New Jersey Turnpike Authority
Newark Bay–Hudson County Extension
Interchange 14 to Interchange 14A / Newark Bay Bridge Replacement and Associated Improvements

FINAL ENVIRONMENTAL ASSESSMENT
TECHNICAL APPENDICES

Submitted to:

UNITED STATES COAST GUARD
U.S. DEPARTMENT OF HOMELAND SECURITY

Submitted by:

New Jersey Turnpike Authority

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Appendix 3.3

Land Use

3.3 Land Use

3.3.1 Study Area and Data Collection

"Land use" is the term used to describe the human use of land (EPA 2021). It represents the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place.

For assessment of potential impacts to land use the study area is the NB-HCE corridor between Interchanges 14 and 14A including portions of Newark, Bayonne, and Jersey City within approximately a quarter mile (1,320 feet) of the NB-HCE (see Figures 3.3-1a and 3.3-1b). This distance reflects the typical extent of freeway operational and accessibility effects, for example, noise and development influence, on land uses near the freeway.

Land use changes occur constantly and at many scales and can have effects on air and water quality, watershed function, generation of waste, extent and quality of wildlife habitat, and human health. Transportation infrastructure has always been a critical element to land development in Newark, Bayonne, and Jersey City. The Morris Canal was constructed in the 1830s, linking Jersey City to the Delaware River and solidifying the city's central role in waterborne transportation. In the mid to late nineteenth century, major railroad companies built lines through the cities to terminals along the Hudson River waterfront, serving commerce between Manhattan and New Jersey and the nation's interior. The western edge of Newark Bay was originally the Newark Meadows, shallow tidal wetlands covering about 12 square miles. In the 1910s, the city of Newark began excavating an angled shipping channel in the northeastern quadrant of the wetland. This became the basis of Port Newark. Work on the channel and terminal facilities on its north side accelerated during World War I, when the federal government took control of Port Newark. The PANYNJ was formed in 1921 and the Newark Bay Channels were authorized by the Rivers and Harbors Acts in 1922. Shipping operations languished after the war, and in 1927, the city of Newark started construction of Newark Airport (now known as Newark Liberty International Airport [EWR]) on the northwestern quadrant of the wetlands that lay between Port Newark and the edge of the developed city. The Port Authority took over the operations of Port Newark and Newark Airport in 1948 and began modernizing both facilities and expanding them southward.

On the east side of Newark Bay, Bayonne became one of the largest centers in the nation for refining crude oil notably including the Standard Oil of New Jersey's facility, originally established in 1877, which employed approximately 6,000 workers. A 430-acre site in Bayonne on the Upper New York Bay waterfront that had been originally developed for industrial uses in the 1930s was taken over by the U.S. government during World War II as the Military Ocean Terminal at Bayonne. Meanwhile, the development of the railroad system required the expansion of Jersey City's eastern boundary to extend into the Hudson River, which resulted in filling low-lying wetlands. This historic area of fill accounts for a large portion of the city's total land acreage.

By the time the NB-HCE and NBB were constructed in the mid-1950s, highway routes were already well developed between the New Jersey mainland and the Hudson County peninsula, most notably the Goethals Bridge/Bayonne Bridge route and the Pulaski Skyway constructed in the 1920s as efforts to adapt to individual passenger vehicles and heavy commercial truck traffic took hold. The NB-HCE was built largely on filled land alongside railroad routes now comprising the Consolidated Rail Corporation's (Conrail's) National Docks Branch.

Figure 3.3-1a. Land Use, Community Resources and Proposed Development – Newark

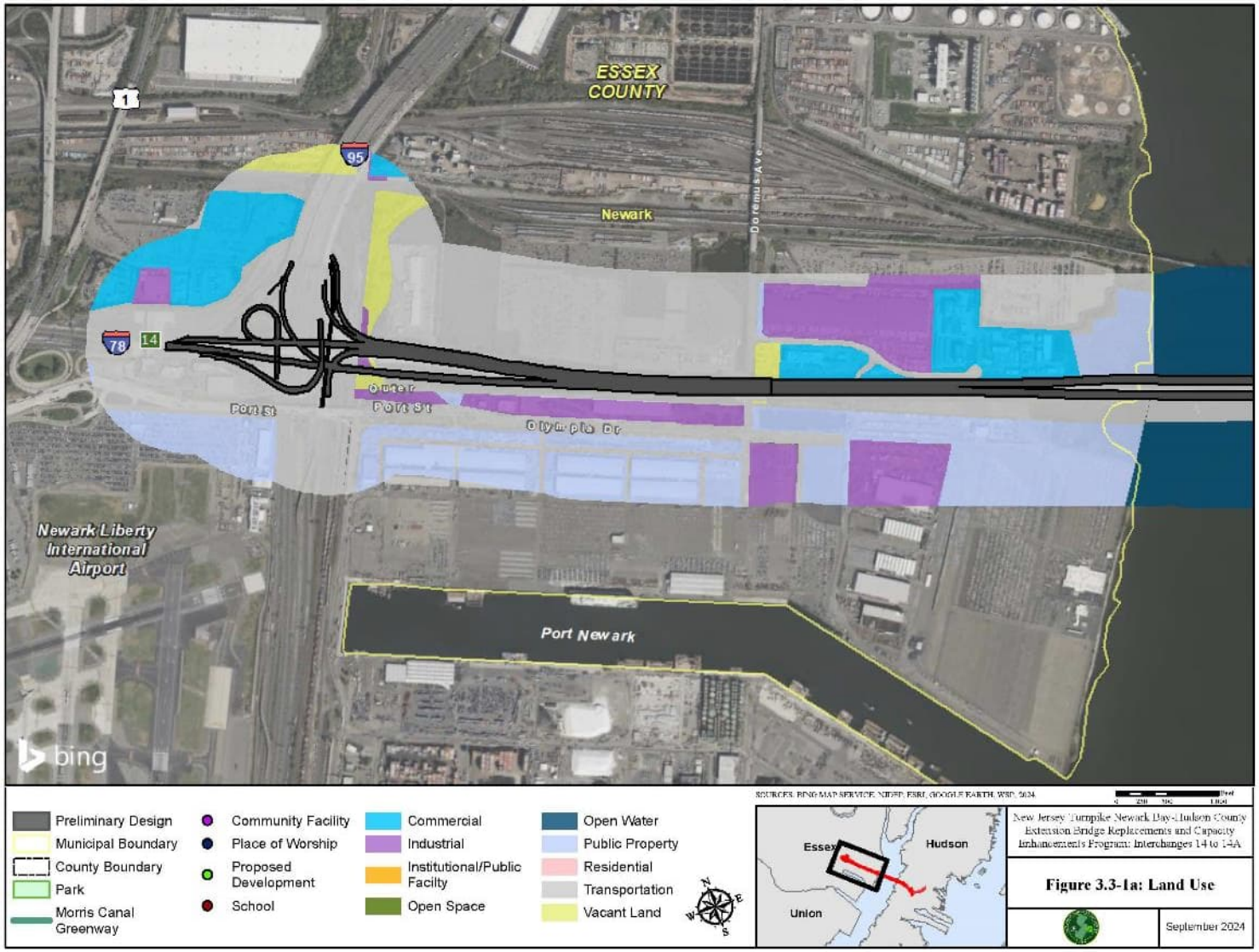
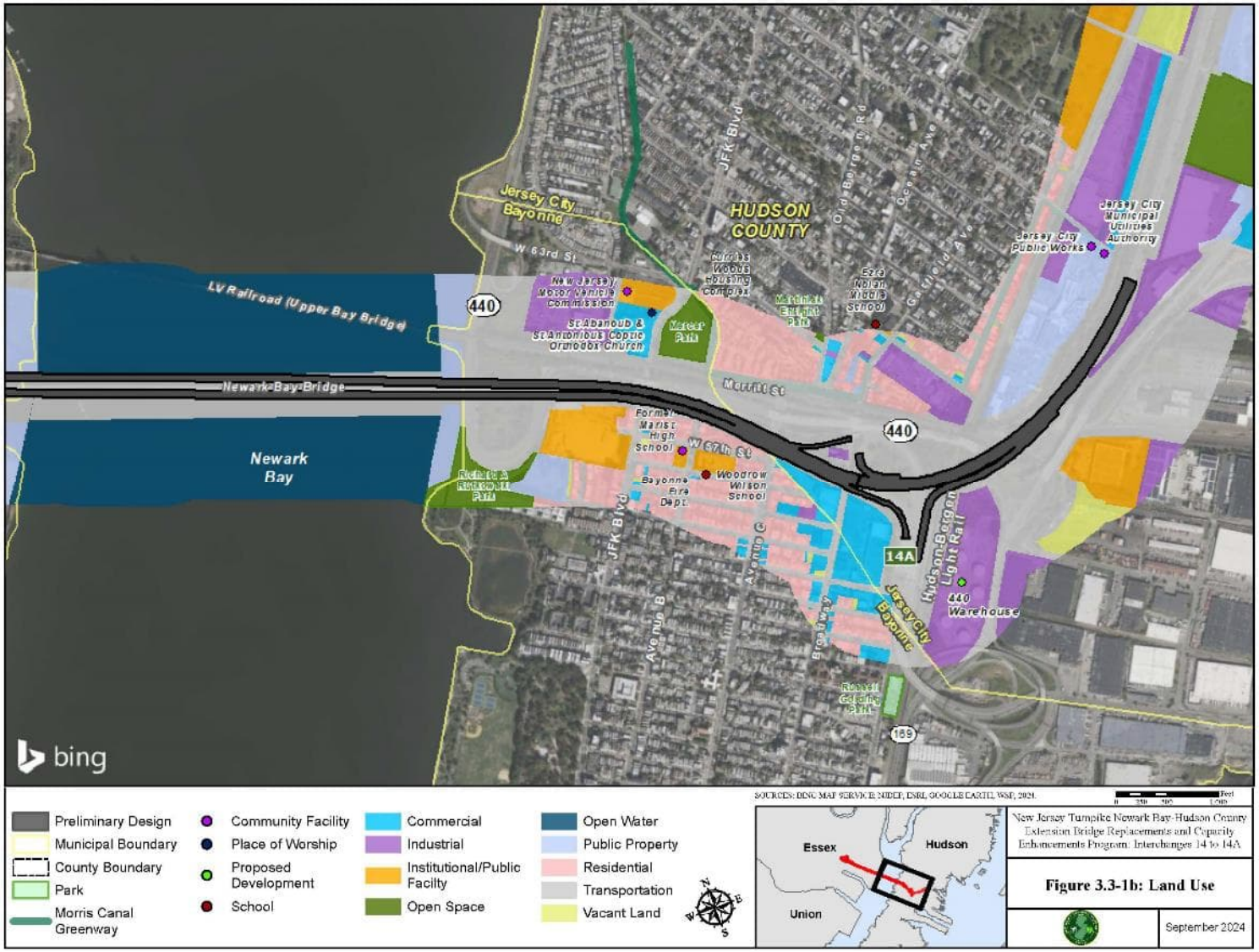


Figure 3.3-1b. Land Use, Community Resources and Proposed Development – Bayonne and Jersey City



Sources of data characterizing existing land uses within the study area include municipal and other governmental land use and zoning mapping and comprehensive plans, coordination with municipal planning and engineering departments, as well as windshield survey and aerial photographic analysis of the area. Parkland was identified through a search of the Recreation and Open Space Inventory (ROSI) database maintained by the New Jersey Department of Environmental Protection (NJDEP) Green Acres Program and the Office of Transactions and Public Land Administration (NJDEP 2022). The ROSI database includes municipal, county, and nonprofit parkland encumbered as a condition of Green Acres funding. Other sources consulted for parkland information include NJDEP's Division of State Parks and Forests online directories, the U.S. Department of the Interior National Park Service online directory, and a map of Federal Land and Water Conservation Fund supported projects maintained by the Land and Water Conservation Fund Coalition.

3.3.2 Methodology and Criteria

The assessment of the effects on land use of the No Action and Proposed Action alternatives evaluated the following relevant considerations:

- Whether the alternative would conflict with local and State plans.
- Whether the alternative would result in displacement or relocation of existing or planned residences or businesses.
- Whether the alternative would encroach on, affect access to, or otherwise affect parks, community facilities, or places of worship.

With respect to compliance with other applicable regulatory processes, the NJ Turnpike system is not subject to local land use regulations and the New Jersey Development and Redevelopment Plan (the "State Plan") is guidance to State agencies and is not regulation of State agency activities. Diversion or disposal of parkland encumbered by New Jersey's Green Acres Program is subject to approval of the NJDEP Commissioner and the State House Commission. However, as no parkland will be acquired under the Proposed Action, there will be no disposal or diversion of parkland and the regulation creating the Green Acres Program does not apply to the project.

3.3.3 Existing Conditions

3.3.3.1 Planning and Land Use by Municipality

New Jersey Municipal Land Use Law requires that municipalities update and adopt a new master plan every 10 years as a blueprint for shaping the municipality's future. This section describes master plans and redevelopment plans relevant to the land use study area, as well as current land uses by type.

City of Newark – The City of Newark Master Plan was updated in 2022 through the "Newark360, Shaping Our City Together" initiative (City of Newark 2022a). Newark 360 is grounded in health, equity, and resilience and includes the following goals:

- Connect Newarkers to well-paying jobs within the city.
- Protect our residents from vulnerabilities.
- Continue to leverage our educational and medical anchor institutions.
- Leverage our assets – the Airport, Sea Port, and Industrial Districts as economic engines for the city.
- Continue to foster new jobs, clean industries, and a range of industry sectors.
- Support and encourage locally grown businesses across all sectors.
- Build Community Wealth for all Newarkers.
- Support Newark's diverse and vibrant arts and culture scene.
- Bring new vibrancy to our existing historic buildings and public spaces.

