua Boulevard.	148.05 acres	Mantua Township	Parcels contain heavily vegetated areas and wetlands that run parallel to Chestnut Branch Creek and lead into Chestnut Branch Park to the southeast.	Yes*	No
79	Greenwich Open Space Located west of proposed alignment between the Fairview Drive to the east and the Bellmeade subdivision (Main Street & Hollybrook Drive) to the west.	36.78 acres	Mantua Township	Parcel contains heavily vegetated areas that abut a segment of Chestnut Branch Creek.	Yes*	No
80	Chestnut Branch Open Space Located west of proposed alignment and running between subdivisions, bounded by Center Street, Main Street and Route 55.	80.15 acres	Mantua Township	Parcels contain heavily vegetated areas and segment of Chestnut Branch Creek.	Yes*	No
81	Mantua Township Community Center Located east of proposed alignment on the southeastern corner of E. Mercer Avenue at Trenton Avenue.	0.55 acres	Mantua Township	Parcel contains a community center that serves as a public cooling space during the summer and functions as a Gloucester County Nutritional Site.	Yes*	No
82	Sewell Park Located east of proposed alignment and adjacent to Mantua Township Community Center at the southwestern corner of E. Mercer Avenue and Mantua Boulevard.	0.98 acres	Mantua Township Board of Education	Parcel contains a playground, basketball court and open field.	Yes*	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
	BOROUGH OF PITMAN					
83	Pitman High School Fields Located east of proposed alignment near the intersection of Edgemoor Avenue at Linden Avenue, opposite Pitman High School.	8.55 acres	Pitman Borough Board of Education	Parcel contains the high school/little league baseball/softball fields along with a practice football field.	Yes	No
84	Pitman High School Located east of proposed alignment and bounded by Linden Avenue, Edgemoor Avenue, Magnolia Avenue, and Waverly Avenue, opposite the Pitman High School Fields.	12.01 acres	Pitman Borough Board of Education	Public high school parcel includes an oval track.	Yes	No
85	Pitman Middle School Located east of proposed alignment and bounded by Esplanade Avenue, Glenmere Avenue, Woodlynne Avenue, and E. Holly Avenue.	4.42 acres	Pitman Borough Board of Education	Public middle school parcel contains a football field and playground.	Yes	No
86	Pitman Middle School "Summit Field" Located east of proposed alignment, opposite Pitman Middle School, and bounded by S. Summit Avenue, E. Holly Avenue, Mt. Vernon Avenue, and residences to the south.	1.64 acres	Pitman Borough Board of Education	Parcel contains two baseball fields.	Yes	No
87	Ballard Park Located west of proposed alignment on the same triangular parcel as the McCowan Memorial Library and bounded by S. Broadway, Pitman Avenue, and Ballard Avenue.	1.30 acres	Borough of Pitman	Parcel is used for passive recreation and contains benches and tables.	Yes	No
88	Sunset Auditorium Located west of proposed alignment and bounded by Laurel Avenue, Lincoln Avenue, and abutting residential properties to the east and south. The auditorium is located on the opposite side of Laurel Avenue from Shertel Park which is beyond the 1,000 foot radius.	0.93 acres	Borough of Pitman	Parcel contains a covered auditorium that serves as a venue for both public and private events, including concerts and family picnics. Parcel also features a public parking lot on either side of the venue.	Yes	No

**Table 2.4-6: Parks, Recreational Facilities, and Open Space Resources Located Within the GCL Study Area
(Continued)**

Map ID	Resource	Area	Ownership	Description/Activities	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
89	Glen Lake Located east of proposed alignment and bounded by W. Jersey Avenue, Glen Lake Avenue, Longmere Avenue, and Glen Lake Boulevard near the Glassboro Borough border.	3.08 acres	Borough of Pitman	Parcel contains Glen Lake and abutting open space used for passive recreation facilities.	Yes	No
	BOROUGH OF GLASSBORO					
90	Glen Lake Located east of proposed alignment and south of Glen Lake in Pitman Borough, running between residences bounded by Glen Lake Boulevard, County Road 553 Alt, and Central Avenue.	5.66 acres	Borough of Glassboro	Parcels contain open space used for passive recreation facilities that connect to the Pitman Borough portion of Glen Lake to the north.	Yes	No
91	Bowe Park Located west of proposed alignment and roughly bounded by S. Cummings Avenue and Ruth Mancuso Lane, opposite Glassboro High School.	26.23 acres	Glassboro Board of Education	Public elementary school parcel (Thomas E. Bowe School) contains a playground and playing fields (basketball, soccer, and baseball).	Yes	No
92	Glassboro High School Located east of proposed alignment and bounded by the rail ROW, Carpenter Avenue, and Joseph L. Bowe Boulevard, opposite Bowe Park.	36.35 acres	Glassboro Board of Education	Public high school parcel contains track and field facilities, playing fields (soccer, football, baseball) and tennis courts.	Yes	Yes
93	Glassboro Sports Complex Located west of the southern project terminus and bounded by Sewell Street, Wilmer Street, and the rail ROW.	18.21 acres	Borough of Glassboro	Parcel contains playing fields (baseball, football and basketball), a playground, and concession stand.	Yes	No
Note: *Indicates that park or open space resource was not directly identified as encumbered by Green Acres requirements within the NJGIN database, but is located within a municipality that has accepted green acres funding						

Source: GCL Project Team; NJDEP – Green Acres Program; New Jersey Geographic Information Network; Delaware Valley Regional Planning Commission; Camden County Tax Assessor; Gloucester County Tax Assessor.

Table 2.4-7: Multi-Use Trail Resources Located Within the GCL Study Area

Map ID	Resource	Length	Responsibility	NJDEP Green Acres Encumbered?	Directly Impacted by GCL
	BOROUGH OF WENONAH & DEPTFORD TOWNSHIP				
A	Wenonah Lake Loop Trail Multi-use trail around Wenonah Lake within Wenonah Lake Park (Park ID 58/59) with portions of the trail running through Wenonah Borough and Deptford Township. Trail is entirely located west of proposed alignment.	0.57 mile	Wenonah Environmental Commission	Yes*	
B	Break Back Run Trail Multi-use trail connecting to Wenonah Lake Loop within Wenonah Borough and Deptford Township. Trail is entirely located west of proposed alignment.	0.48 mile	Wenonah Environmental Commission	Yes*	
	BOROUGH OF WENONAH				
C	Wenonah School Trail Multi-use trail that provides non-motorized access to/from Wenonah Elementary School (Park ID 60) for those on the west side of the rail ROW. Trail is located on the west side of the school parcel and bounded by E. Buttonwood Street and E. Elm Street. Trail is entirely located east of proposed alignment in Wenonah Borough.	0.21 mile	Wenonah Environmental Commission	No	
	BOROUGH OF WENONAH, MANTUA & DEPTFORD TOWNSHIPS				
D	Mantua Creek Trail Wooded trail along Greene's Lake connecting the Break Back Run Trail to the west with the Monongahela Brook Trail to the east via Mantua Creek. The trail travels under the rail ROW and includes portions located to the east and west of proposed alignment within Wenonah Borough, Mantua Township, and Deptford Township.	1.15 miles	Wenonah Environmental Commission	Yes*	
E	Monongahela Brook Trail Multi-use trail extending eastward from Mantua Creek Trail along Greene's Lake in Wenonah Borough. Trail is entirely located east of proposed alignment in Wenonah Borough.	0.71 mile	Wenonah Environmental Commission	No	
Note: *Indicates that park or open space resource was not directly identified as encumbered by Green Acres requirements within the NJGIN database, but is located within a municipality that has accepted green acres funding					

Source: GCL Project Team; NJDEP – Green Acres Program; New Jersey Geographic Information Network; Delaware Valley Regional Planning Commission; Camden County Tax Assessor; Gloucester County Tax Assessor.