- Support Newark's artists and makers.
- Enhance the accessibility, functionality, experience, and condition of Newark's existing parks.
- Pursue opportunities to expand the park system and add usable green space to the city.
- Connect Newark neighborhoods to each other and to job centers.
- Invest in and expand our neighborhood corridors.
- Ensure affordable housing at all income levels, calibrated to needs of each neighborhood.
- Increase neighborhood health, resilience, and preparedness for climate change impacts.
- Ensure housing security for Newark families.
- Improve the quality of Newark's building stock.
- Enable Newarkers of all ages and abilities to safely move around the city.
- Leverage sustainable development to improve outdoor air quality.
- Expand access to resources for healthier living.
- Address the legacy of environmental injustice by investing in community development.
- Create capacity to manage stormwater equitably.
- Bridge the digital divide for all Newarkers.
- Leverage the energy transition to build a cleaner, greener, smarter, and more efficient city.
- Expand regional connectivity and recreation networks.
- Improve existing transit infrastructure.

There are no redevelopment plans for any area of the city within this project's study area. However, Newark initiated a planning process in 2020 known as Forward Bound Doremus for the City's core port-industrial area anchored by Doremus Avenue with a southern boundary of the NB-HCE. A redevelopment plan has not yet been published.

Land use in the Newark portion of the study area is consistent with that shown on the Newark Zoning Map (City of Newark 2022b) and consists of the following designations:

- EWR: Airport/Airport Support north and south of the NB-HCE and west of the NJ Turnpike Mainline (related to Newark Liberty International Airport).
- I-3: Industrial High north of the NB-HCE and between the NJ Turnpike Mainline and Newark Bay.
- PORT: Port Industrial south of the NB-HCE and between the NJ Turnpike Mainline and Newark Bay (Port Newark).

There are no public parks, community facilities, places of worship, or proposed developments in the Newark portion of the study area (Figure 3.3-1a).

City of Bayonne – Bayonne completed a Reexamination of its 2000 Master Plan in 2017 (Bayonne 2017). The primary areas of focus of the 2000 Master Plan were affirmed through the Reexamination, including the following items, among others: redevelopment of the Military Ocean Terminal as a livable and real urban district with a thriving mixed-use center with a deepwater port; promoting the Broadway Central Business District as a livable and real urban district; and capitalizing on the Hudson-Bergen Light Rail Transit Stations (Avenue E Transit District) (City of Bayonne 2000). The Reexamination noted that at that time the Authority was reconstructing Interchange 14A to address congestion and inadequate connections that were identified in the 2000 Plan. The 2017 Reexamination supported the Port Jersey complex as an active marine terminal, including providing adequate truck and freight access with an emphasis to increase intermodal connections. Another major objective was to increase the supply and location of parkland in the city and promote the Newark Bay/Hackensack River Walkway (now referred to as the Hackensack RiverWalk) (City of Bayonne 2017).

Land use in the Bayonne portion of the study area is generally consistent with that shown on the Bayonne Zoning Map (City of Bayonne 2020), proceeding from west (Newark Bay) to east (Interchange 14A) as follows:

- C-2: Community Commercial District.
- R-M: High Density Residential District.
- R-2: Detached/Attached Residential District (the predominant district in the Bayonne portion of the study area).
- R-3: Medium Density Residential District.
- UBD: Uptown Business District (Broadway).
- TDD: Transit Development District (Avenue E).
- IL-B: Light Industrial District B.
- BMHO: Bayonne Metropolitan Harbor District (including portions of Port Jersey).

Specific land uses of interest in the Bayonne portion of the study area are shown on Figure 3.3-1b.

There are three public parks in the Bayonne portion of the study area: Richard A. Rutkowski Park, Mercer Park, and Russell Golding Park. These parks are described as follows:

- Richard A. Rutkowski Park (formerly known as Bayonne Passive Waterfront Park, or North Forty Park) is on a 40-acre former industrial site on Newark Bay south of the NB-HCE that received funding for constructing wetland restoration, observation decks, bike trails and other amenities through NJDEP's settlement with a company over natural resources damages (NJDEP 2005). The park is used for bird watching and recreation and has a walking path, a bike path, a Boatworks Monument, and parking facilities. The park is accessed from NJ Route 440 southbound and adjoining Stephen R. Gregg County Park via the Hackensack RiverWalk. Richard A. Rutkowski Park is accessed via transit by JFK Boulevard (NJ TRANSIT 10 and 119 buses).

  The City received Green Acres funding for improvements at Rutkowski Park under Green Acres Project: 0901-00-067 resulting in the park being encumbered by Green Acres (NJDEP 2023). The Authority coordinated with the City of Bayonne, NJDEP's Public Land Compliance Office of Transactions and Public Land Administration, and the NJ Department of Transportation (NJDOT) on the history of Rutkowski Park and researched public records of Rutkowski Park's boundaries and Green Acres encumbrance. Based on this coordination and research, it was determined that Rutkowski Park lies within a portion of City of Bayonne Tax Block 12, Lot 2 and that NJDOT is the owner of Block 12, Lot 2. In 2000, NJDOT entered into a 99-year lease with the City of Bayonne on a portion of the property for "…the right to use the leased property for conservation and public recreation purposes and other public uses."

- In 2003, the Hudson County Department of Public Resources Division of Parks and Recreation published the Hackensack RiverWalk Plan, a planned 8-mile waterfront park extending from Newark Bay in Bayonne through Jersey City to Bellman's Creek in North Bergen. The RiverWalk is contemplated to extend north from Richard A. Rutkowski Park and cross under the NBB adjacent to NJ Route 440 (Hudson County 2003).
- Mercer Park, located on the boundary of Bayonne and Jersey City north of the NB-HCE, is a 6.5-acre park established in 1909 and is part of the Hudson County parks system. Mercer Park contains walkways, two basketball courts, a lighted field for the dual use of youth baseball and football, a playground, spray park, outdoor fitness stations, and a picnic grove (Hudson County 2022). Mercer Park is accessed via transit by JFK Boulevard (NJ TRANSIT 10 and 119 buses) and Merritt Street (NJ TRANSIT 6 and 81 buses). Mercer Park is listed on the Green Acres ROSI (NJDEP 2022).
- Russell Golding Park is a 20.2-acre park established in 1969 located south of the Interchange 14A toll

plaza on Avenue E between 48th and 50th streets. It contains a spray park, playground, basketball courts, benches, and walking paths. It was announced in 2022 that the park is to receive $5 million in federal funding for renovations. The park is accessed by transit via NJ TRANSIT 10, 119, and 81 buses and the Hudson-Bergen Light Rail 45th Street Station. Russell Golding Park is listed on the Green Acres ROSI (NJDEP 2022).

None of these parks were identified as having received funding through Section 6(f) of the Land and Water Conservation Fund Act of 1965 sources. No other parkland in the Bayonne portion of the study area was identified.

There are three community facilities in the Bayonne portion of the study area: Bayonne Fire Department Engine Company No. 6, Ladder Company No. 3 at 329 Avenue B; Woodrow Wilson Community School at 101 West 56th Street south of the NB-HCE; and the New Jersey Motor Vehicle Commission (MVC) Agency at 1347 JFK Boulevard. The Woodrow Wilson Community School educates approximately 750 students (pre-K through 8th grade) and is part of the Bayonne School District. The MVC Agency provides licensing services.

There is one place of worship in the Bayonne portion of the study area: St. Abanoub and St. Antonius Coptic Orthodox Church at 1325 JFK Boulevard north of the NB-HCE.

One proposed development/redevelopment plan was identified in the Bayonne portion of the study area, specifically, the proposed redevelopment of the former Marist High School property by a private developer and owner of the property: 1241 JFK Boulevard IPX, LLC (Figure 3.3-1b). The property (redevelopment area) consists of four land lots and one tax lot in the northwestern portion of the city. The structures on the property were demolished in 2022. One lot was home to the three-story school, two lots each contained one small building on the northwest portion of the site, and the fourth lot contained a soccer field. The tax lot is the site of a billboard. The site is surrounded by the NB-HCE to the north, residential properties to the south, Rutkowski Park to the west, and frontage on JFK Boulevard to the east. The redevelopment area is zoned for both residential and industrial uses (Israel 2021, 2022).

The redevelopment plan was adopted by the Bayonne Planning Board in December 2021 (Hudson Reporter 2021). Under the redevelopment plan, permitted uses include: multi-family residential; assisted living; community center; self-storage; warehouse; office space; agricultural growing operations (both indoor and rooftop); retail uses not to exceed 20,000 square feet; hotel auto rental facilities; free-standing billboards; retail non-trucking fuel sales; equipment sales; art galleries; educational uses, including special needs; streets, sidewalks, and walkways; and any combination except warehouse and residential. Permitted accessory uses include: outdoor storage; business offices; pharmacy medical offices; wall-mounted electronic billboards; food service for employees; fitness centers and gyms; residential amenities; off-street parking; signage; rooftop solar arrays; outdoor plazas; outdoor seating, fences, landscaping, lighting, utilities, and refuse enclosures. Wall-mounted electronic message boards would only be on the north facing the NB-HCE.

City of Jersey City – Jersey City's Master Plan was adopted in 2021 (Jersey City 2021a) along with updated Open Space (Jersey City 2021b) and Land Use Elements (Jersey City 2021c). The Land Use Element outlines the following Land Use Principles, with an expanded description of those principles relevant to the Proposed Action:

- Continue efforts to enhance residential neighborhoods.
- Ensure the City's available housing is balanced and meets the needs of all current and future city residents.
- Promote the development of a diversified economy. The Greenville Port[1] is a major driver of economic

[1] The Jersey City Master Plan refers to the area including Port Jersey PAMT as "the Greenville Port."

activity and has continued to thrive, largely due to growth in global trade. The City should continue to support the infrastructure and other needs of a twenty-first century port. Land use policies should provide for sufficient land-side facilities in port areas to serve port growth and generate port-oriented development (e.g., adequate rail service, road connections and storage). Given Jersey City's location along the highway network and proximity to New York City, there are also opportunities for last-mile distribution centers at or around highway interchanges.

- Strengthen neighborhood-oriented commercial areas.
- Promote innovation and industrial activity that is cleaner, greener, and job creating.
- Provide flexibility that allows large format retail and offices to adapt.
- Make the City more walkable, bikeable, transit friendly, and less reliant on the automobile. There is a particular need in Jersey City to reconnect areas separated by highway and utility infrastructure or superblock development. The City should require new development to make improvements to the circulation network and streetscape that increase safety and facilitate circulation for pedestrians and bicyclists.
- Improve open space assets and connect them to each other and into the community. The City should link existing parks and open space assets to form interconnected greenways that provide connectivity to neighborhoods, public facilities (i.e., schools and libraries) and employment areas. This network should include continued efforts to complete public access along both the Hudson and Hackensack Rivers and leveraging opportunities to reuse legacy infrastructure for greenways (e.g., Bergen Arches, Sixth Street Embankment, and Morris Canal). Development around these areas should support the transformation of these assets for public recreational use.
- Recognize and promote the richness of the City's historic assets and cultural diversity.
- Celebrate and beautify the public realm. In addition, more could be done to identify and strengthen gateways into the City as well as into individual neighborhoods.
- Protect and restore environmental assets and plan for sustainability. Reducing potential impacts from flooding remains one of the City's most pressing needs. High volumes of surface water runoff from impervious surfaces exacerbate flooding during storm events, particularly in low-lying areas.
- Upgrade community facilities and infrastructure to accommodate population growth and address changing needs and ensure that major institutions can continue to thrive.
- Undertake zoning revisions to consolidate districts, clarify regulations, and address current issues.

Specific land uses of interest in the Jersey City portion of the study area are shown on Figure 3.3-1b. Land use in the Jersey City portion of the study area generally conforms with the Jersey City Zoning Map (Jersey City 2021d). Predominant zoning districts and land uses in the Jersey City portion of the study area proceeding west to east are as follows:

- NC: Neighborhood Commercial (along JFK Boulevard beginning approximately 1,000 feet north of the NB-HCE and NJ Route 440).
- R-3: Multi-Family Mid-Rise (north of NJ Route 440 and along Merritt Street).
- HC: Highway Commercial (south of NJ Route 440 along Garfield Avenue and Avenue C).
- R-1: One- and Two-Family Housing.
- PI: Port Industrial

The R-3 district encompasses the Jersey City Housing Authority-operated Curries Woods, one of five conventional public housing developments in Jersey City that includes senior housing. Curries Woods comprises one 14-story/91-unit building, 13 two- and three-story/120 units total townhouses, and 20 two-story/84 units total townhouses. Curries Woods also has a 14,500 square-foot Community Revitalization

Center, a multi-purpose space accommodating community room space, Head Start Program, and support services (Jersey City Housing Authority 2020).

The Ocean Avenue South Redevelopment Plan Area, between the R-3 and R-1 zoning districts, includes 115 properties fronting on Ocean Avenue in an approximately 21-acre area from Merritt Street to Cator Avenue (Jersey City 2016). The Redevelopment Plan was adopted in 2016 with the purpose of fostering the redevelopment and rehabilitation of Ocean Avenue by providing land use regulations tailored to existing land uses as well as existing social, economic, and historic fabric in order to return Ocean Avenue South to a flourishing main street and neighborhood destination. Transportation uses separate the NB-HCE from the R-3 and R-1 zoning districts and the redevelopment area, specifically, NJ Route 440 and the National Docks Secondary freight rail line.

The portion of Jersey City south of the NB-HCE and west of the Interchange 14A toll plaza is an "HC: Highway Commercial" zoning district. This area includes commercial properties along Avenue C and Garfield Avenue.

Industrial properties fronting on NJ Route 440 east of the Interchange 14A toll plaza, the PSEG Greenville substation on Garfield Avenue between the NB-HCE and NJ Route 440, and the Jersey City Public Works complex are within the "PI: Port Industrial" zoning district. There is one proposed development in the PI District, 440 Warehouse, which borders NJ Routes 440 and 185. A developer is seeking variances for approval to construct an approximately 1.4 million square-foot warehouse with 1,548 parking stalls, 430 van stalls, and 33 trailer parking stalls.

The Greenville Industrial Redevelopment Plan Area covers the large area generally east of NJ Route 440 and the NB-HCE east of Interchange 14A. This area includes the Port Jersey PAMT and Greenville rail yard as well as other industrial and warehouse uses. The Redevelopment Plan was adopted in 1989, with amendments through 2013, and provides for "comprehensive development regulations to strengthen the industrial nature of the Redevelopment Area" (Jersey City 2013).