In addition to the existing open spaces described in Table 2.4-6, “Parks, Recreational Facilities, and Open Spaces Resources Located Within the GCL Study Area,” and Table 2.4-7, “Multi-Use Trail Resources Located Within the GCL Study Area,” several proposed multi-use trail investments are contemplated for locations near the proposed GCL (please also refer to Section 3.3.4.3., “Pedestrian and Bicycle Access”). As currently contemplated, these trails are conservatively assumed to be in development or in use by time the proposed GCL would be implemented. These trails include:

- Camden/Gloucester County Light Rail with Trail, which would be a planned regional off-road trail approximately adjacent to portions of the GCL alignment from Camden south to Glassboro.
- Dinosaur Trail, an initial segment of which is currently in the active planning/design phase, will extend north from the vicinity of the proposed Rowan University Station north/northwest to New

Jersey 55 near the Pitman Golf Course; additional phases of this project include connections north to Blackwood.

- Monroe Township Bicycle Path is an existing off-road path between Delsea Drive (New Jersey 47) and Blue Bell Road; an extension of this existing facility is proposed west from Delsea Drive into Glassboro, terminating along Sewell Street at the Bridgeton Secondary near the proposed Glassboro Maintenance Facility.
- Bridgeton Secondary is an off-road trail currently in the planning phase, which would provide a direct link into Glassboro, connecting to the proposed Camden/Gloucester County Light Rail.

2.4.9. Aesthetic Features

2.4.9.1. Regional Landscape and Development Patterns

As described in Chapter 1, “Project Description,” the GCL is a proposed 18-mile expansion of transit service in Southern New Jersey that would traverse eleven communities between Camden City and Glassboro Borough. At its approximate midpoint, the proposed project would cross under the New Jersey Turnpike. A broad view of the region reveals that urbanized areas characterize Camden County and much of northern Gloucester County, north of the New Jersey Turnpike. In contrast, much of Gloucester County south of the New Jersey Turnpike is characterized by large expanses of natural areas, such as wetlands, wooded areas, and waterbodies, as well as farmland. These land use and development patterns that are generally apparent in the broad regions north and south of the New Jersey Turnpike, however, are not as readily apparent within the immediate vicinity of the proposed project.

South of the City of Camden, the proposed project would follow an existing Conrail corridor, which is surrounded by residential communities. These residential communities have historically developed alongside passenger service that had been provided in this rail corridor, which is now currently limited to freight operations. Together with the residential development and with the freight rail operations, some areas of light industry have also developed in the vicinity of the proposed project. While neither the residential areas nor the light industrial areas are as expansive or as densely developed as similar land uses found in the cities of Camden and Gloucester to the north, this development along the existing rail corridor south differs from those broader patterns of natural areas and farmland that surround the rail corridor in Gloucester County.

Some natural areas and farmland are present along the corridor, introducing natural scenery amid the suburban development. Primarily due to the characteristically subtle variations in topography, there are no grand vistas or designated scenic views in the vicinity of the proposed project. Visual resources in the vicinity of the area include urban and suburban parklands, as well as larger recreational open spaces that may be adjacent to or part of natural areas (see Attachment 9, “Parklands Technical Report”). Individually designated historic architectural structures, as well as historic districts, are present near the WRTC in the City of Camden and along the existing rail corridor in Brooklawn Borough, Woodbury Borough, Wenonah Borough, and also nearer the southern end in Glassboro Borough. These districts illustrate the extent to which communities surrounding the proposed project developed in tandem with (or after) the existing rail corridor.

2.4.9.2. Study Area

The aesthetic features study area utilized in the visual impact assessment has been delineated at a 1,000-foot radius around the project area in order to relate the visual presence of the project area, as it would exist with and without the proposed project, to its setting of built-up and unbuilt areas. The project area is defined as the LOD for GCL which includes the new rail infrastructure, stations, and associated parking, landscaping and VMFs as well as roadway improvements. Because the aesthetic features study area topography is relatively flat, there are no opportunities for unusual views, or “scenic” vistas, of or through the project area. Instead, the project area is generally visible as a distinct part of the landscape, but it is visible primarily from adjacent properties, beyond which views are generally interrupted by intervening buildings, highway infrastructure, and trees. Thus, the viewshed (the area from which the project area may be visible) is considerably less than 1,000 feet for most of the project area. However, the width of the aesthetic features study area remains set at 1,000 feet so that a conservative approach is taken, and so that the aesthetic features study area comports with the related assessments of Land Use and Parklands, and generally includes the APE for historic architectural structures considered in the Cultural Resources analysis. As such, the aesthetic features study area captures pertinent view corridors of which the project area may be component, as well as all potential direct and indirect land use, parklands, and cultural resources impacts that may have the potential for associated changes to the landscape.

2.4.9.3. Study Area Landscape

Landscape Units

In order to assess the aesthetic character of the aesthetic features study area landscape and determine how it may be changed as a result of the proposed project, the existing landscape is assessed according to a menu of descriptive “landscape units” identified specifically for the aesthetic features study area. Landscape units are defined as distinguishable types of developed or undeveloped areas sharing recognizably similar characteristics and forms, regardless of location in the aesthetic features study area. For example, an agricultural field is likely recognizable as such in virtually any location in the broader region, regardless of crops or season; taken in the context of the aesthetic features study area, the agricultural field is also generally distinguishable from adjacent landscape units, such as naturalized areas or suburban residential development.

Landscape units defined for the aesthetic features study area are as follows:

- ***Agricultural*** – Characteristic of the broader region south of the New Jersey Turnpike outside the more built-up areas of the aesthetic features study area, a few agricultural areas are present in the aesthetic features study area. These landscape units typically comprise fields and may also include a residence and farm buildings associated with the farming operations.
- ***Recreational Open Space*** Individual, designated parkland resources considered herein are those that are larger than an acre in size and therefore large enough to establish a clear landscape component that is visually distinct from surrounding development. Recreational Open Space, as a landscape unit, therefore, is a subset of all parkland resources identified in Attachment 9, “Parklands Technical Report.”
- ***Natural or Naturalized Areas*** – Unbuilt areas in this region tend to be wetland or wooded areas proximate to waterbodies and agricultural areas (particularly in the southern half of the aesthetic features study area).

- **Railway** – A large extent of the project area is existing Conrail ROW. This established linear landform and corridor defined by the clearing of trees and absence of buildings characterizes this landscape unit. Rail infrastructure, including tracks, bridges, and signal equipment, result in a utilitarian visual character, while the presence of some historic passenger stations (not currently in use) illustrates the relationship of the communities to the rail corridor that once provided them with passenger service.
- **Historic Railway Corridor** – The southern portion of the project area was historically developed as railway and has remained an unimproved and distinct component of the development pattern, though it currently lacks rail infrastructure.
- **Regional Highways and Roadways** – Major roadway infrastructure for regional highways maintains a large visual presence throughout the region, and the I-676 elevated highway infrastructure defines a substantial portion of the project area. (Note that no highway in the aesthetic features study area is a designated Scenic Highway, and so views from these roadways are not considered sensitive or evaluated as visual resources.)
- **Grid Residential** – Residential development in older urban and suburban development is typically arranged according to a grid pattern of local streets and rectilinear blocks.
- **Cul-de-sac Residential** – In some suburban residential development, typically developed after World War II, houses line curvilinear streets that end in cul-de-sacs; there is no regular grid of local streets interconnecting with surrounding development and there are no regular block forms.
- **Suburban Apartment Complex** – Unlike many urban apartment buildings that are characteristic of older parts of cities in the northeastern United States, suburban apartment complexes tend to be developments comprising low-rise (typically up to three stories) buildings often arranged around centralized parking lots.
- **Exurban Residential** – Houses, including both historic farmhouses and more recent suburban style homes, may appear outside suburban areas, singularly or in small clusters along roads that are otherwise surrounded by agricultural or natural areas.
- **Unique Residential** – Within the aesthetic features study area, there are occasions in which the residential development (otherwise characterized as Grid Residential) maintains a unifying and unique attribute, such as a unique street pattern that contributes to its urban design and aesthetic character; these Unique Residential areas are generally small and surrounded by other forms of residential development in the aesthetic features study area.
- **Local Commercial** – Pedestrian-oriented commercial areas, traditionally referred to as “downtown” areas, are typical of older urban landscapes, with on-street parking and densely arranged buildings with ground-floor commercial uses opening onto the public sidewalk.
- **Low Density Urban Commercial** – Commercial areas typically present outside downtowns and among suburban areas (or separating urban areas and surrounding suburban residential development) are generally reliant on automobile transportation and, as such, combine large-footprint buildings on large lots with off-street parking (includes “strip-mall” development).
- **Institutional Campus** – Educational buildings, particularly with a formal arrangement of multiple buildings relating to one another via an internal pedestrian system, typify Institutional Campus arrangements. Although other forms may exist in dense urban areas, they exist with fewer and more massive buildings with facades oriented to public streets. Institutional Campuses also may include non-educational uses, such as medical complexes.

- **Midscale Industrial Area** – Although some large areas of heavy industry characterize portions of the Delaware River Waterfront outside the aesthetic features study area, most of the manufacturing uses in the aesthetic features study area are not water dependent (though they may be near water), and instead comprise warehousing and similar uses that are dependent on trucking. These landscapes typically feature large properties, large-footprint buildings of limited height (one- or two-stories), surrounded by outdoor storage lots (for materials and containers) and truck parking areas.

These aesthetic features study area landscape units are considered in terms of their form and aesthetic character, as noted above. In this way the visual appearance of the project area, with and without the proposed project, may be considered in relationship to its project setting. In addition, these landscape units provide the means for considering the people that may be present in each landscape unit, who, by virtue of being near the project area, may have views of it. These people, referred to in this visual impact assessment as “viewer groups,” are those populations typically associated with a given landscape unit. Their typical and routine activities are considered to determine their likely sensitivity to changes in the landscape that may result with the proposed project (i.e., whether, as part of routine behavior, they may be expected to perceive changes to the landscape or to views associated with visual resources as being substantial effects to aesthetic character or visual quality).

Viewer Groups

Viewer groups in the aesthetic features study area include workers in the industrial areas; workers and shoppers in commercial areas; residents in residential areas; and a broad range of visitors, including children, teens, and the elderly, in public parks. Viewer groups also include drivers associated with I-676 and other regional highways and roadways. Each viewer group may be assigned a typical level of activity, such as outdoor labor associated with industrial areas, typically during the daytime in the aesthetic features study area; indoor activity and driving associated with some commercial areas and residential areas (typically suburban), throughout the day and in the evening; outdoor pedestrian activity associated with some local commercial areas and residential areas (typically urban), throughout the day and potentially into the night; and active recreational activity in parks or passive enjoyment of parks throughout the day and into evening (particularly for active recreation areas).

For each type of activity, a viewer may be attributed a corresponding level of attentiveness to the surrounding environs. For example, workers in an industrial yard may have clear views of the project area, but they may not pause to consider the visual quality of the landscape because they are active and attending to the often dangerous work at hand. Similarly, drivers may enjoy views of surroundings, whether built or unbuilt environment, but their focus is on safe driving rather than on the aesthetic character of the surrounding landscape; this is particularly true on highways, where speeds are greater than on local roads, and in built-up areas, where traffic patterns may require greater attention to safe driving. Pedestrians in a downtown commercial area, whether visitors, workers, or residents may be highly aware of their environs, though perhaps most interested in specific street-side activity, as they stroll along the sidewalk, seeking destinations for shopping and dining. Residents of suburban areas are typically focused on their immediate environs, such as yards, suburban streetscapes, and characteristic landscape views from their homes and outdoor areas; thus, residential users may be sensitive to broad changes to the landscape that characterize neighborhood identity, as well as specific changes that visibly alter the appearance of their home landscapes, such as physical changes to property boundaries, landscaping, etc. Active users of recreational open space would be expected to focus their attention on activities in which they are participating (such as ballgames) and not be attentive to off-site surroundings, and crowds gathered to watch sporting events would also be focusing primarily on the recreational

activities interior to the parkland. Hikers and passive users of open space, such as persons resting on park benches to enjoy their surroundings, may be the most highly attuned to the visual quality of the landscape.

2.4.9.4. Visual Resources

Visual resources typically include designated Federal, State or local landmarks (historic, architectural, or natural landmarks); State or locally designated visual resources, including scenic roads; and park and recreational areas. A total of 93 parklands and 17 extant historic resources have been identified in the aesthetic features study area, comprising the full inventory of visual resources considered in this analysis. (See Attachment 7, “Cultural Resources Technical Report,” and Attachment 9, “Parklands Technical Report,” for a complete inventory of these resources.)

2.4.9.5. Parklands

The visual impact assessment has identified 36 parks (not counting multi-use trails) sharing visual connectivity with the project area.