There is one public park in the Jersey City portion of the study area, Martiniak-Enright Park located at Pamrapo Avenue and Old Bergen Road north of the NB-HCE. The "parklet" opened in 1949 to honor two Pamrapo Avenue residents who died while fighting in World War II. In 2019, Jersey City announced that $200,000 from its Open Space Trust Fund would be used for a complete overhaul of the park, including landscaping, benches, and other passive improvements. Transit access to the park is via the NJ TRANSIT 81 bus line which runs along Old Bergen Road. Martiniak-Enright Park is listed on the Green Acres ROSI (NJDEP 2022). The park was not identified as having received funding through Section 6(f) of the Land and Water Conservation Fund Act of 1965 sources. No other parkland in the Jersey City portion of the study area was identified.

In 2013, Jersey City published the Morris Canal Greenway Plan (Jersey City 2013). The purpose of the study was to prepare a plan for a bicycle and pedestrian greenway that is, to the greatest extent possible, on the six-mile former right-of-way of the historic Morris Canal in Jersey City. The proposed Morris Canal Greenway would be a linear bicycling and walking route that can be used to access public destinations across the interior of the city and link the Hudson and Hackensack Rivers. A 2018 Morris Canal Greenway Corridor Study was published by the NJTPA envisioning a continuous pedestrian and bicycle route across the state of New Jersey, connecting people and places and giving new purpose to the state's first industrial transportation corridor (NJTPA 2018). The greenway will follow the former path of the historic Morris Canal, stretching 102 miles across six counties from Phillipsburg in Warren County to Jersey City. The NB-HCE does not cross but is in proximity to the Morris Canal Greenway route in the study area. Specifically, the Greenway would use Merritt Street between Garfield Avenue and Mercer Park (see description under Bayonne), following the northern boundary of the park on the Bayonne-Jersey City border to JFK Boulevard. To construct the first phase of the Greenway in Jersey City, Jersey City was awarded a $3.5 million grant from the New Jersey Department of Transportation for construction of four on-road and off-road segments of the Morris Canal Greenway pedestrian and bicycle path. Two of the segments are along portions of the Greenway route near the NB-HCE

described above with design change to City streets in the following locations: Garfield Avenue from Merritt Street to Seaview Avenue, and Merritt Street from Avenue C to Garfield Avenue. The grant will fund improvements including new curb ramps, crosswalks, sidewalk reconstruction, lighting, landscaping and green infrastructure, signage, bike lanes, roadway repair, and other improvements.

There is one community facility in the Jersey City portion of the study area in addition to the Curries Woods Community Revitalization Center: Ezra L. Nolan Middle School #40. At 88 Gates Avenue, the school has approximately 300 students in grades 6 through 8 and is part of the Jersey City School District.

No places of worship were identified in the Jersey City portion of the study area.

3.3.3.2 State Plan

New Jersey Development and Redevelopment Plan (State Plan) – In 2001, the New Jersey State Planning Commission adopted the New Jersey Development and Redevelopment Plan (New Jersey State Planning Commission 2001). The "State Plan" is intended to serve as a guide for public and private sector investment in New Jersey's future. The State Plan is a policy document for state, regional, and local agencies, to guide their functional plans, regulatory processes, and investment decisions.

The State Plan recognizes that New Jersey requires different approaches in its Metropolitan, Suburban, Fringe, Rural, and Environmentally Sensitive Planning Areas. The entire study area is designated by the Plan as "PA1: Metropolitan Planning Area," and Newark and Jersey City are both designated as Urban Centers. Metropolitan Planning Areas are to provide for much of the state's future redevelopment; revitalize cities and towns; promote growth in compact forms; stabilize older suburbs; redesign areas of sprawl; and protect the character of existing stable communities. Meanwhile, Urban Centers offer the most diverse mix of industry, commerce, services, residences, and cultural facilities. Urban Centers are repositories of large infrastructure systems, industrial jobs, corporate headquarters, medical and research services, universities, government offices, convention centers, museums, and other valuable built assets.

The Plan's public investment priorities give higher priority for projects and programs encompassing the following aspects:

- Public Health and Safety
- Infrastructure Maintenance and Repair with priority to Urban Centers.
- Capacity Expansion in Urban Centers.

By incorporating these goals, strategies, and priorities, the State Plan provides a guide to targeting growth and development in New Jersey.

3.3.4 No Action Alternative

Under the No Action Alternative, land uses in the study area would continue to conform with municipal master plans and corresponding zoning and would continue to be guided by the State Plan. Future changes in land use in the study area would be based on the activities of individual homeowners and businesses and other government agencies, where appropriate. There would be no changes to parkland boundaries or access or those of community facilities or places of worship.

3.3.5 Proposed Action Alternative

3.3.5.1 Impacts

Based on a review of the preliminary design plans for the Proposed Action and the municipal master plans identified in Section 3.3.3.1, the Proposed Action alternative would not conflict with municipal master plans as described further in the following paragraphs.

City of Newark – With respect to the goals of the City of Newark Master Plan, the Proposed Action promotes local and regional connectivity, minimizes traffic congestion, and provides adequate transportation infrastructure to accommodate the job producing growth of the airport, seaport, and industrial districts. Through measures to manage contamination from brownfields during construction and manage stormwater from the roadway the Proposed Action is consistent with the Plan's goal to increase neighborhood health and resilience. Meanwhile, the Proposed Action does not interfere with the Newark Master Plan goals of encouraging greater use of transit or safe streets for all users.

Coordination of construction will be undertaken with City, Conrail, and PANYNJ staff to maintain vehicular and railroad traffic undercrossing the reconstructed NB-HCE (e.g., along Doremus Avenue) to minimize adverse effects on port and intermodal operations and businesses during construction, and with Port Authority and FAA staff to maintain airspace to minimize adverse effects on Newark Liberty International Airport operations during construction.

The Proposed Action is estimated to result in the following property impacts from right-of-way in Newark[2] aerial easements on 16 tax lots and partial fee acquisitions of five tax lots. Of the aerial easements, 10 are on railroad-owned (Conrail) tax lots, five are on commercially owned tax lots (four individual businesses), and one is on a vacant City-owned tax lot. Of the partial fee acquisitions, one is on a railroad-owned tax lot, two are on commercially owned lots (two individual businesses), and one is on the vacant City-owned tax lot. While the railroad and commercial properties have rail track, buildings, and other improvements, none of the easements or partial acquisitions are expected to impact business operations, buildings, or access.

With respect to the potential for the Proposed Action to cause indirect effects on land use, the underlying factors that shape land uses in the Newark portion of the study area, specifically, the continued operations of Newark Liberty International Airport, the Port Newark-Elizabeth Marine Terminal, the City's access to the regional highway and rail systems, zoning, and real estate market conditions would not be affected by the Proposed Action as the access and connections afforded by the NB-HCE through its interchanges have been in place since the mid-1950s. The Proposed Action, combined with other actions in the study area that have, are, or will affect land use, will not substantially change land use.

City of Bayonne – The Proposed Action would not interfere with the goals of Bayonne's Master Plan, including redeveloping the former Military Ocean Terminal, promoting the Broadway central business district, capitalizing on the Hudson-Bergen Light Rail Transit stations (the Avenue E Transit District), increasing the supply of parkland in the city, nor developing the Hackensack RiverWalk.

Maintenance and Protection of Traffic Plans will be developed through coordination with city, county, and state transportation and engineering staff such that vehicular, transit, pedestrian, and bicycle traffic will be maintained in a safe manner during construction of NB-HCE crossings of local streets, and such that access to

[2] "Aerial easements" are needed for above-ground structures that encroach on a property, but do not affect the land surface. "Partial fee acquisitions" are small portions of a property that would be purchased by the Authority but that would not affect the existing property use or access. "Full acquisitions" refer to properties that would be acquired by the Authority with any existing use removed.

neighborhoods, businesses, community facilities, parkland, and places of worship will be maintained in a safe manner.

The Proposed Action is estimated to result in the following property impacts from right-of-way in Bayonne: three aerial easements on State-owned (New Jersey Department of Transportation [NJDOT]) tax lots (associated with NJ Route 440), one partial fee acquisition of a City-owned tax lot (associated with West 58th Street), and full acquisition of one property comprising four tax lots. Neither the aerial easements nor the partial fee acquisition, both of which are on portions of roadway right-of-way, is expected to have substantial impact on the use of the right-of-way or transportation operations. The Proposed Action will not encroach on paved portions of State-owned land (NJ Route 440 right-of-way).

While the Proposed Action will encroach on a portion of Block 12, Lot 2, it will not encroach on the portion of the property containing Rutkowski Park, which is encumbered by the State's Green Acres Program. The closest proximity of the Proposed Action's limits-of-disturbance to Rutkowski Park is approximately 650 feet. Consequently, the Proposed Action will not cause a diversion of Green Acres encumbered land from Rutkowski Park, nor divert any other Green Acres encumbered land, either temporarily or permanently.

As discussed in Section 3.8.5.2, the portion of West 58th Street near Avenue B will be permanently narrowed by the Project. The existing single one-way travel lane will be maintained. However, parking on both sides of the street for approximately 100 feet on each side of the roadway, or approximately 9 to 12 on-street parking spaces in total, will be eliminated. Reconnaissance of the affected area indicates that the capacity of on-street parking exceeds the demand for on-street parking, likely because many residential units in the area have off-street parking. Consequently, the elimination of the on-street parking will have a minor adverse effect on this land use.

The full property acquisition would be of the former Marist High School property (Figure 3.3-2). The proposed use of this property is for a stormwater basin, constructed for treating runoff to comply with NJDEP stormwater management regulations, and for contractor lay down areas and future maintenance needs. This acquisition would not result in a displacement or relocation as there is presently no active use of the property. However, the Proposed Action would eliminate the potential for redeveloping this property into either residential or commercial uses per the redevelopment plan discussed in Section 3.3.3 nor any other use as the entire property consisting of three tax lots would be acquired.

With respect to the potential for the Proposed Action to cause indirect effects on land use, the underlying factors that shape land uses in the Bayonne portion of the study area would not be affected by the Proposed Action as the access and connections afforded by the NB-HCE through its interchanges have been in place since the mid-1950s. Potential development activities in Bayonne (i.e., the redevelopment of the former Military Ocean Terminal and nearby properties), transit-oriented development near the Hudson-Bergen Light Rail Transit stations, and the City's access to the regional rail and highway systems would not change with the Proposed Action. The Proposed Action, combined with other actions in the study area that have, are, or will affect land use, will not substantially change land use.

City of Jersey City – The Proposed Action is consistent with the relevant land use principles of the Jersey City Master Plan's Land Use Element and does not interfere with those principles for which the Proposed Action does not interrelate (e.g., increasing the supply of available housing, adapting large format retail and office space, upgrading community facilities, and zoning revisions). By improving mobility between Interchanges 14 and 14A, the Proposed Action is consistent with the principle of a diversified economy centered in part on port and port-oriented development accessed via Interchange 14A. Indeed, the Proposed Action supports Jersey City Master Plan's element for supporting continued use of "port-related uses where located close to highway access and with limited impacts on residential areas." With respect to the principle of strengthening neighborhood-oriented centers, the Proposed Action does not cross the Ocean Avenue South Redevelopment Plan Area. Meanwhile, Maintenance and Protection of Traffic Plans will be developed through coordination

with city, county, and state transportation and engineering staff such that vehicular, transit, pedestrian, and bicycle traffic will be maintained in a safe manner during construction of NB-HCE crossings of local streets, and such that access to neighborhoods, businesses, community facilities, parkland, and places of worship will be maintained in a safe manner. The NBB spans over the proposed route of the Hackensack RiverWalk multi-use path. The Proposed Action does not cross the Morris Canal Greenway route but is in proximity of the planned route. The Proposed Action will not interfere with implementation of these public open space connecting assets described in the City's Land Use Element. Finally, incorporation of stormwater management and flood hazard area measures into the Proposed Action is consistent with the principle of protecting and restoring environmental assets and wetland planning for sustainability.

Tidal Waterfront Public Access (Newark and Bayonne) – Portions of the replacement of the Newark Bay Bridge will require new right-of-way (ROW) within tidal waterfront areas abutting Newark Bay in Newark and Bayonne. Use of this ROW by the Proposed Action will potentially affect public access to this tidal waterfront area. Presently, public access to these new areas of ROW is limited, particularly on the Newark side of the Bay.

On the Newark side, an in-lieu fee contribution for offsite mitigation is proposed in support of a City of Newark's planned waterfront public access initiative from the NJDEP-approved Municipal Public Access Plan submitted by the City.

On the Bayonne side, the ROW is in an area included in Hudson County plans for the Hackensack River Greenway, also known as the Hackensack RiverWalk. The portion within the Authority's ROW in the NB-HCE project area is currently a gap in the completed Greenway. Conceptually, the Authority has proposed providing public access, such as a waterfront path within its 310 feet of ROW and extend additional waterfront pathway to connect to the existing RiverWalk path in Rutkowski Park to the south. This would result in approximately 1,040 feet of new public access in Bayonne to meet the public access requirement of N.J.A.C. 7:7-16.9(a). The proposed concept is illustrated in Figure 3.3-3.