- ***Triangle Park (City of Camden)*** – offers direct, unobstructed eastward views of the project area and I-676 infrastructure (overhead).
- ***Spruce Street (City of Camden)*** – offers partial eastward view of project area and I-676, limited by distance and intervening structures.
- ***6th and Ferry (City of Camden)*** – offers partial eastward view of project area and I-676, limited by distance and intervening trees. Views from the parkland toward the proposed Gloucester City Station site are direct and partial, limited by intervening trees.
- ***Sherman Neighborhood Playground (Gloucester City)*** – offers direct, full eastward views of adjacent project area.
- ***Paul Street Playground (Gloucester City)*** – offers direct, full westward views of the adjacent project area.
- ***Washington Street Playlot (Gloucester City)*** – offers partial westward views of project area, limited by distance and intervening trees.
- ***Thomson Street and Lane Avenue Park (Gloucester City)*** – offers direct, full westward views of adjacent project area.
- ***Wetlands and Ballfields (Borough of Brooklawn)*** – (one of two areas identified as such in Attachment 9, “Parklands Technical Report”) offer partial eastward view, limited by distance and intervening structures and trees.
- ***Wetlands and Ballfields (Borough of Brooklawn)*** – (one of two areas identified as such in Attachment 9, “Parklands Technical Report”) offer partial eastward view, limited by distance and intervening structures and trees.
- ***Memorial Park (Borough of Brooklawn)*** – offers partial westward views of nearly adjacent project area, limited by intervening structures.
- ***Michael Galbraith Park (Borough of Westville)*** – offers partial eastward views of nearly adjacent project area, limited by intervening structures and trees.

- **Park Avenue Baseball Field (Borough of Westville)** – offers partial eastward views of nearly adjacent project area, limited by intervening structures and trees. Views from this parkland toward the proposed Crown Point Station site are full and direct.
- **Westville Borough Park aka “Gateway Boulevard and Chestnut Street Park” (Borough of Westville)** – offers partial eastward views of nearly adjacent project area, limited by intervening structures.
- **Green Street Playground (City of Woodbury)** – offers direct, full eastward view of adjacent project area. Views from the parkland toward the proposed Red Bank Avenue Station site are indirect (oblique) southward and partial, limited by distance and intervening structures and trees.
- **Stewart Lake Park (City of Woodbury)** – offers partial westward views, limited by distance and intervening structures and trees. Views from this parkland toward the proposed Red Bank Avenue Station site are direct and partial, limited by distance and intervening structures and trees.
- **Woodbury Lake Park (City of Woodbury)** – offers direct, full westward and eastward views of the adjacent project area. Views from this parkland toward the proposed Red Bank Avenue Station site are indirect (northward) and partial, limited by distance and intervening structures and trees.
- **Woodbury Lake Park (1) (City of Woodbury)** – offers partial north-westward view toward proposed Red Bank Avenue Station, across the water of Woodbury Lake, limited by distance and intervening structures and trees; otherwise, views toward project area are precluded by distance and intervening structures. Partial westward view from this parkland toward proposed Woodbury Station, limited by distance and intervening structures and trees; otherwise, views toward project area are precluded by distance and intervening structures and trees.
- **Woodbury Lake Park (2) (City of Woodbury)** – offers partial westward view, limited by distance and intervening structures. Views from the parkland toward the proposed Woodbury Station site are indirect and partial, limited by distance and intervening structures and trees.
- **Rotary Park (City of Woodbury)** – offers both direct and indirect, full and partial westward views of project area; otherwise, precluded by distance and intervening structures.
- **Stuart Street Park (City of Woodbury)** – offers partial eastward view of project area, limited by distance and intervening structures.
- **Preserved Open Space (City of Woodbury Heights)** – offers partial view of project area, limited by distance and intervening structures.
- **Veterans’ Park (City of Woodbury Heights)** – offers direct, full eastward view of adjacent project area. Views from the parkland toward the proposed Woodbury Station site are indirect (oblique) southward and partial, limited by distance and intervening structures and trees.
- **Princeton Boulevard Baseball Fields (City of Woodbury Heights)** – offers direct, partial eastward view of adjacent project area. (Active use area has no views, precluded by intervening trees).
- **Woodbrook Park Playground (City of Woodbury Heights)** – offers direct, partial westward view of project area, primarily over water limited by intervening trees.
- **Wenonah Lake (City of Woodbury Heights) (also within Borough of Wenonah)** – offers direct, partial eastward view of adjacent project area, limited by intervening trees.
- **Wenonah Elementary School (Borough of Wenonah)** – offers direct, partial westward view of adjacent project area, limited by intervening trees. Views from the parkland toward the proposed

Wenonah Station site are indirect (oblique) southward and partial, limited by distance and intervening structures and trees.

- **Wenonah Park (Borough of Wenonah)** – offers direct, partial westward view of adjacent project area, limited by intervening trees. Views from the parkland toward the proposed Wenonah Station site are indirect (oblique) northward and partial, limited by intervening structures and trees.
- **Cedar Field (Borough of Wenonah)** – offers direct, full westward view of adjacent project area.
- **Westcott Field (Borough of Wenonah)** – offers direct, full eastward view of adjacent project area.
- **Pitman High School (Borough of Pitman)** – offers partial westward view of project area, limited by distance and intervening structures.
- **Pitman Middle School “Summit Field” (Borough of Pitman)** – offers partial westward view of project area, limited by distance and intervening structures. This parkland has no views toward Pitman Station site, which is located within 1,000 feet of the park (to the southwest).
- **Ballard Park (Borough of Pitman)** – offers direct, full eastward view of adjacent project area. Views from the parkland toward the proposed Pitman Station site are indirect (oblique) northward and partial, limited by intervening structures and trees.
- **Glen Lake (Borough of Pitman) (also within Borough of Glassboro)** – offers direct, partial westward view of adjacent project area, limited by intervening trees.
- **Bowe Park (Borough of Glassboro)** – offers direct, full eastward view of adjacent project area.
- **Glassboro High School (Borough of Glassboro)** – offers direct, full westward view of adjacent project area. Views from the parkland toward the proposed Rowan University Station site are indirect (oblique) from the southernmost portion of the park (the running track), southward and partial, limited by intervening trees.
- **Glassboro Sports Complex (Borough of Glassboro)** – offers direct, full view of adjacent project area (east toward proposed new rail and west toward proposed Glassboro VMF site) some intervening trees.

This visual impact assessment has identified eight view corridors between parkland visual resources (excluding multi-use trails), three of which also share visual connectivity with the project area:

- **Princeton Boulevard Baseball Fields** – Woodbrook Park Playground (City of Woodbury Heights).
- **Bowe Park** – Glassboro High School (Borough of Glassboro).
- **Woodbury Lake Park** – Woodbury Lake Park (1) (City of Woodbury).

The aesthetic features study area contains five existing multi-use trails, all within Gloucester County in the vicinity of the proposed Wenonah Station, between the proposed Woodbury Heights Station to the north and the proposed Mantua Boulevard Station to the south. (See Attachment 9, “Parklands Technical Report,” for a description of the full routes of these multi-use trails; only those portions of the trails sharing visual connectivity with the project area or with other parkland resources in the aesthetic features study area are described here.)

- **Wenonah Lake Loop Trail and Break Back Run Trail (Wenonah Borough and Deptford Township)** – these two trails connect within Wenonah Lake Park to form a singular trail unit. Although Wenonah Lake Park shares views of the project area, the trails do not share views of the park area

that lies in the vicinity of the project area; rather, the trails are situated within the central and western portions of the park, away from the project area. As such, views of Wenonah Lake Park are interior views of the park, and there is no direct visual connectivity with the project area.

- **Wenonah School Trail (Wenonah Borough)** – is located along the eastern edge of the project area. There are direct westward views from the trail to the project area (through some standing trees) which is characterized by the existing freight rail track bed in the vicinity of the trail. Eastward views are characterized by Grid Residential development.
- **Mantua Creek Trail (Wenonah Borough, Mantua Township and Deptford Township) and Monongahela Brook Trail (Wenonah Borough)** – a portion of Mantua Creek Trail runs along the western edge of the project area, while a portion of Monongahela Brook Trail runs along the eastern edge of the project area. Where these trails have views of the project area, it is characterized by the existing freight rail track bed. Both trails also have direct views of the proposed Mantua Boulevard Station site. They connect to one another (across the project area) via a crossing over the existing freight rail corridor.

2.4.10. Air Quality

2.4.10.1. Air Quality Standards and Regulations

The Clean Air Act (CAA) Amendments of 1990 and the Final Transportation Conformity Rule (40 Code of Federal Regulations [CFR] Parts 51 and 93) direct the EPA to implement environmental policies and regulations that will ensure acceptable levels of air quality. In accordance with the CAA, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants. These pollutants, known as criteria pollutants, are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM), sulfur dioxide (SO₂), and lead (Pb), and are summarized below.

Carbon Monoxide – CO, a colorless gas, interferes with the transfer of oxygen to the brain. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Mobile sources are the primary sources of CO in New Jersey. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban “street canyon” conditions. Consequently, CO concentrations must be predicted on a localized, or microscale, basis.

Nitrogen Dioxide – NO and NO₂ are collectively referred to as nitrogen oxides (NO_x) and are major contributors to ozone formation. NO₂, a brownish gas, irritates the lungs. NO₂ is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO₂ also contributes to the formation of PM₁₀, small liquid and solid particles that are less than 10 microns in diameter (see discussion of PM₁₀ below). At atmospheric concentration, NO₂ is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between NO₂ and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 parts per million (ppm).

Ozone – Ozone (O₃) is a colorless toxic gas. O₃ is found in both the Earth’s upper and lower atmospheric levels. In the upper atmosphere, O₃ is a naturally occurring gas that helps to prevent the sun’s harmful ultraviolet rays from reaching the Earth. In the lower layer of the atmosphere, the formation of O₃ is mostly the result of human activity, although O₃ also occurs because of hydrocarbons released by plants

and soil. O₃ is not directly emitted into the atmosphere; it forms in the lower atmosphere through a chemical reaction between hydrocarbons (HC), also referred to as Volatile Organic Compounds (VOCs), and nitrogen oxides (NO_x), which are emitted from industrial sources and from automobiles. Biogenics (natural sources) are the primary source of VOCs and mobile sources are the primary sources of NO_x in New Jersey. Substantial O₃ formations generally require a stable atmosphere with strong sunlight; thus, high levels of O₃ are generally a concern in the summer. O₃ is the main ingredient of smog. O₃ enters the bloodstream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O₃ also damages vegetation by inhibiting its growth.

Particulate Matter – Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate pollution can include dust, soot, and smoke; these can be irritating but usually are not poisonous. Particulate pollution also can include bits of solid or liquid substances that can be highly toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns (PM₁₀) and 2.5 microns (PM_{2.5}) in size.

PM₁₀ – PM₁₀ refers to particulate matter less than 10 microns in diameter, about one-seventh the thickness of a human hair. Major sources of PM₁₀ include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility. In addition, PM₁₀ poses a greater health risk than larger-sized particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. PM₁₀ can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections.

PM_{2.5} – PM_{2.5} refers to particulates that are 2.5 microns or less in diameter, roughly 1/28 the diameter of a human hair. A small portion of particulate matter is the product of fuel combustion processes. In the case of PM_{2.5}, the combustion of fossil fuels accounts for a significant portion of this pollutant. The main health effect of airborne particulate matter is on the respiratory system. PM_{2.5} results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, PM_{2.5} can be formed in the atmosphere *from* gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. Like PM₁₀, PM_{2.5} can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Whereas, particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues.

Sulfur Dioxide – SO₂ is a product of high-sulfur fuel combustion. The main sources of SO₂ are coal and oil used in power stations, industry and for domestic heating. Industrial chemical manufacturing is another source of SO₂. SO₂ is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. SO₂ can also yellow plant leaves and erode iron and steel.

Lead – Pb is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have significantly decreased due to the Federally mandated switch to lead-free gasoline.

The Federal standards for these pollutants are summarized in Table 2.4-8, "National Ambient Air Quality Standards." The "primary" standards have been established to protect public health. The "secondary" standards are intended to protect the nation's welfare, and they account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of general welfare.

Table 2.4-8: National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		Carbon Monoxide (CO)	eight-hour	9 ppm	Not to be exceeded more than once per year
			one-hour	35 ppm	
Lead (Pb)		Lead (Pb)	Rolling three-month average	0.15 $\mu\text{g}/\text{m}^3$ ⁽¹⁾	Not to be exceeded
Nitrogen Dioxide (NO ₂)		Nitrogen Dioxide (NO ₂)	one-hour	100 ppb	98 th percentile, averaged over three years
		Primary and secondary	Annual	53 ppb ⁽²⁾	Annual mean
Ozone (O ₃)		Ozone (O ₃)	eight-hour	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hr concentration, averaged over three years
Particle Pollution	Particle Pollution	Primary	Annual	12 $\mu\text{g}/\text{m}^3$	Annual mean, averaged over three years
		Secondary	Annual	15 $\mu\text{g}/\text{m}^3$	Annual mean, averaged over three years
		Primary and Secondary	24-hour	35 $\mu\text{g}/\text{m}^3$	98 th percentile, averaged over three years
	PM ₁₀	Primary and Secondary	24-hour	150 $\mu\text{g}/\text{m}^3$	Not to be exceeded more than once per year on average over three years
Sulfur Dioxide (SO ₂)		Sulfur Dioxide (SO ₂)	one-hour	75 ppb	99 th percentile of one-hour daily maximum concentrations, averaged over three years
		Secondary	three-hour	0.5 ppm	Not to be exceeded more than once per year

Notes:

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 $\mu\text{g}/\text{m}^3$ as a calendar quarter average) also remain in effect.

(2) The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of a clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. In addition, the previous (2008) O₃ standards remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) In addition, the previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will remain in effect in certain areas: (1) any areas for which it is not yet one year since the effective date of designation under the current (2010) standards, and (2) any areas for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO₂ standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS. ppm = parts per million; ppb = part per billion; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

2.4.10.2. Mobile Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, the EPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (<http://www.epa.gov/iris/>). In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 2011 National Air Toxics Assessment

(<https://www.epa.gov/national-air-toxics-assessment>). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics (MSAT), the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. FHWA, using the ~~latest version of the~~ EPA's Motor Vehicle Emission Simulator (MOVES) emissions program, MOVES2014a, estimates a combined reduction of 91 percent in the total annual emissions for the priority MSATs even as vehicle miles traveled (VMT) increases, as forecast, by 45 percent from 2010 to 2050.