Figure 3.3-2. Proposed Full Property Acquisition

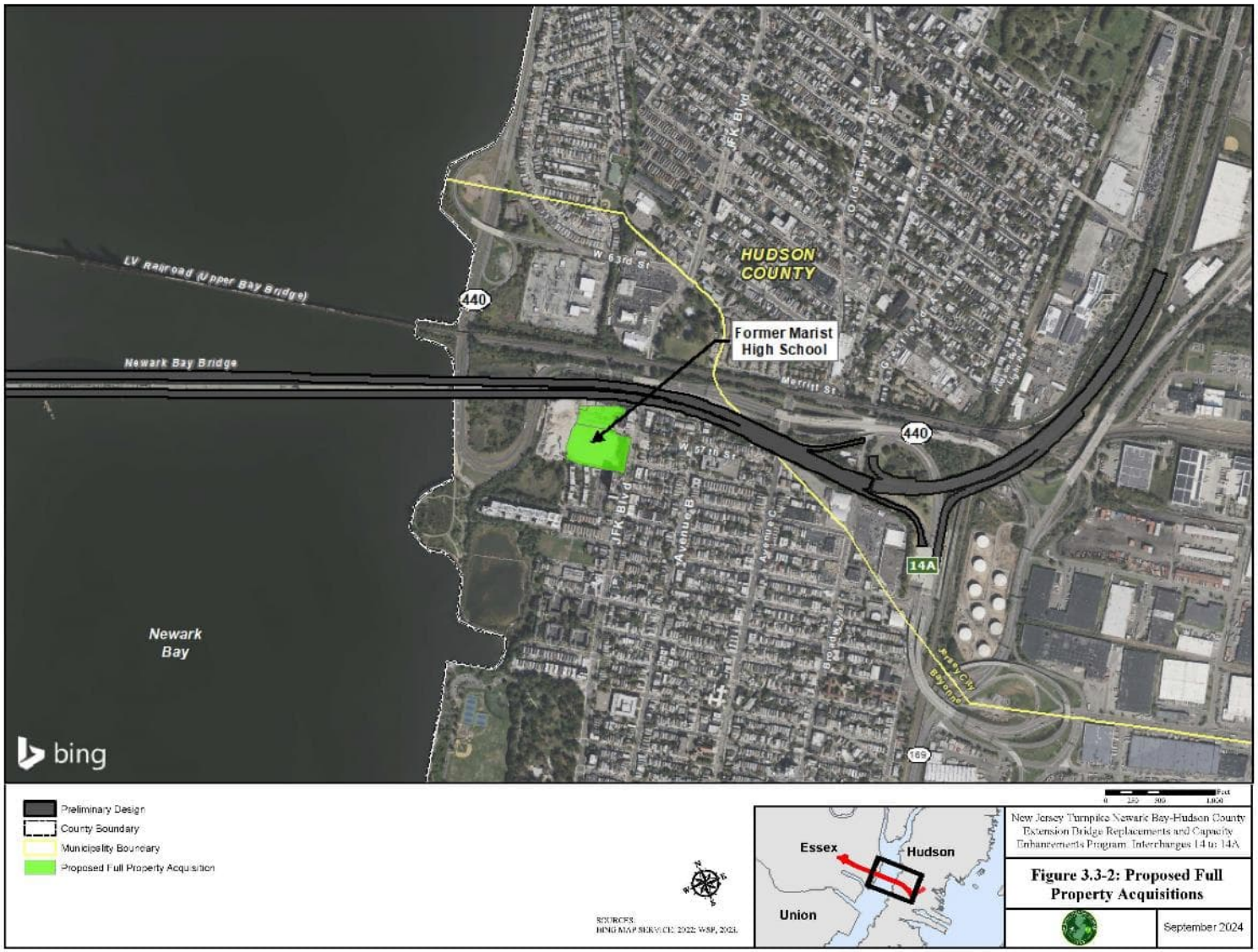
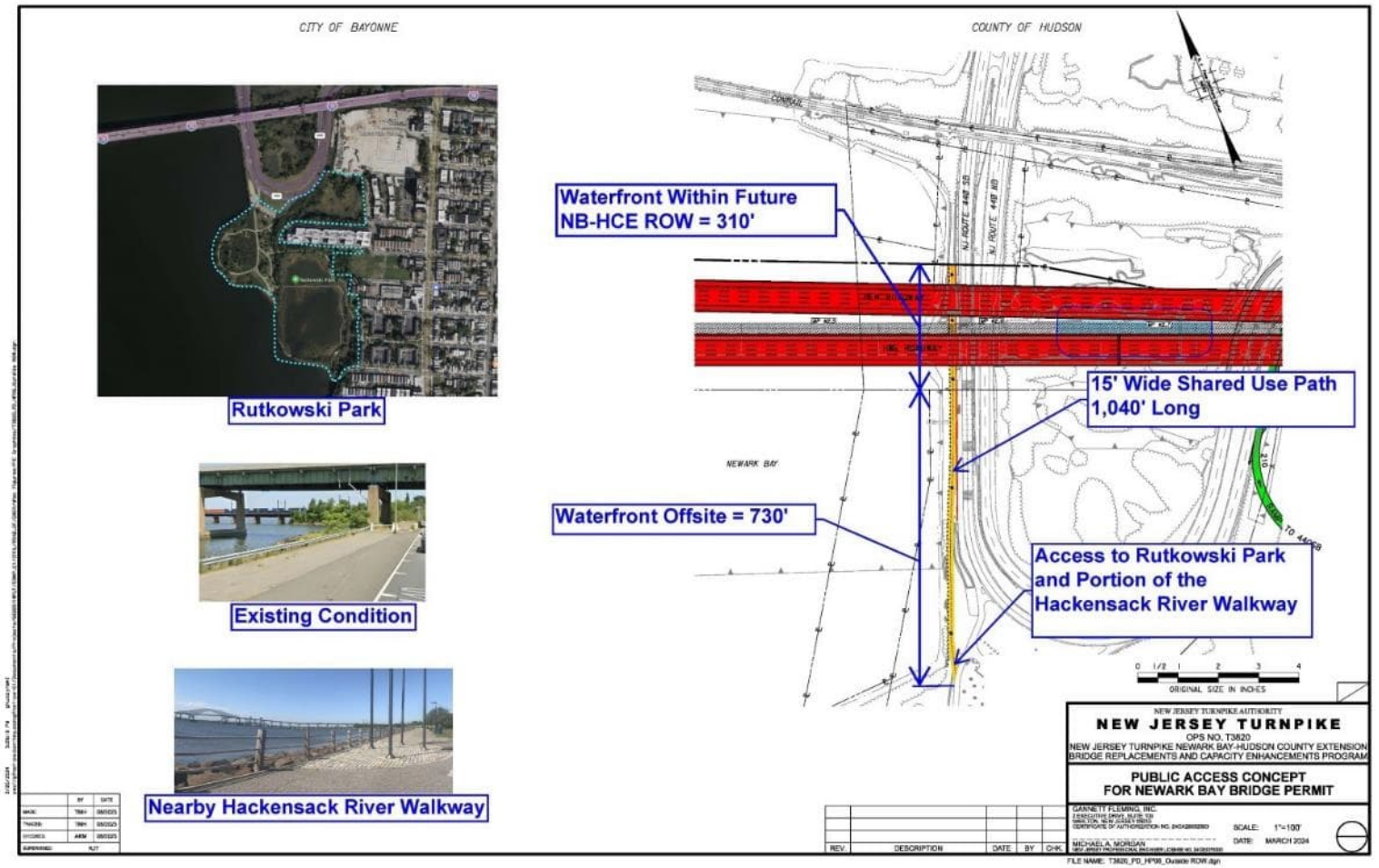


Figure 3.3-3. Proposed Public Access Concept: Bayonne



The Proposed Action is estimated to result in aerial easements on 10 tax lots and partial fee acquisitions of four tax lots. Of the aerial easements, eight are on railroad-owned (Conrail) tax lots, one is property owned by Jersey City Redevelopment Authority, and one is on NJ DOT right-of-way. Of the partial fee acquisitions, one is on PANYNJ-owned land, two tax lots are owned by Jersey City, and one tax lot is privately-owned (industrial) land. While the railroad and commercial properties have rail track, buildings, and other improvements, none of the easements or partial acquisitions are expected to impact business operations, buildings, or access. With respect to the potential for the Proposed Action to cause indirect effects on land use, the underlying factors that shape land uses in the Jersey City portion of the study area (i.e., the port growth and redevelopment of nearby properties for port-oriented uses), transit-oriented development near the Hudson-Bergen Light Rail Transit stations, the City's access to the regional rail and highway systems, zoning and other land use policies, and real estate market conditions would not be affected by the Proposed Action as the access and connections afforded by the NB-HCE through its interchanges has been in place since the mid-1950s. Indeed, the Proposed Action supports the Jersey City Master Plan's element for supporting continued use of "port-related uses where located close to highway access and with limited impacts on residential areas." The Proposed Action, combined with other actions in the study area that have, are, or will affect land use, will not substantially change land use.

State Plan – By improving mobility between Interchanges 14 and 14A, the Proposed Action supports the overall State Plan policy for Metropolitan Planning Areas to provide for much of the State's future redevelopment and, specifically, redevelopment of Newark and Jersey City as designated Urban Centers. As a priority investment of the Authority's Long-Range Capital Plan, the Proposed Action aligns with the State Plan's policy that higher priority be paced on projects that encompass public health and safety, infrastructure maintenance, and repair, with priority to Urban Centers and capacity expansion in Urban Centers.

3.3.5.2 Conclusion

Based on the preceding assessment, the Proposed Action will have no significant impact on land use, zoning, or public policy. The Proposed Action includes such measures as compensation of property owners for the aerial easements, partial acquisitions, and the full acquisition required to implement the Proposed Action. In addition to coordination with owners of the affected properties, the Authority will continue to coordinate with the municipalities, counties, and State on measures to manage temporary impacts on land uses during construction and avoid or minimize long-term effects on land use following construction. With incorporation of these measures, no further mitigation is necessary.

Appendix 3.4

Socioeconomics

3.4 Socioeconomics[1]

3.4.1 Study Area and Data Collection

Socioeconomics refers to the way social and economic factors influence one another in local communities and households.

The socioeconomics study area for the Proposed Action represents the portions of Newark, Bayonne, and Jersey City within approximately 0.25 mile (1,320 feet) of the NB-HCE between Interchanges 14 and 14A. This distance reflects the typical extent of freeway operational and accessibility effects, for example, noise and development influence, on communities nearby the freeway.

Demographic data for the existing conditions analysis was compiled at the largest scale of Census geography for such data, the Census Block Group, using the United States Census Bureau American Community Survey (ACS) 2016-2020 5-year Estimates released on March 17, 2022, and Public Use Microdata Sample files released on March 31, 2022.

NJDEP has created an online interactive mapping tool, to describe community character, identify overburdened communities, the criteria each block group meets, and the municipality for which the overburdened community is designated. The State of New Jersey established the following criteria for identifying census block groups as overburdened:

- At least 35 percent low-income households (at or below twice the poverty threshold as determined by the United States Census Bureau); or
- At least 40 percent of the residents identify as minority or as members of a State recognized tribal community; or
- At least 40 percent of the households have limited English proficiency.

The ACS data and these screening tools were used to describe community character within the study area.

To assist the Authority in compliance with Title VI of the Civil Rights Act, comparisons of race, income, and limited English proficiency are provided between the study area's census block groups and the following geographies: project municipalities (i.e., Newark, Bayonne, and Jersey City); project counties (i.e., Essex and Hudson); commuter "catchment" counties or counties having at least a portion of land area within one-hour drive time of Downtown Jersey City and the Holland Tunnel via Interstate Route 78 west of Interchange 14 and the NJ Turnpike south of Interchange 14 (i.e., Hunterdon, Somerset, Morris, Union, Essex, Mercer, Monmouth, and Middlesex); and New Jersey as a whole.

[1] In January 2025, Executive Order (E.O.) 14148 revoked E.O. 14096. E.O. 14173 revoked E.O. 12898. While USCG continues to evaluate impacts of the Proposed Action on the human environment, USCG no longer evaluates potential disproportionate impacts to environmental justice communities. The NEPA EA has been revised to reference the appropriate Executive Orders and reference documents. Although some terms have been modified to comply with E.O. 14148 and E.O. 14173, as directed by USCG, the Authority's environmental commitments outlined in the NJ E.O. 215 EIS remain. Collectively, the requirements of NJ E.O. 215 EIS, the Authority's NEPA environmental mitigation outlined in the AMP, and State and Federal permit requirements, represents a comprehensive program to ensure community awareness as the Authority advances construction. The Authority's outreach efforts with adjacent communities and the general public as outlined in the AMP will continue as the Authority obtains additional design and construction-related information.

Economic data regarding the study area counties and municipalities was obtained from the New Jersey Department of Labor and Workforce Development (2022) website. Included in the analysis are data from the Quarterly Census of Employment and Wages, Local Employment Dynamics, and Labor Force Participation.

3.4.2 Methodology and Criteria

Social and Economic factors – The assessment of potential social and economic effects of the project considered the following factors:

- Effect on community character or community cohesion.
- Effect on population or household demographic characteristics.
- Effect on essential businesses (e.g., displacement of a food, social, or medical service business).
- Effect on the major industry sectors.
- Effect on worker and resident inflows or outflows.

Construction Economic Effect – The assessment of the effect of project construction expenditures on the economy used the IMPLAN input-output model as the analysis tool. Input-output models such as IMPLAN allow one to assess the economic impacts of construction expenditures.

The impacts from construction expenditures come in the following forms:

- Employment – Number of jobs in an industry needed to complete the project. Sometimes, this is referred to as "job-years." One person in one job lasting five years results in five "jobs." A job can either be full-time or part-time.
- Value Added – Net additional economic activity (e.g., difference between an industry's total output and the cost of its intermediate inputs). It is synonymous with Gross Regional Product.
- Labor Income – Wage/salary earnings paid to the associated jobs.
- Taxes – Various taxes on production and imports (sales, property, excise, etc.), fines, fees, licenses, permits, etc., resulting from business economic activity. Includes all federal, state, and local revenues.

An input-output model estimates economic impacts for three types of effects: direct effects, indirect effects, and induced effects. They are defined as follows:

- Direct – Economic activity generated by injection of spending (known as "change in final demand") to any given industry or set of industries in an economy. This is the initial spending and the first step in a spending pattern. In this case, direct effects are the effects generated from the dollars spent on construction of the project.
- Indirect – Second-order economic impacts that result from inter-industry purchases necessary to produce the goods and services purchased in the direct effects. A construction company will spend money on several non-construction-related items such as legal fees, insurance costs, office supplies, safety equipment, etc. These can be thought of as downstream supply chain effects, as other industries begin to benefit from spending in the initial industry (e.g., construction).
- Induced – Economic impacts generated by the spending patterns of households who, after receiving additional wages from the direct and indirect effects, will use those wages to purchase goods and services. As local businesses employ people, those individuals are consumers who then spend their earnings on everything households spend on. These expenditures subsequently benefit local businesses and produce the induced effects.
- Total – Combines direct, indirect, and induced effects.