A description of the nine priority MSATs are provided in Attachment 10, "Air Quality Technical Report."

2.4.10.3. Climate Change and Greenhouse Gases

No national standards have been established regarding greenhouse gases (GHGs), nor has the EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO₂ under the CAA. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the U.S. National Academy of Sciences, and the EPA and other Federal agencies. Greenhouse gases are different from other air pollutants evaluated in Federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The *affected environment* for CO₂ and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions, such as actions involving an entire industry sector or large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Further, presently there is no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

2.4.10.4. Attainment Status/Regional Air Quality Conformity

Section 107 of the 1977 CAAA requires that the EPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS. Areas not in NAAQS compliance are deemed nonattainment areas. Areas that have insufficient data to make a determination are deemed unclassified and are treated as being attainment areas until proven otherwise. Maintenance areas are areas that were previously designated as nonattainment for a particular pollutant, but have since demonstrated compliance with the NAAQS for that pollutant. An area's designation is based on the data collected by the State monitoring network on a pollutant-by-pollutant basis.

The project study corridor encompasses both Camden and Gloucester counties. Table 2.4-9, "Project Area Attainment Status," shows the attainment status for those portions of the counties in which the project is located. As shown in the table, both counties are classified as maintenance areas for PM_{2.5} (24-hour standard) and nonattainment for O₃. The project is currently included in the DVRPC FY 2018-2021 TIP as the Second Phase of River LINE Light Rail Transit (LRT)/PATCO Extension, under Transit Rail Initiatives, DB# T300.

Table 2.4-9: Project Area Attainment Status

Pollutant	Camden County	Gloucester County
Ozone (O ₃)	Nonattainment	Nonattainment
Nitrogen Dioxide (NO ₂)	Attainment	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Particulate Matter (PM ₁₀)	Attainment	Attainment
Particulate Matter (PM _{2.5}) Annual/24-Hour	Attainment/Maintenance	Attainment/Maintenance
Lead (Pb)	Attainment	Attainment

Source: U.S. Environmental Protection Agency, 2018

Camden and Gloucester Counties are part of the DVRPC. The DVRPC is the Federally designated metropolitan planning organization for the greater Philadelphia region. The DVRPC represents nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. As the metropolitan planning organization, the DVRPC is directly responsible for making sure that any money spent on existing and future transportation projects and programs is based on a continuing, cooperative, and comprehensive planning process. All transportation projects in the Philadelphia region that receive Federal funding, such as the proposed GCL, go through this planning process.

The DVRPC provides policy direction and oversight in the development of a Federally mandated Transportation Improvement Program (TIP), the Long Range Transportation Plan (LRTP) and the transportation element of the *State Air Quality Implementation Plan* (SIP).

The TIP is financially constrained over five years covering the most immediate implementation priorities for surface transportation projects and strategies from the LRTP. The TIP includes all State and local projects that request Federal dollars to implement (those projects have a State or local dollar match). The DVRPC FY2016 TIP for New Jersey (FY 2016-2019) was adopted by the DVRPC Board on September 30, 2015 and became effective on November 20, 2015. The project is currently included in the DVRPC TIP as the Second Phase of River LINE LRT/PATCO Extension, under Transit Rail Initiatives, DB# T300.

The LRTP guides transportation system improvements for southeastern Pennsylvania and southern New Jersey. It serves as a blueprint for long and short range strategies and actions for developing an integrated intermodal transportation system to facilitate the efficient movement of people and goods. The area's LRTP—*Connections 2045 Long-Range Plan for Greater Philadelphia*—was approved by the DVRPC on October 26, 2017. The project is currently included in the LRTP.

In December 2012, the New Jersey Department of Environment Protection submitted a Maintenance Plan SIP to demonstrate attainment for both the Annual and 24-Hour PM_{2.5} standards. The Maintenance Plan was found adequate for conformity purposes by the EPA in May 2013, and the final approval of that finding became effective in July 2013 (78 FR 37717).

2.4.10.5. Climate Description and Ambient Air Quality in the Study Area

New Jersey has five distinct climate zones/regions. The geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns produce distinct variations in the daily weather between each of the zones. These five zones include Northern, Central, Pine Barrens, Southwest and Coastal.

The proposed project is within the Southwest Zone. The Southwest Zone lies between sea level and approximately 100 feet above sea level. The close proximity to Delaware Bay adds a maritime influence to the climate of this region. The Southwest region has the highest average daily temperatures in the

State and, without sandy soils, tends to have higher nighttime minimum temperatures than in the neighboring Pine Barrens. This region receives less precipitation than the Northern and Central regions of the State, as there are no orographic features, and it is farther away from the Great Lakes-St. Lawrence storm track. It is also far enough inland to be away from the heavier rains from some coastal storms, thus it receives less precipitation than the Coastal Zone.

Prevailing winds are from the southwest, except in winter when west to northwest winds dominate. High humidity and moderate temperatures prevail when winds flow from the south or east. The moderating effect of the water also allows for a longer growing season. Autumn frosts usually occur about four weeks later than in the North and the last spring frosts are about four weeks earlier, giving this region the longest growing season in New Jersey (Office of New Jersey State Climatologist, Rutgers University).

New Jersey Department of Environment Protection maintains a series of monitors throughout the State to measure ambient air quality levels. The air quality data collected at monitors near and within the project's study area for the years 2014-2016 is presented in Table 2.4-10, "Ambient Air Quality Monitoring Data 2014-2016." As All pollutants monitored, with the exception of O₃, are below the applicable NAAQS.

Table 2.4-10: Ambient Air Quality Monitoring Data 2014-2016

			266 Spruce Street Camden County Site ID 340070002			Ancora State Hospital 202 Spring Garden Road Camden County Site ID 340071001			Clarksboro Shady Rest Home Shady Lane and County House Road Gloucester County Site ID 340150002			Morgan Boulevard and I-676 Entrance Ramp Camden County Site ID 340080009			Morris Delair Water Treatment Plant Camden County Site ID 340071007			
			'14	'15	'16	'14	'15	'16	'14	'15	'16	'14	'15	'16	'14	'15	'16	
Carbon Monoxide (CO)	1-Hour	Maximum	1.8	2.0	1.8													
		2 nd Maximum	1.7	1.9	1.7													
		# of Exceedances	0	0	0													
	8-Hour	Maximum	1.5	1.7	1.5													
		2 nd Maximum	1.3	1.5	1.3													
		# of Exceedances	0	0	0													
Particulate Matter [$\mu\text{g}/\text{m}^3$]	PM ₁₀	Maximum 24-Hour										97	114	127				
		Second Maximum											57	110	113			
		# of Exceedances											0	0	0			
	PM _{2.5}	24-Hour 98 th Percentile	22	26	24											24	22	17
		Mean Annual	10.6	10.2	9.4											9.4	9.0	8.1

Table 2.4-10: Ambient Air Quality Monitoring Data 2014-2016 (Continued)

		266 Spruce Street Camden County Site ID 340070002			Ancora State Hospital 202 Spring Garden Road Camden County Site ID 340071001			Clarksboro Shady Rest Home Shady Lane and County House Road Gloucester County Site ID 340150002			Morgan Boulevard and I-676 Entrance Ramp Camden County Site ID 340080009			Morris Delair Water Treatment Plant Camden County Site ID 340071007			
		'14	'15	'16	'14	'15	'16	'14	'15	'16	'14	'15	'16	'14	'15	'16	
Ozone (O ₃) [ppm]	8-Hour	First Highest	0.075	0.090	0.081	0.076	0.076	0.076	0.077	0.080	0.083						
		Second Highest	0.074	0.083	0.078	0.073	0.076	0.076	0.075	0.079	0.079						
		Third Highest	0.068	0.081	0.078	0.069	0.075	0.069	0.071	0.077	0.077						
		Fourth Highest	0.068	0.079	0.078	0.068	0.072	0.069	0.070	0.076	0.076						
		# of Days Standard Exceeded	2	11	9	2	7	2	3	5	7						
Nitrogen Dioxide (NO ₂) [ppb]	1-Hour 98 th Percentile	50	51	52													
	Annual Mean	18.51	13.57	12.24													
Sulfur Dioxide (SO ₂) [ppb]	1-Hour 99 th Percentile	10	16	11													

2.4.11. Noise and Vibration

This section provides a summary of both the noise and vibration assessments conducted for the proposed GCL, considering both its construction and its operational conditions. Descriptions of the existing noise levels at noise- and vibration-sensitive land uses along the proposed GCL corridor are provided herein, together with comparisons of estimated project-generated noise and vibration levels, as they relate to the appropriate Federal Transit Administration (FTA) impact criteria used in determining the potential for project noise and vibration impacts. Attachment 11, "Noise and Vibration Technical Report," includes further information.

2.4.11.1. Overview of Noise

Noise is typically defined as unwanted or undesirable sound. In the natural environment, sound is generated by the vibration of air molecules, which results in small fluctuations in air pressure. As a series of air pressure fluctuations moves through the air, a sound wave is created. Different sound waves may vibrate at different rates or "frequencies"; the faster an object vibrates, the higher the frequency or pitch of the sound wave, while slower vibration rates produce lower sound frequencies.

Noise frequency is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz and abbreviated as Hz). The human ear can detect a wide range of frequencies, from about 20 Hz to 20,000 Hz. However, the sensitivity of human hearing varies with frequency. Therefore, when measuring environmental noise, a weighting system is commonly used to provide a single number

descriptor that correlates well with human subjective responses to changes in sound frequency and perception of level. Noise levels measured using this weighting system are called “A-weighted” noise levels and are expressed in decibel notation as “dB(A).” The A-weighting of noise levels is widely accepted by acousticians as the best method for describing human response to environmental noise. Most Federal and State impact criteria and exposure measures use the dB(A) weighting metric.

The basic parameters of environmental noise that affect human subjective response are (1) intensity or sound level; (2) frequency content; (3) variation with time (e.g., intermittent or continuous); and (4) context (e.g., compared to level and nature of existing sound environment; necessity; time of day). Intensity, or level, is determined by how much the sound pressure fluctuates above and below the atmospheric pressure and is expressed on a logarithmic compressed scale in units of decibels (dB). By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 decibels. On a relative basis, a 1-decibel change in sound level generally represents a barely noticeable change outside the laboratory. A 3–5 decibel change is readily perceptible, whereas a 10-decibel change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

Because environmental noise fluctuates from moment to moment, it is common practice to condense all of its sound energy into a single number, called the “equivalent” noise level (L_{eq}). L_{eq} can be thought of as the steady noise level that represents the same sound energy as the varying noise levels over a specified time period (typically 1-hour or 24-hour, or period-of-use). Often the L_{eq} values during a 24-hour period are used to calculate cumulative noise exposure. One such measure is the Day-Night Sound Level (L_{dn}). The L_{dn} noise descriptor is the A-weighted L_{eq} for a 24-hour period, with a 10-decibel penalty added to noise levels that occur during the nighttime hours (defined as between 10 P.M. and 7 A.M.).

The L_{dn} descriptor was developed to account for the fact that people tend to be more sensitive to sound during the typical sleeping hours. Many surveys have shown that L_{dn} is well correlated with human annoyance, and therefore this descriptor is widely used to describe how humans perceive environmental noise. While the extremes of L_{dn} typically range from 50 dB(A) in a small town residential environment to near 80 dB(A) in a downtown or industrial area of a city, L_{dn} is generally found to range between 55 dB(A) and 75 dB(A) in most communities. Both the L_{eq} and L_{dn} noise descriptors are utilized in this assessment.

2.4.11.2. Overview of Vibration

Ground-borne vibration is described in the FTA Manual as a circumstance where “train wheels rolling on the rails create vibration energy.”⁶ This energy can lead to shaking and rumbling, resulting in impacts to nearby communities. However, for the purposes of this assessment, the “velocity” is the descriptor used to represent impacts related to ground-borne vibration. When evaluating human response, ground-borne vibration is usually expressed in terms of a root mean square (RMS) vibration velocity level. The RMS is defined as the average of the squared amplitude of the vibration signal. As vibration is a varying quantity, the use of the RMS is the best way to describe its magnitude. To avoid confusion with sound decibels, the abbreviation VdB is used to represent vibration decibels. Because the vibration decibel represents a ratio of the vibration quantity, a reference value should always be specified. For the purposes of this report, vibration levels are all referenced to one micro-inch per second (1.0×10^{-6} in/sec).

⁶ Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*; U.S. Department of Transportation, Report No. FTA-VA-90-1003-06, May 2006, section 7-1

Typical vibration levels range from below 50 VdB to 100 VdB (0.000316 in/sec to 0.1 in/sec). The typical human threshold of perception is around 65 – 70 VdB. Unlike airborne noise, most common environmental ground-borne vibration, though present in our surroundings all the time, are generally not perceptible. However, human annoyance from vibration often occurs when vibration levels exceed the threshold of perception by only a small margin. Common sources of perceptible ground-borne vibration include those generated from steel-wheeled rail transit movements, construction activities, and some industrial processes. Conversely, vibration levels generated from traffic movements on roadways are generally below the threshold of perceptibility. There is substantial knowledge about vibration from rail systems. In general, this collective experience indicates the following:

- It is rare that ground-borne vibration from transit systems results in even minor cosmetic damage to buildings. Therefore, the primary consideration for study purposes is whether vibration would be intrusive to building occupants or would interfere with interior activities or machinery.
- According to the FTA Manual, the threshold for human perception is approximately 65 VdB. Vibration levels in the range of 70 to 75 VdB are often noticeable, but acceptable. Beyond 80 VdB, vibration levels are often considered unacceptable.

Regarding human annoyance, there is a relationship between the number of daily events and the degree of annoyance caused by ground-borne vibration.