Impacts (spending) are applied to specific industries, because each industry has a unique set of spending patterns and "multiplier effects" in the economy. For this analysis, all construction expenditure estimated to take place

is classified as spending in the "construction of highway and streets" industry, which generates direct, indirect, and induced impacts.

New Jersey Law - New Jersey's N.J.S.A.13:1D-157 et seq, requires the NJDEP to evaluate the environmental and public health impacts of certain facilities on overburdened communities when reviewing certain permit applications. Highways, however, such as the NB-HCE are not classified as facilities subject to this state statute. Separately, State of New Jersey Executive Order 23 directs the NJDEP, in consultation with the Department of Law and Public Safety to develop guidance for all Executive Branch departments and agencies, including the Authority. Please refer to the New Jersey E. O. 215 Environmental Impact Statement for further information regarding the NJDEP assessment of community character in accordance with State requirements.

3.4.3 Existing Conditions

3.4.3.1 Description of Communities

Access to water and transportation have historically been major influences of the social and economic fabrics of the study area. Before the arrival of the Europeans, the study area was the home to Lenni Lenape Native Americans who were attracted to the area's waters. See Figure 3.4-1 for key neighborhoods and features within the study area.

City of Newark – The Newark portion of the study area is adjacent to the City's Ironbound community. The Ironbound, also referred to as "Down Neck," is a multi-ethnic, largely working-class neighborhood of approximately 50,000 residents.

German, Lithuanian, Italian and Polish immigrants settled in Ironbound in the nineteenth century. In the early twentieth century, African Americans arrived during the famed Great Migration from the Jim Crow-era South, along with large numbers of Portuguese and Spanish immigrants. In the latter half of the twentieth century immigrants from Central and South America joined the community. These successive waves of migration and immigration all contributed to the richness of Ironbound's cultural diversity. Immigration to Ironbound continues to the present, and now two out of three Ironbound residents have come to the United States as immigrants. Three languages – Spanish, Portuguese, and English – can be frequently heard throughout the community.

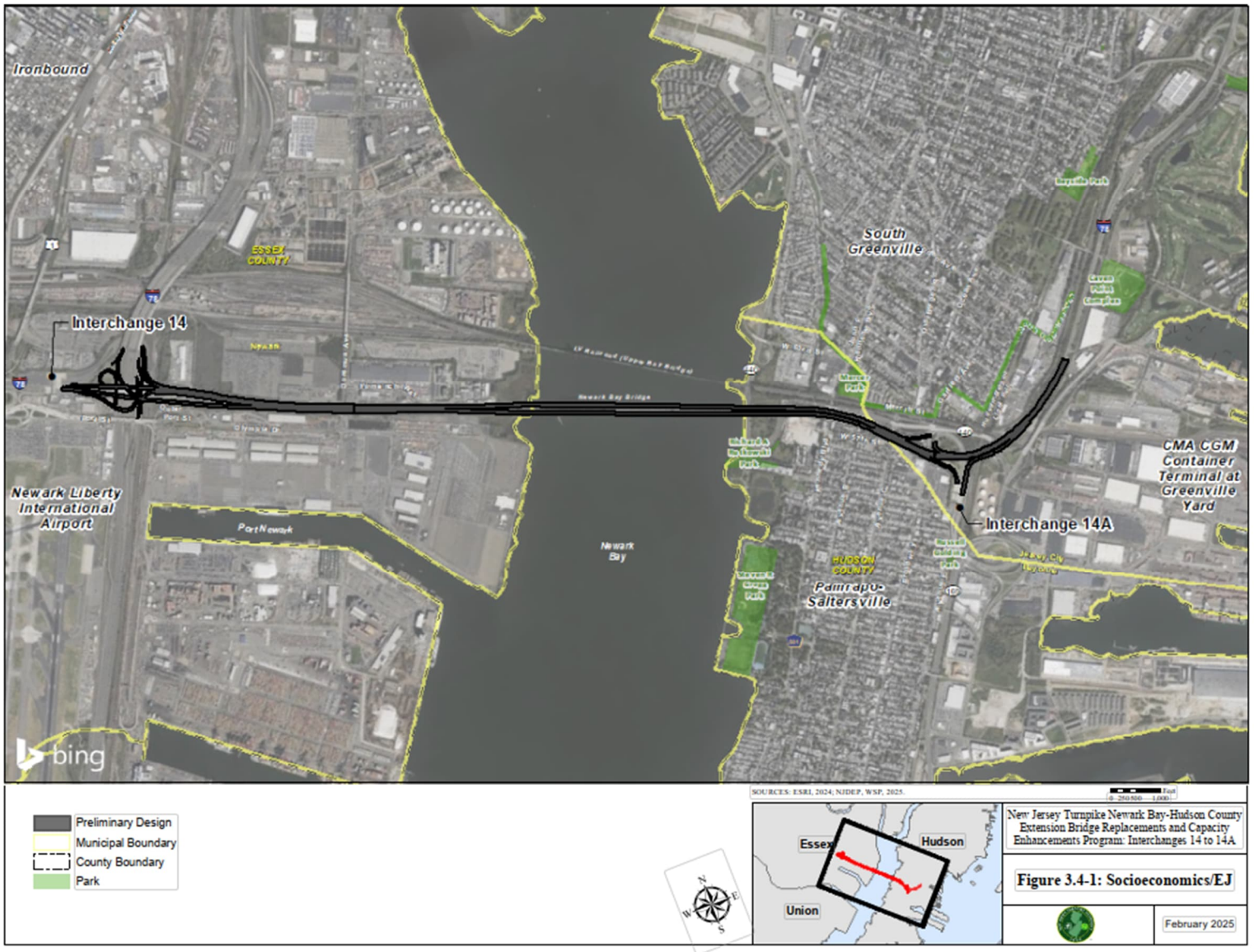
The Ironbound composes most of Newark's East Ward City Council district, covering approximately 4 square miles. Its residential community, with Ferry Street as its spine, is interspersed with commerce, covering roughly a third of the neighborhood. The surrounding industrial area includes trucking, chemical, and waste businesses. The name "Ironbound" is derived from the many forges and foundries and railroads that once encircled it. It is bound by Newark Penn Station and the Amtrak line on the west; the Passaic River—the nation's longest Superfund site—on the north; U.S. Routes 1 and 9, the NJ Turnpike, and Port Newark on the east; and Interstate Route 78 and Newark Liberty International Airport (EWR) on the south.

The Ironbound is an economic engine within Newark driving approximately 40 percent of its economy and contributing to approximately 33 percent of its tax base (Ironbound Community Corporation 2019). Today local factories, warehouses, and industrial properties continue to operate alongside one-, two-, and three-family homes and public housing complexes.

City of Bayonne – The City of Bayonne is located in the Gateway Region of Hudson County and lies between Newark Bay and New York Bay. The portion of the study area in Bayonne is in the Pamrapo/Saltersville neighborhood named after villages that preceded the formation of Bayonne and, politically, in the City's Third Ward. The neighborhood encompasses approximately 1.5 square miles and is home to slightly over 30,000 residents (City of Bayonne 2022).

In the late nineteenth and early twentieth century, Bayonne urbanized and industrialized rapidly, becoming the home to thousands of European immigrants. In recent decades, sources of immigration have largely been represented from countries in Latin America, the Middle East, and Southeastern Asia. In the decades since World War II, oil refining and other traditional industries have declined and have been replaced by port operations and the service sector. The city's largest employer is the Bayonne Medical Center, a nonprofit hospital, which employs over 1,200 individuals, many of whom reside in Bayonne.

Figure 3.4-1. Socioeconomic Study Area



City of Jersey City – Jersey City is recognized as the most ethnically diverse city in the nation (WalletHub 2021). The 2020 Census has also revealed that Jersey City is the third most dense city in America (with a population over 100,000).

The portion of the study area in Jersey City is in the South Greenville neighborhood of the City's Greenville/Ward A. The neighborhood is characterized by low- and medium-density housing with JFK Boulevard and Ocean Avenue serving as key commercial corridors.

Greenville was settled by working-class Irish Catholic families, as well as other ethnic groups. The area's demographics changed dramatically between the 1950s and 1970s, with the decline of factories and the collapse of the independent railroad lines. The neighborhood east of JFK Boulevard was later settled by African Americans, while that west of JFK Boulevard is more diverse with a sizable Filipino population. Greenville also has a sizable Hispanic and Egyptian population, and many of the older Irish residents remain in the neighborhood.

The CMA CGM (formerly Global) Container Terminal at Greenville Yard is a major driver of economic activity in this portion of Jersey City.

3.4.3.2 Social and Economic Profiles

The study area contains portions of 13 census block groups:

- Newark – 340139802001
- Bayonne – 340170101001, 340170101002, 340170101003, 340170102001, and 340170102003
- Jersey City – 340170058021, 340170061011, 340170061021, 340170061022, 340170061023, 340170063002, and 340170063003.

A census block group is the smallest geographic area for which the Census Bureau collects and tabulates data. The census block group in the Newark portion of the study area recorded zero population and, hence, zero households in the 2020 Census. Therefore, the data labeled "Study Area" reported in this section identifies the data for those census block groups in the Bayonne and Jersey City portions of the study area and are compared to that of the entire cities of Newark, Bayonne, and Jersey City; Essex and Hudson Counties; and the State of New Jersey.

Tables 3.4-1 through 3.4-6 provide various population-level statistics for the defined study area and relevant city, county, and state geographies. While there are variations in data among the twelve census block groups of the study area that have population, summary assessments of the statistics at the study area level of geography are as follows:

1. The study area has a higher percentage of children under five years of age and a low percentage of adults over 64 years of age relative to the other geographies (Table 3.4-1). These demographic age cohorts are vulnerable to health-related issues such as air pollution.
2. The study area has a lower percentage of White populations and a higher percentage of Asian and African American populations than at the county and state levels. The study area also has a higher Hispanic percent population than New Jersey and Essex County, but less than Hudson County. The study area's racial and ethnic composition comparatively varies between each city (Table 3.4-2).
3. The study area has a relatively low percentage of adults without a high school diploma or less than 9th grade level of educational attainment (Table 3.4-3).
4. The study area has higher labor force participation compared to most of the other geographies (Table 3.4-4).

5. The study area has relatively high drive-alone percentages for work travel, consistent with most of the other geographies (Table 3.4-5).
6. The percentages of the study area workers reporting a commute of less than or greater than 35 minutes travel time to work, 55.7 percent and 44.3 percent, respectively, are similar to the county and Bayonne and Jersey City level travel times but less than the Newark and State level travel times (Table 3.4-6). The mean commuting time for workers in Essex and Hudson Counties in 2020 is estimated at 34.79 minutes and 36.23 minutes, respectively (St. Louis Federal Reserve 2022).

Table 3.4-1. Population and Age

	Population	Age			
		<5 Years Old	Pct.	>64 Years Old	Pct.
Study Area	19,274	1,511	7.8%	2,127	11.0%
Newark	281,917	19,836	7.0%	29,914	10.6%
Bayonne	65,112	4,578	7.0%	9,665	14.8%
Jersey City	262,652	20,469	7.8%	29,050	11.1%
Essex County	798,698	52,978	6.6%	109,354	13.7%
Hudson County	671,923	46,656	6.9%	80,389	12.0%
New Jersey	8,885,418	518,349	5.8%	1,442,938	16.2%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-2. Race and Hispanic Ethnicity

	White		African American		American Indian		Asian		Pacific Islander		Some other Race		Two or more Races		Hispanic Ethnicity	
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Study Area	7,130	37.0%	4,043	21.0%	139	0.7%	4,045	21.0%	0	0.0%	2,727	14.1%	1,190	6.2%	5,872	30.5%
Newark	75,589	26.8%	139,660	49.5%	1,102	0.4%	4,989	1.8%	217	0.1%	41,785	14.8%	18,575	6.6%	103,548	36.7%
Bayonne	40,156	61.7%	6,411	9.8%	127	0.2%	6,513	10.0%	68	0.1%	7,177	11.0%	4,660	7.2%	22,487	34.5%
Jersey City	88,293	33.6%	60,777	23.1%	1,534	0.6%	68,445	26.1%	61	0.0%	25,753	9.8%	17,789	6.8%	70,547	26.9%
Essex County	328,493	41.1%	313,839	39.3%	2,116	0.3%	43,682	5.5%	324	0.0%	67,473	8.4%	42,771	5.4%	185,818	23.3%
Hudson County	338,748	50.4%	81,178	12.1%	3,274	0.5%	105,812	15.7%	379	0.1%	89,283	13.3%	53,249	7.9%	286,039	42.6%
New Jersey	5,820,147	65.5%	1,189,681	13.4%	22,288	0.3%	857,873	9.7%	3,156	0.0%	564,662	6.4%	427,611	4.8%	1,815,078	20.4%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-3. Educational Attainment

	Total Post-High School Age	Less than 9th Grade Education		9th to 12th Grade; no Diploma		No High School Diploma	
	No.	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Study Area	12,386	659	5.3%	573	4.6%	1,232	9.9%
Newark	184,100	22,678	12.3%	20,643	11.2%	43,321	23.5%
Bayonne	45,582	2,745	6.0%	2,281	5.0%	5,026	11.0%
Jersey City	187,996	11,441	6.1%	10,454	5.6%	21,895	11.6%
Essex County	538,203	36,110	6.7%	35,639	6.6%	71,749	13.3%
Hudson County	481,233	41,255	8.6%	27,639	5.7%	68,894	14.3%
New Jersey	6,169,501	287,866	4.7%	312,895	5.1%	600,761	9.7%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-4. Labor Force Participation

	Total Population 16 years and older	In Labor Force Population 16 years and older	Pct. in Labor Force
Study Area	14,805	9,238	62.4%
Newark	219,996	120,095	54.6%
Bayonne	51,762	31,172	60.2%
Jersey City	212,899	140,051	65.8%
Essex County	629,085	379,534	60.3%
Hudson County	547,213	360,200	65.8%
New Jersey	7,161,184	4,426,619	61.8%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-5. Journey to Work by Travel Mode