An important consideration for rail transit projects is the vibration that is transmitted from rail movement on the tracks through the ground to adjacent buildings. This vibration is caused by the interaction or friction between the wheels and rails, resulting in the transmission of vibration waves through the ground. When these ground-borne waves emerge inside the foundation of a building, they may be perceptible to the building occupants. High levels of ground-borne vibration can cause windows, pictures on walls, and/or items on shelves to rattle. However, although the perceived vibration from rail vehicle pass-by can be intrusive to building occupants, the actual impact from vibration is almost never of sufficient magnitude to cause even minor cosmetic damage to the building structure. Vibration levels from diesel light rail vehicle (DLRV) systems typically range from 70 to 87 VdB at speeds of 50 mph and receptor distances of 50 feet. This vibration level range would lie between those anticipated for rapid transit and commuter rail systems.

2.4.11.3. Existing Noise Environment

FTA recommends applying a screening procedure to determine the likelihood of project-related noise impacts. The areas defined by the screening distances are meant to be large enough to encompass all potentially affected locations. The FTA screening distance for transit alignments is 350 feet for sites with an unobstructed line of sight to the transit facility. For proposed VMF sites and maintenance facilities, the screening distance is 1,000 feet. A screening distance of 1,500 feet was used for the park-and-ride facilities. These screening distances were applied from the centerline of the transit corridor to determine the study area limits for noise analysis purposes.

Within a given land use category, noise measurements recorded at one site may be representative of existing conditions, as well as future noise exposure, at other similarly located nearby sites. Therefore, noise readings collected at one monitoring location were used to provide site equivalence to other nearby sites exposed to similar background noise conditions. Physical and operational parameters that would produce the worst-case noise effect—such as notable train speeds, frequency of operation, distance to track and VMF sites—were factors used in selecting representative noise measurement sites.

Noise measurements were conducted throughout the proposed GCL corridor from September 2013 to June 2014, when environmental studies for this project were initiated. These measurements were collected during acceptable seasonal, weather, and traffic pattern periods. A review of land use based on the most recent land use data available throughout the proposed GCL corridor has confirmed that there have been no major changes in land use or new developments in the area since the noise measurements were conducted. Further, there have been no changes to freight service in the GCL corridor since noise measurements were conducted. As such, current background noise conditions are comparable to those in 2013/2014 and the previously collected noise measurements are considered valid.

All field measurements were collected in accordance with the procedures described in the FHWA Measurement of Highway-Related Noise (Report Number FHWA-DP-96-046, May 1996). Noise measurements were collected using Larson Davis LD-720 sound level meters. The LD-720 complies with ANSI Standard S1.4 for Type 2 accuracy. The outdoor assemblies were mounted at a height of five feet above the ground surface on a tripod and at least six feet away from any sound-reflecting surfaces to avoid major interference with source sound levels being measured. The sound level meters' laboratory calibration was checked before and after sound level readings with a precision Brüel and Kjær Type 4231 sound level calibrator. Noise measurements at all locations were made using dB(A), which best corresponds with the hearing perception of humans. The data were digitally recorded and stored in the sound level meters and displayed at the end of the measurement period in one-hour L_{eq} decibel units. All noise measurements were collected during precipitation free weekdays with a wind speed of less than 15 mph.

Twenty-seven representative measurement sites were identified within the proposed GCL study area corridor. All 27 sites were also chosen as receptors for the noise impact assessment. Seventeen of these 27 sites are in communities where there would be a likelihood of increased noise exposure from daily project-related service operations. The likelihood of impact could be related to their proximity to the proposed track and at-grade crossings. Locations where train speeds would be greatest were also considered. These sites are identified with the "M" prefix. Long-term, 24-hour continuous noise measurements were collected at each of these 17 representative sites. In addition, 24-hour noise measurements were collected at four representative residential properties identified near the proposed VMF sites. The proposed VMF sites would be located in the communities of Woodbury Heights and Glassboro. Receptor sites near the proposed VMF sites are designated by the "Y" prefix. Noise measurements were also collected at six FTA Category 3 land use sites identified within 150 feet of the proposed GCL alignment. The six sites consisted of five parks and one public library. These receptors are identified with the "PK" prefix on the figures and summary tables.

A summary of the measured noise levels is provided in Table 2.4-11, "Summary of Existing Measured Sound Levels." The L_{dn} values, which are derived from measured hourly L_{eq} noise levels, ranged from approximately 58 dB(A) L_{dn} at Receptor M08 (single-family residences at 348 East-West Jersey Avenue in Woodbury Heights) to 79 dB(A) L_{dn} at Receptor M01 (includes the Cooper Hospital area and nearby residences on Haddon Avenue in Camden) and Receptor Site M05 (single-family residences at 800 Gateway Boulevard in Westville). Existing ambient L_{dn} levels estimated near proposed VMF sites were low to medium for residential areas, varying from 54 dB(A) at Site Y02 to 65 dB(A) at Y04. Peak-hour noise measurements at the six FTA Category 3 land uses ranged from 57 dB(A) L_{eq} at Veterans' Park to 67 dB(A) L_{eq} at Bowe Park.

Table 2.4-11: Summary of Existing Measured Sound Levels

Site ID	Description of Measurement Location	Land Use	Measured Day-Night Noise Levels (L _{dn} dBA)
M01	501A Haddon Avenue, Camden and Cooper Hospital	Residential/Hospital	79
M02	911 South 9 th Street, Camden	Residential	71
M03	56 South Railroad Avenue, Gloucester City	Residential	76
M04	5 ½ Railroad Lane, Westville	Residential	65
M05	800 Gateway Boulevard, Westville	Residential	79
M06	926 Washington Avenue, Woodbury	Residential	77
M07	93 Wallace Street, Woodbury	Residential	70
M08	348 East-West Jersey Avenue, Woodbury Heights	Residential	58
M09	1 Cedar Street, Wenonah	Residential	62
M10	870 East Atlantic Avenue, Sewell	Residential	69
M11	304 Montgomery Avenue, Pitman	Residential	67
M12	827 West Jersey Avenue, Pitman	Residential	69
M13	43 Zane Street, Glassboro	Residential	69
M14	11 Church Street, Glassboro	Residential	65
M15	Girard House #14, Rowan University, Glassboro	Residential	69
M16	Stewart Park, Measurement taken at 168 Laurel Street, Woodbury	Residential	65
M17	816 Essex Street, Gloucester City	Residential	65
Y01	560 Chestnut Street near East-West Jersey Avenue, Woodbury Heights	Residential	60
Y02	601 Park Avenue, Woodbury Heights	Residential	54
Y03	39 Sewell Street near Highland Avenue, Glassboro	Residential	63
Y04	530 Ellis Street, Glassboro	Residential	65
PK01	Gloucester City Public Library, Gloucester City	Institutional	64 ¹
PK02	Thompson Street and Lane Avenue Park, Gloucester City	Park	59 ¹
PK03	Green Street Playground, Woodbury	Park	60 ¹
PK04	Veterans' Park, Woodbury Heights	Park	57 ¹
PK05	Ballard Park, Pitman	Park	59 ¹
PK06	Bowe Park, Glassboro	Park	67 ¹

Note: Peak-hour L_{eq} (1hr) dBA noise levels.

Source: GCL Project Team, WSP USA, January 2018