	Total	Drove alone	Carpool	Public transportation	Taxicab	Motorcycle	Bicycle	Walked	Other means	Worked from home
Study Area	8,997	49.2%	11.9%	26.0%	0.8%	0.0%	0.6%	2.3%	2.0%	7.2%
Newark	115,068	53.9%	8.1%	23.7%	0.7%	0.0%	0.1%	5.6%	5.2%	2.7%
Bayonne	30,602	53.5%	8.1%	25.1%	0.6%	0.2%	0.2%	6.4%	1.3%	4.6%
Jersey City	137,183	30.2%	6.3%	45.3%	0.8%	0.0%	0.8%	6.8%	0.9%	8.9%
Essex County	368,427	59.1%	7.0%	20.1%	0.5%	0.0%	0.1%	3.5%	2.3%	7.1%
Hudson County	353,155	36.9%	6.8%	39.5%	0.7%	0.1%	0.5%	7.1%	1.1%	7.3%
New Jersey	4,332,443	69.6%	7.8%	10.8%	0.4%	0.0%	0.3%	2.6%	1.2%	7.3%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-6. Journey to Work Travel Time

	Total	< 5 minutes	5 - 9 minutes	10 - 14 minutes	15 - 19 minutes	20 - 24 minutes	25 - 29 minutes	30 - 34 minutes	35 - 39 minutes	40 - 44 minutes	45 - 59 minutes	60 - 89 minutes	90 + minutes
Study Area	8,348	2%	3%	10%	11%	12%	3%	16%	6%	6%	11%	13%	8%
Newark	112,015	2%	4%	9%	10%	14%	5%	21%	3%	6%	9%	11%	6%
Bayonne	29,208	1%	8%	10%	10%	9%	5%	16%	3%	6%	13%	13%	6%
Jersey City	124,937	1%	3%	6%	9%	10%	4%	17%	4%	8%	18%	15%	4%
Essex County	342,127	2%	5%	9%	11%	14%	6%	17%	3%	5%	10%	13%	6%
Hudson County	327,262	1%	4%	7%	9%	10%	5%	17%	3%	7%	17%	15%	4%
New Jersey	4,016,070	2%	8%	11%	13%	13%	6%	13%	3%	5%	10%	11%	5%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-7 provides summary household-level statistics for the defined study area and relevant city, county, and state geographies. While there are variations in data among the twelve census block groups of the study area that have households, summary assessments of the statistics at the study area level of geography are as follows:

1. On average, the study area household size (i.e., the number of people comprising the average household) is high relative to the other geographies.
2. The median household income within the block group level varies widely between $37,750 for households in block group 340170061022 and $201,875 for households in block group 340170058021, both of which are in Jersey City.
3. The study area has a low percentage of zero car owning households relative to the other compared geographies, except New Jersey.
4. The study area has a low percentage of households with limited English proficiency relative to the other compared geographies, except New Jersey.

The lowest geographic level of employment data is at the municipal level. Table 3.4-8 summarizes average annual labor force participation data for the three study area municipalities, two counties, and the State of New Jersey for 2010 (post-recession), 2019 (pre-COVID), and 2021 (the most recent full year of data). As shown, Newark's average annual labor force size in 2021 was slightly higher than in 2010 and was higher than 2019. Newark's percent unemployment for each of the periods was higher than that of all the other geographies. Bayonne's average annual labor force in 2021 was the same as in 2019 and slightly higher than in 2010. Jersey City's average annual labor force grew nearly six percent between 2010 and 2019 before declining slightly over one percent between 2019 and 2021. Jersey City's percent unemployment for each of the three periods was the lowest of the three study area municipalities and generally tracked closely with the percent unemployment of Hudson County and New Jersey.

Table 3.4-9 shows the top five employment sectors (government and private) for each of the study area municipalities for 2010 and 2019 (the most recent year of reporting). The data shows the diversity of key employment sectors across the municipalities framed by Newark's having Transportation/Warehousing as its largest employment sector and Jersey City's having Finance/Insurance as its largest employment sector. Also notable is Newark's having Local Government and State Government as the second and third ranked employment sectors. The data also show the relative concentration of private industry in the municipalities. Adding the Accommodation/Food and Administration/Waste Management sectors to the top three private employment sectors in Newark indicates that nearly 59 percent of Newark's private sector employment is in the top five private employment sectors. Adding Manufacturing to the top four private employment sectors in Bayonne indicates that nearly 70 percent of Bayonne's private sector employment is in the top five employment sectors. Adding the Professional/Technical sector to the top four private employment sectors in Jersey City indicates that nearly 67 percent of Jersey City's private sector employment is in the top five private employment sectors.

The New Jersey State Data Center publishes Worker Inflow/Outflow Reports annually for larger municipalities. Changes in Worker Inflow/Outflow over the last decade in Newark, Bayonne, and Jersey City are shown in Tables 3.4-10 through 3.4-12, respectively. All cities exhibit relatively high percentages of city residents working outside the city and people employed in the city but living outside the city. While the data do not reveal worker commute origins and destinations, the relatively high resident outflow to jobs outside each city and non-resident inflows to jobs in each city indicates the importance of mobility for travel to place of employment that transcends city boundaries.

Table 3.4-7. Summary Household Statistics

				Zero Car Ownership		Limited English Proficiency (LEP)					
	Total Households No.	Mean Household Size	Median Household Income	No.	Pct.	Spanish	Other Indo-European languages	Asian and Pacific Island languages	Other languages	Total LEP	Pct. LEP
Study Area	6,528	2.95	$36,880-$201,875	1,294	19.8%	343	97	108	69	617	9.5%
Newark	102,195	2.76	$37,476	38,111	37.3%	12,241	5,478	251	326	18,296	17.9%
Bayonne	24,784	2.63	$69,511	5,655	22.8%	1,426	523	232	442	2,623	10.6%
Jersey City	103,880	2.53	$76,444	39,283	37.8%	6,417	2,300	2,250	1,446	12,413	11.9%
Essex County	290,680	2.75	$63,959	64,040	22.0%	16,847	9,850	1,340	1,086	29,123	10.0%
Hudson County	261,289	2.57	$75,062	83,307	31.9%	27,029	4,814	4,033	2,246	38,122	14.6%
New Jersey	3,272,054	2.72	$85,245	367,585	11.2%	130,827	51,490	34,294	8,354	224,965	6.9%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-8. Summary Labor Force Statistics (annual averages)

	Labor Force	Employment	Unemployment	Unemployment Rate
Newark				
2021	122,600	109,500	13,000	10.6%
2019	120,800	113,900	6,900	5.7%
2010	122,500	105,400	17,100	14.0%
Bayonne				
2021	34,000	31,300	2,800	8.2%
2019	34,000	32,800	1,300	3.7%
2010	33,200	29,600	3,600	10.9%
Jersey City				
2021	144,000	133,800	10,100	7.0%
2019	145,500	140,700	4,800	3.3%
2010	137,600	123,900	13,700	9.9%
Essex County				
2021	386,000	355,100	30,900	8.0%
2019	385,600	369,200	16,300	4.2%
2010	382,800	340,700	42,100	11.0%
Hudson County				
2021	371,000	345,700	25,400	6.8%
2019	376,200	364,500	11,700	3.1%
2010	354,000	319,800	34,300	9.7%
New Jersey				
2021	4,661,100	4,365,400	295,700	6.3%
2019	4,686,700	4,528,200	158,500	3.4%
2010	4,559,800	4,119,000	440,800	9.7%

Source: New Jersey Department of Labor and Workforce Development (2022) Information

Table 3.4-9. Study Area Municipalities' Top Five Employment Sectors

2019					2010				
NAICS Code[1]	Sector	Average Units	Average Annual Employment	Annual Average Wages	NAICS Code	Sector	Average Units	Average Annual Employment	Annual Average Wages
Newark									
48	Transportation/ Warehousing[2]	333	25,687	$59,691	48	Transportation/ Warehousing	333	25,154	$55,245
	Local Government (Total)	154	17,942	$72,884		Local Government (Total)	174	18,998	$66,639
	State Government (Total)	41	16,639	$88,833		State Government (Total)	13	14,496	$73,147
62	Health/Social	1,021	13,861	$55,181	62	Health/Social	439	12,741	$49,848
52	Finance/Insurance	162	10,267	$173,644	52	Finance/Insurance	179	8,657	$117,485
Bayonne									
44	Retail Trade	178	2,459	$29,766	62	Health/Social	166	2,299	$41,336
	Local Government (Total)	34	2,245	$72,330		Local Government (Total)	7	2,249	$64,682
62	Health/Social	263	2,134	$48,411	44	Retail Trade	194	1,731	$27,577
48	Transportation/ Warehousing	82	2,122	$84,212	48	Transportation/ Warehousing	72	1,439	$48,272
72	Accommodations/ Food	114	1,233	$19,812	42	Wholesale Trade	61	1,156	$55,356
Jersey City									
52	Finance/Insurance	318	30,945	$182,189	52	Finance/Insurance	339	28,145	$172,316
	Local Government (Total)	41	12,699	$66,943		Local Government (Total)	40	13,955	$64,429
62	Health/Social	957	12,276	$48,234	62	Health/Social	507	10,663	$39,484
44	Retail Trade	756	9,244	$37,980	44	Retail Trade	763	7,911	$27,116
56	Admin/Waste Remediation	203	7,619	$47,355	54	Professional/Technical	586	5,939	$108,979

Source: New Jersey Department of Labor and Workforce Development (2022)
[1] NAICS = North American Industry Classification System, the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.
[2] Transportation/Warehousing data for 2012; the last year this sector was reported.

Table 3.4-10. Worker Inflow/Outflow: Newark

	2019		2010	
	Count	Share	Count	Share
Living in Newark	96,862	100.0%	83,261	100.0%
Living and Employed in Newark	24,310	25.1%	25,588	30.7%
Living in Newark but Employed Outside	72,552	74.9%	57,673	69.3%
Employed in Newark	138,183	100.0%	140,634	100.0%
Employed and Living in Newark	24,310	17.6%	25,588	18.2%
Employed in Newark but Living Outside	113,873	82.4%	115,046	81.8%
Net Job Inflow (+) or Outflow (-)	41,321	-	57,373	-

Source: U.S. Census Bureau 2022

Table 3.4-11. Worker Inflow/Outflow: Bayonne

	2019		2010	
	Count	Share	Count	Share
Living in Bayonne	25,405	100.0%	21,932	100.0%
Living and Employed in Bayonne	3,121	12.3%	3,472	15.8%
Living in Bayonne but Employed Outside	22,284	87.7%	18,460	84.2%
Employed in Bayonne	11,098	100.0%	10,123	100.0%
Employed and Living in Bayonne	3,121	28.1%	2,472	34.3%
Employed in Bayonne but Living Outside	7,977	71.9%	6,651	65.7%
Net Job Inflow (+) or Outflow (-)	-14,307		-11,809	

Source: U.S. Census Bureau 2022

Table 3.4-12. Worker Inflow/Outflow: Jersey City

	2019		2010	
	Count	Share	Count	Share
Living in Jersey City	130,151	100.0%	100,986	100.0%
Living and Employed in Jersey City	23,875	18.3%	18,773	18.6%
Living in Jersey City but Employed Outside	106,276	81.7%	82,213	81.4%
Employed in Jersey City	118,206	100.0%	98,574	100.0%
Employed and Living in Jersey City	23,875	20.2%	18,773	19.0%
Employed in Jersey City but Living Outside	94,331	79.8%	79,801	81.0%
Net Job Inflow (+) or Outflow (-)	-11,945	-	2,412	-

Source: U.S. Census Bureau 2022

3.4.3.3 Demographic Criteria

Analysis of various sources of data on low-income and on minority populations indicates that the study area as a whole and each of the census block groups comprising the study area are overburdened communities by virtue of meeting the low-income population criteria, the minority population criteria, or both criteria.

As documented below, analysis of the 2016-2020 ACS estimates published by the U.S. Census Bureau provided in Table 3.4-13 and Table 3.4-14, indicates the following:

1. The study area overall has a relatively low percentage of working age population with income below the poverty level compared with the study area municipalities and counties. The study area's percentage of working age population with income below the poverty level is on par with that of the NB-HCE catchment counties and the State of New Jersey.
2. The study area percentage of minority population is roughly comparable to that of the municipalities and counties within the study area, but well above those of the NB-HCE catchment counties and the State of New Jersey.
3. Table 3.4-15 highlights the New Jersey NJDEP measurements for the study area's census block groups having population (see also Figure 3.4-2). This tool shows that four of the twelve census block groups are greater than 40 percent low-income population and eleven of the twelve census block groups are greater than 50 percent minority population. Two of the census block groups in the Jersey City portion of the study area between JFK Boulevard to the west and the Hudson-Bergen Light Rail Transit to the east are greater than 95 percent minority population. Based on the NJDEP measurement tool, the entire Project study area Census block groups are mapped with a Combined Stressor Summary of "Higher than 50th Percentile."
4. Based on the NJDEP tool, the Newark census block group is designated as meeting the "adjacent" criteria as it is adjacent to one or more census block groups identified as overburdened under one or more criterion. Of the twelve census block groups in the study area, five are identified as meeting both the low-income and the minority criteria (Bayonne 340170101002, 3401701003, and Jersey City 340170061022, 340170061023, and 340170063002) and the other seven are identified as meeting the minority criterion. None of the census block groups in the study area exceed the State's limited English proficiency criterion for designation as overburdened.

Table 3.4-13. Demographic Profile – Comparative Geographies

Geography	Total Population	Population (Ages 24-64)	Ages 20-64 with Income Below Poverty Level		Minority Population	
			No.	*Pct.*	*No.*	*Pct.*
Study Area	19,278	11,510	1,007	5.7%	14,739	78%
Newark	281,917	166,711	37,215	22.3%	251,322	89%
Bayonne	65,112	39,598	3,995	10.1%	36,298	56%
Jersey City	262,652	173,945	21,490	12.4%	204635	78%
Essex County	798,698	469,451	62,489	13.3%	558,938	70%
Hudson County	671,923	438,519	50,437	11.5%	479,931	71%
Catchment Counties	4,115,756	2,414,095	192,139	8.0%	1,953,502	47%
New Jersey	8,885,418	5,196,222	442,284	8.5%	4,026,611	45%

Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-14. Demographic Profile – Study Area Detail

Municipality/Census Block Group #	Total Population	Population (Ages 24-64)	Ages 20-64 with Income Below Poverty Level		Minority Population	
			No.	*Pct.*	*No.*	*Pct.*
Bayonne						
340170101001	2,012	1,316	111	8.4%	1,068	53.1%
340170101002	1,773	930	100	10.8%	1,401	79.0%
340170101003	1,857	1,133	43	3.8%	1,400	75.4%
340170102001	1,221	800	9	1.1%	548	44.9%
340170103003	995	522	106	20.3%	743	74.7%
Jersey City						
340170058021	1,822	1,192	32	2.7%	1,072	5.8%
340170061011	2,606	1,314	67	5.1%	2,193	12.2%
340170061021	495	220	22	10.0%	495	18.6%
340170061022	524	237	34	14.3%	519	71.0%
340170061023	2,379	1,492	162	10.9%	2,095	45.4%
340170063002	1,330	857	124	14.5%	1,083	36.5%
340170063003	2,260	1,497	197	13.2%	2,122	23.5%

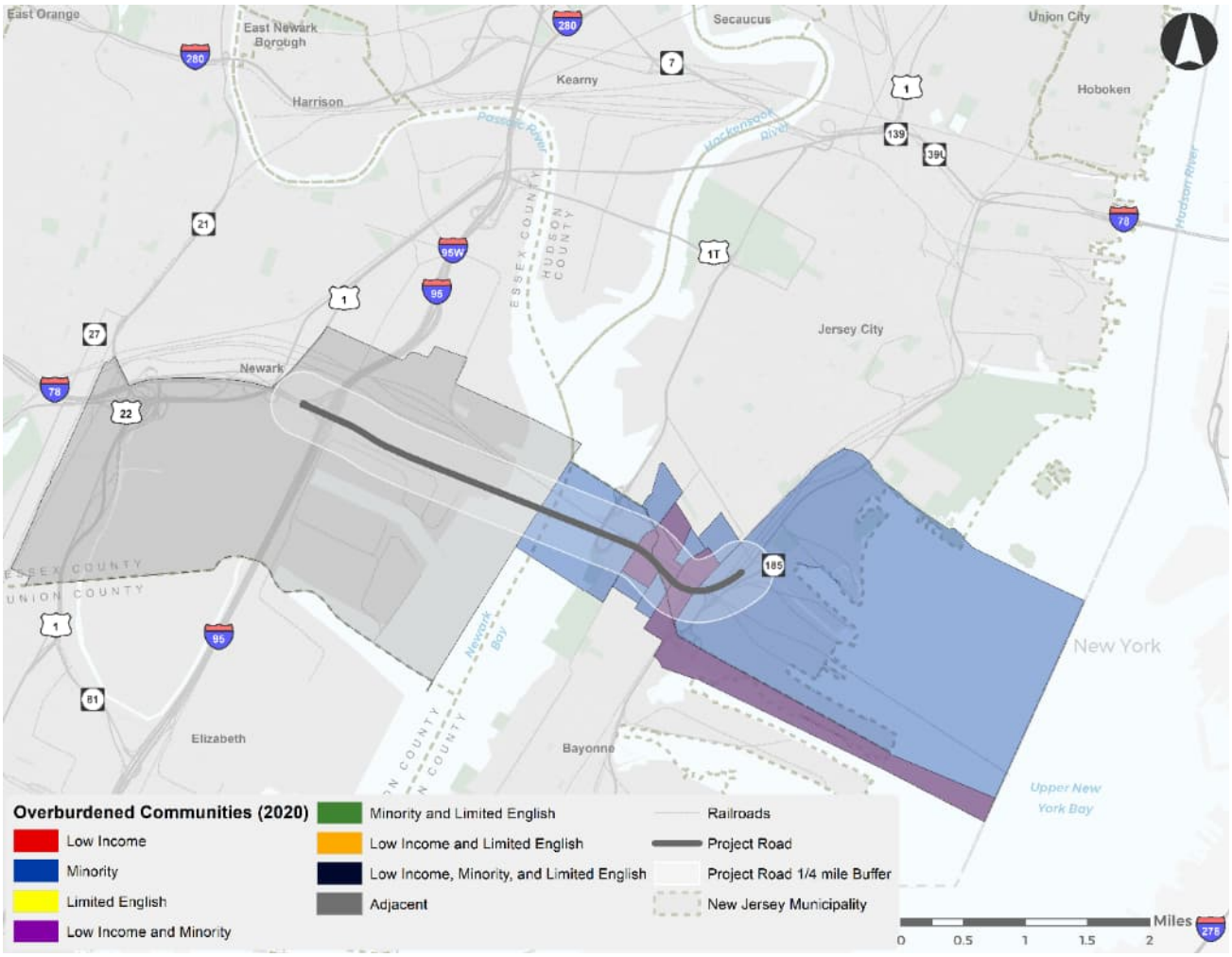
Source: ACS 2016-2020 5-year Estimates (2022)

Table 3.4-15. Overburdened Community Measurements (New Jersey definition)

Municipality / Census Block Group #	Low Income	Minority	Under Age 5	Over Age 64	Less than High School Education	Linguistically Isolated
Bayonne						
340170101001	29.7%	53.1%	10.1%	9.6%	6.0%	7.5%
340170101002	45.0%	79.0%	8.1%	11.4%	12.0%	27.3%
340170101003	20.4%	75.4%	11.1%	2.6%	3.9%	9.9%
340170102001	10.5%	44.9%	8.4%	10.4%	3.3%	5.5%
340170103003	41.9%	74.7%	8.9%	18.3%	8.0%	19.3%
Jersey City						
340170058021	5.8%	58.8%	6.6%	8.1%	1.8%	4.6%
340170061011	12.2%	84.2%	9.6%	19.2%	7.5%	0.0%
340170061021	18.6%	100.0%	0.0%	45.5%	17.3%	14.7%
340170061022	71.0%	99.0%	9.7%	0.0%	9.6%	0.0%
340170061023	45.4%	88.1%	2.6%	10.5%	16.3%	9.6%
340170063002	36.5%	81.4%	6.5%	7.5%	8.7%	5.1%
340170063003	23.5%	93.9%	8.7%	6.7%	23.0%	14.3%

Source: NJDEP 2020

Figure 3.4-2. NJ Overburdened Communities in the Study Area



Source: WSP

3.4.4 No Action Alternative

Social and Economic Factors – Under the No Action Alternative, the community character of the study area is expected to be influenced by implementation of land use plans and planned investments in open space, the Morris Canal Greenway, and transit-oriented development around Hudson-Bergen Light Rail Stations, among other changes to the physical environment. Community cohesion is expected to be enhanced by investments along major north-south corridors, such as JFK Boulevard and Garfield Avenue, that are crossed by the complex of east-west infrastructure formed by the NB-HCE, NJ Route 440, and Conrail's National Docks Secondary freight rail line near the Bayonne-Jersey City boundary.

While population and household projections are not made at the census block group level, the relatively built-out nature of the study area likely translates into modest population growth within the study area. Meanwhile, it can be expected that the study area's historic trend of being a place for newly arrived immigrants to reside and work alongside existing members of the community will continue.

Efforts such as the Ocean Avenue South Redevelopment Plan in Jersey City to attract and retain local businesses to serve the community will shape the availability of essential business services for community residents.

Port and related investments (e.g., the Doremus Avenue area of Newark, Port Jersey Marine Terminal, and the CMA-CGM Container Terminal) will continue to contribute to economic growth and employment opportunities maintaining Transportation and Warehousing as a major industrial sector in the area.

Finally, as evidenced by regional transportation model projections of travel, workers and other users of the region's roadway and transit networks will continue to use roadways and transit for journey to work and other trip purposes.

Effects of the No Action Alternative on community character are assessed in comparison with the effects of the Proposed Action Alternative in Section 3.4.5.1, in compliance with N.J.S.A.13:1D-157 et seq.

3.4.5 Proposed Action Alternative

3.4.5.1 Impacts

Social and Economic Factors – It is anticipated that the Proposed Action will not affect the community character of the study area as it will not affect those factors influencing community character, that is, land use plans and planned investments in open space, the Morris Canal Greenway, and transit-oriented development around Hudson-Bergen Light Rail Stations, among other changes to the physical environment. It is anticipated that the Proposed Action will not affect community cohesion in the study area as it involves widening and improving a highway and the NBB that have been in place for nearly 75 years under which existing travel corridors crossed by the NB-HCE will be retained. The Proposed Action will not affect potential future investments along major north-south corridors that are expected to enhance community cohesion, such as increased neighborhood retail development identified in the Jersey City Master Plan along JFK Boulevard and Garfield Avenue corridors (Jersey City 2021a). Meanwhile, the scope of the Proposed Action, that is, improvement of existing transportation infrastructure in an area with a relatively mature transportation system, on top of the relatively built-out nature of the study area likely translates into the Proposed Action having little to no effect on population and household demographics.

The Proposed Action does not affect the availability of essential business services for community residents as it does not conflict with efforts such as the Ocean Avenue South Redevelopment Plan in Jersey City to attract and retain local businesses to serve the community.

One property (four tax lots) will be acquired in full for the Proposed Action. Acquisition of the former Marist High School property by the Proposed Action will remove this property from the tax rolls as the Authority is exempt from property taxes. Under the Proposed Action, the former Marist High School property will be repurposed for use as a stormwater management basin and for contractor lay down areas and future maintenance needs.

The former Marist High School was sold to a private developer in December 2021. While a redevelopment plan was subsequently approved by the Bayonne City Council for the property, no specific site plan has been submitted by the developer for the property. While the assessed value of the four tax lots comprising the property may change in the future based on improvements that could be built on the property, the current combined assessed value of the tax lots is $25,857,200 (New Jersey County Tax Boards Association 2022).

The Proposed Action is expected to have a beneficial effect on planned port and port-related growth in and around the study area by providing sufficient roadway capacity to at least 2050 on the section of the NB-HCE between Interchanges 14 and 14A, both of which provide access between the ports, railyards, and warehouses and the regional transportation system. In this way, the Proposed Action supports the continued economic growth and employment opportunities of Transportation and Warehousing, a major industrial sector in the area. Finally, by providing sufficient roadway capacity to at least 2050 on the section of the NB-HCE between Interchanges 14 and 14A, the Proposed Action will also have a beneficial effect on workers and other users of the region's roadway system for journey to work and other trip purposes.

Construction Economic Effect – As shown in Table 3.4-16, the project's construction expenditures are anticipated to generate the following economic impacts:

- Approximately 25,500 total jobs during the construction period.
- $2.0 billion earned in labor income by employees.
- $2.8 billion in value added; value added is equivalent to the investment's contribution to the gross regional product.
- $519.8 million in federal, state, and local taxes ($357.8 million in federal taxes and $162.0 million in state and local taxes).

Table 3.4-16. Estimated Construction Economic Impact

Metrics	Direct	Indirect	Induced	Total
Employment	18,786	2,845	3,863	25,494
Value Added	$1,902.0	$478.8	$468.5	$2,849.3
Labor Income	$1,437.1	$314.8	$262.6	$2,014.6
State/Local Taxes	$50.4	$62.9	$48.7	$162.0
Federal Taxes	$247.4	$59.0	$51.4	$357.8

Source: WSP 2022
Note: Monetary values are in millions of 2021 dollars.

Community Character Assessment – As noted in Section 3.4.4, the NB-HCE between Interchanges 14 and 14A traverses census block groups in the study area having population that meet the criteria of low-income populations, minority populations, or both.

Following are assessments of the Proposed Action effects, conducted in coordination with requirements outlined in N.J.S.A.13:1D-157 et seq., on adjacent communities by various factors through comparison with the No Action Alternative and with applicable standards:

- Destruction or disruption of community cohesion or a community's economic vitality. As discussed under Social and Economic Factors, no adverse effect is anticipated for either the Proposed Action or the No Action Alternative.
- Destruction or disruption of the availability of public and private facilities and services. As discussed under Social and Economic Factors, no adverse effect is anticipated.
- Adverse employment effects. As discussed under Social and Economic Factors, no adverse effect is anticipated. The Proposed Action is expected to have a beneficial effect on planned port and port-related growth in and around the study area by providing sufficient roadway capacity to at least 2050 on the section of the NB-HCE between Interchanges 14 and 14A, both of which provide access between the ports, railyards, and warehouses and the regional transportation system.
- Bodily impairment, infirmity, illness, or death. One of the purposes of the Proposed Action is to improve motorist and worker safety on the section of the NB-HCE between Interchanges 14 and 14A. Maintenance and protection of traffic and work-zone safety measures will be incorporated into the project to protect the safe movement of travelers and workers during construction.
- Air pollution (measured by changes in stressors including ground level ozone and air toxics like diesel particulate matter). Ground level ozone is not formed locally; it is formed by reactions of certain air pollutants in the atmosphere from the cumulative contribution of the air pollutants from use of transportation facilities (roads and highways). The cumulative effect of transportation system contributions to the formation of ground level ozone in northern New Jersey is assessed by comparing NJTPA's regional emissions analysis of the transportation improvement program with the goals of the State Implementation Plan (SIP) for attaining the National Ambient Air Quality Standard for ozone. The most recent regional emissions analysis of the TIP, including the NB-HCE Program, demonstrates that the transportation improvement program conforms with the SIP. In other words, the Proposed Action does not interfere with the State's goals for attainment of the ozone standard. The results of the criteria pollutant (carbon monoxide and fine particulates) and mobile source air toxic (MSAT) emissions analysis of the Proposed Action documented in Technical Appendix 3.8 indicate no meaningful differences are expected for the 2050 Build Alternative, as compared to the 2050 No Build Alternative. Emissions associated with the project are not expected to create or contribute to any new violations of the national ambient air quality standards, increase the frequency or severity of NAAQS violations, or delay timely attainment of the standards. Assessment of construction-period air emissions, including through hot spot analyses within each municipality, indicates that construction of the Proposed Action does not exceed *de minimis* thresholds and, therefore, can be presumed to conform to the New Jersey SIP.
- Noise. As documented in Technical Appendix 3.9, a noise analysis of existing conditions and conditions under the No Action and Proposed Action alternatives was conducted in accordance with the Authority's Noise Barrier Policy. That policy is modeled after FHWA and NJDOT policies for the abatement of highway traffic noise. Based on the analysis, the existing noise barrier on the NB-HCE in the study area (along the south side of the NB-HCE, beginning west of the NB-HCE crossing of JFK Boulevard and continuing past the crossing of Avenue C to the east) will be replaced under the Proposed Action with a noise barrier designed to mitigate NB-HCE traffic noise under 2050 traffic conditions. Construction-period noise may create impacts. Measures to minimize construction noise, as described in Section 3.9.5.3 of Technical Appendix 3.9, will be implemented to minimize impacts to the maximum extent practicable.
- Water pollution (measured by changes in stressors including impervious surfaces and flooding). By increasing the number of travel lanes and providing full width shoulders, the Proposed Action increases the area of impervious surface on the NB-HCE between Interchanges 14 and 14A. However, as documented in Technical Appendix 3.11, while the existing NB-HCE provides no stormwater

treatment of roadway stormwater runoff, the Proposed Action will provide stormwater management of this section of the NB-HCE by collecting stormwater in basins for treatment. Meanwhile, the Proposed Action addresses potential flooding through being designed to conform with NJDEP's Flood Hazard Area requirements.

- Soil and groundwater contamination (measured by changes in stressors including contaminated sites). As documented in Technical Appendix 3.10, the Proposed Action will not create any new contaminated sites. Meanwhile, the Proposed Action includes measures to manage, control, and treat contaminated sites in the study area that will be affected by construction in a manner that protects public and worker health and safety.
- Destruction or disruption of man-made or natural resources. Replacement of bridge structures on the NB-HCE between Interchanges 14 and 14A is an integral part of maintaining the structural reliability aspect of the project's purpose. The project's construction will also result in the unavoidable temporary disruption of utilities and other roadways affected by the project's construction. The Authority is coordinating with the owners of the affected utilities and other roadways on measures to minimize disruption of service. The replacement of NB-HCE bridge structures will result in unavoidable adverse effects on Newark Bay and nearby wetlands. The effects will be minimized through such measures as using structure rather than fill material in wetlands and avoiding in-water construction between January 1 and June 30. Unavoidable impacts that cannot be minimized will be mitigated through compensatory mitigation, that is, habitat restoration or enhancement.
- Destruction or diminution of aesthetic values. The NB-HCE, NBB, and the nearby Conrail Upper Bay Bridge are important aesthetic features of portions of the study area near Newark Bay to residents, users of waterfront parks, and to roadway users. The NBB would be replaced under the Proposed Action with two new parallel bridge structures. The effect of replacing the existing NBB on the visual environment will be mitigated by constructing the replacement bridges in the general area of the existing bridge with similar height and gradient as the existing bridge and with a modern cable-stay structure type that has been employed on other long-span bridge replacement projects in the region in recent years, including the Goethals Bridge between Elizabeth, New Jersey, and Staten Island, New York, the Kosciusko Bridge between Brooklyn and Queens in New York, and the Tappan Zee Bridge between Rockland and Westchester counties, New York. Views of the nearby Conrail Upper Bay Bridge will be the same or similar to existing views.
- Vibration. According to the U.S. Department of Transportation Federal Highway Administration (FHWA), there are no federal requirements directed specifically to highway traffic induced vibration (FWHA 2011). Prior studies documented by FHWA with the guidance that assessed the impact of operational traffic induced vibrations have shown that both measured and predicted vibration levels are less than any known criteria for structural damage to buildings. The Proposed Action will include measures to reduce construction-related vibration (e.g., use of drilled shafts as opposed to driven piles).
- Displacement of persons, businesses, firms, or nonprofit organizations. As noted in Technical Appendix 3.3, the Proposed Action will not displace persons, businesses, firms, or nonprofit organizations.
- Increased traffic congestion. A stated purpose of the Proposed Action is to reduce traffic congestion on the NB-HCE between Interchanges 14 and 14A. As documented in Technical Appendix 3.7, the Proposed Action reduces traffic congestion from levels projected under the No Action Alternative.
- Isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community. As noted in Technical Appendix 3.7, since the NB-HCE already exists, and existing local roadway crossings under the NB-HCE will be maintained, the Proposed Action will not create circumstances that would isolate, exclude, or separate minority or low-income individuals within the study area's communities. By addressing congestion on the NB-HCE

between Interchanges 14 and 14A, the Proposed Action improves access and mobility to and from the study area's communities and the broader community.

- The denial of, reduction in, or significant delay in the receipt of, benefit of USCG programs, policies, or activities. The Proposed Action will not deny, reduce, or delay benefits of the project (e.g., reduced traffic congestion and travel times and improved treatment of stormwater from the NB-HCE) to minority populations and to low-income populations.

The above assessments demonstrate that the Proposed Action will not cause a disproportionate and adverse effect on adjacent communities nor deny, reduce, or delay benefits of the Proposed Action to adjacent communities.

Project-Specific Mitigation Measures

Recognizing the potential for construction-period impacts on adjacent communities, and emanating largely from engagement with the adjacent communities, the Authority has committed to additional mitigation and community support. The Authority will implement the following project-specific measures in coordination with adjacent communities to mitigate potential effects:

- Extension of the Hackensack RiverWalk greenway north of Rutkowski Park in Bayonne in support of public access to the Newark Bay waterfront.
- Financial support by the Authority to waterfront access improvements planned by the City of Newark in its Riverfront Park.
- Construction of a nest box in a conservation area of Newark for relocating Peregrine falcons that have been nesting on the Newark Bay Bridge.
- Removal of the proposed ramp between the intersection of JFK Boulevard and West 56th Street to NJ Route 440 southbound in Bayonne to address community concerns regarding local traffic accessing regional transportation links.
- Financial support by the Authority of revitalization efforts by Hudson County in Mercer Park in Jersey City.
- Planting trees on the former Marist High School property to enhance the environment for neighbors of the property.
- Additional greenspace, landscaping, tree planting, and related improvements to be coordinated with specific communities as the project advances.
- Where space and safety considerations permit, plant vegetative barriers within NJ Turnpike right-of-way adjacent to residential neighborhoods between JFK Boulevard and Avenue C in Bayonne.
- Coordination with Hudson County to support its efforts to conduct a summer Vo Tech Camp to encourage students to advance Vo Tech careers.
- The Authority is also considering an option to advance the construction of a new noise barrier adjacent to neighborhoods in Bayonne and have it in place before the roadway improvement construction begins.

Standard Best-Practice Measures

Further, the Authority will implement the following best-practice measures in its construction procurement and construction management to avoid or minimize potential effects on adjacent communities and on affected populations.

- The Authority will employ an Adaptive Management Plan and monitor the effectiveness of the above-noted mitigation and best-practice measures. The Adaptive Management Plan is provided in Appendix H. The effectiveness monitoring section of the plan will inform the Authority and the adjacent communities on whether the mitigation measures are working. Additional details of the Adaptive Management Plan will provide the Authority with a means for monitoring, measuring, and, if required, taking corrective action if mitigation implementation or effectiveness monitoring indicates the measures are not achieving the intended outcomes. The Adaptive Management Plan will include public input during development and implementation of the plan, and summary reporting will be posted on the Authority website.

- Initiatives by the Authority to use the services of local small businesses and vendors.

- Requiring the Authority's standard specification for pre-construction baseline surveys following input from the community, in adjacent areas where potential impacts from noise and vibration may occur or are anticipated. As required, installation of noise shielding (e.g., vegetative barriers) during construction where staging and construction activities are proximate to residential properties.

- Conducting baseline air quality monitoring prior to construction near a neighborhood and throughout construction. Implementing measures to mitigate impacts at individual residences should monitoring indicate an impact.

- Requiring use of Tier 4-compliant engines for off-road construction equipment, enforcement of idling restrictions, and implementation of fugitive dust control measures to minimize construction-period air emissions.

- Inclusion of stormwater management as part of the Proposed Action to address stormwater quantity and quality issues (currently no stormwater management is provided for the NB-HCE).

- Implementing erosion and sediment control measures to minimize off-site transport of sediment associated with stormwater.

- Implementing a construction site solid waste handling and storage plan to minimize litter and rodent activity.

3.4.5.2 Outreach to Adjacent Communities

Engagement with the adjacent communities on the planning of the Proposed Action began during concept planning in early 2022, continued throughout preparation of the preliminary design of the Proposed Action and the draft EA, and will continue through final design and construction. Community engagement will continue to focus on engaging and partnering with local community organizations at events, and co-hosting small business and employment opportunity events. The Adaptive Management Plan outlines the Authority's ongoing outreach program, and measures to allow public access to information and Authority staff throughout project construction.

Overall, there were 24 meetings with officials from Newark, Bayonne, and Jersey City and with Essex and Hudson counties; 13 additional meetings with elected officials representing the adjacent communities at the municipal, state, and federal levels; and five meetings with community groups, specifically, Hudson County Complete Streets, Ironbound Community Corporation, Newark Affirmative Action Review Council, the South Ward Environmental Alliance, and I Love Greenville.

Additional engagement with adjacent communities occurred in the form of a Virtual Public Information Center (267 views on YouTube as of the close of the Draft EA public comment period) and Fact Sheets about the Proposed Action posted on the project website (over 6,435 website homepage views as of the close of the Draft EA public comment period). The Fact Sheets were translated into six languages, including Arabic, Hindi, Polish, Portuguese, Spanish, and Tagalog.

Meanwhile, there were three, in-person Public Information Centers (PIC) between February and July in 2024, one each in Newark, Bayonne, and Jersey City, attended by approximately 500 attendees, to further engage with the adjacent communities on the planning of the Proposed Action and listen to their concerns. The project team has received, reviewed, and addressed more than 1100 comments from the pubic and agency representatives. However, approximately 95 percent of comments received were from a "DoNotReply" company-generated email account, and therefore a direct response was not possible. A detailed summary of public comments received are addressed in Appendix G, "Response to Comments."

The Authority will continue to advance outreach to adjacent communities by:

- Meetings, newsletters, project website, and related outreach efforts, outlined in the Adaptive Management Plan (Appendix H).
- Providing workshops to Small Business Enterprises (SBEs) and Veteran- and Disabled Veteran-Owned Businesses (DVOBs) to assist with completing the New Jersey Turnpike Authority's SBE-DVOB certification process.
- Providing forums for local businesses, contractors, and skilled tradespersons to learn about opportunities related to the construction.
- Providing access to Authority personnel for comments, concerns, and complaints.

The Authority will continue to conduct stakeholder outreach throughout the design and construction of the Proposed Action. The community engagement process will continue to focus on partnering with local community organizations to co-host community programs for youth or small business and employment opportunity events with them. Additional community specific programs will be developed, discussed, and reviewed with local communities before the start of construction adjacent to residential communities. The Authority will develop and implement an Adaptive Management Plan to monitor for the effectiveness of mitigation measures during construction and take corrective action as needed. The program team estimates that during the post-EA time frame, additional community-based programs will be discussed and implemented prior to construction.

In addition, the Authority will implement the following outreach strategies for the construction period:

- Operation of a walk-in outreach and information center for community residents, while construction activities are ongoing and proximate to their neighborhoods.
- A project website, email, and outreach "hotline" that will expeditiously allow the Authority to address community concerns. Customized, community-specific outreach plans will be developed for Newark,

Jersey City, and Bayonne, working in coordination with elected officials and community representatives.

- The outreach effort will include translation materials customized for the localized communities as needed.

3.4.5.3 Conclusion

Based on the preceding assessment, the Proposed Action will have no significant impact on socioeconomics, demographic conditions, or community facilities in the study area.

The Authority will continue to engage with study area communities regarding the Proposed Action, including evaluation of additional measures to avoid or minimize impacts and create benefits to the communities. The Adaptive Management Plan will provide performance measures for mitigation measures and multiple methods for the community to express concerns to the Authority. No further mitigation, beyond what is described above, is necessary.

Appendix 3.5

Cultural Resources

3.5 Cultural Resources

3.5.1 Study Area Definition and Data Collection

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties. Among other provisions, the NHPA established the National Register of Historic Places (NRHP) as the official list of the Nation's historic places (both historic and archaeological resources) worthy of preservation. The NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places."

As detailed in the NHPA National Register Criteria of Evaluation (36 CFR Part 60.4), a historic property must possess the following to be eligible for inclusion in the NRHP:

> The quality of significance in American history, architecture, archaeology, engineering, and culture [that] is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
> (b) that are associated with the lives of persons significant in our past; or
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

The New Jersey Register of Historic Places (NJR) is the official list of New Jersey's historic resources of local, state, and national interest. Created by the New Jersey Register of Historic Places Act of 1970 (N.J.S.A. 13:1B-15.128 et seq), the NJR is closely modeled after the NRHP program. Both Registers have the same criteria for eligibility, nomination forms, and review process.

Per the Section 106 regulations (36 CFR 800.5), an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance. Adverse effects on historic properties include, but are not limited to the following:

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access that is not consistent with the Secretary of the Interior's standards for the treatment of historic properties and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.

- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

3.5.2 Area of Potential Effects

For purposes of the Section 106 process, the study area is the Area of Potential Effects (APE), defined as follows:

> *The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.*

Section 106 regulations indicate that "historic properties" are a "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places." Architectural properties are above-ground resources and archaeological properties are below-ground resources. Consistent with the requirements, separate APEs are defined for the Proposed Action for Historic Architecture and Archaeology.

The APEs take into account all locations where an undertaking may result in disturbance of the ground, from which elements of the undertaking may be visible, and where the activity may result in changes in traffic patterns, land use, and public access. Project effects on historic properties may include both physical effects and contextual effects. Direct physical effects could include physical destruction, demolition, damage, or alteration of a historic resource. Indirect contextual effects may include isolation of a property from its surrounding environment; the introduction of visual, audible, or atmospheric elements that are out of character with a property or that alter its setting and context; or elimination of publicly accessible views to the resource.

3.5.2.1 APE-Architecture

The APE for Historic Architecture (APE-Architecture) includes the area in which the project may directly or indirectly cause changes in the character of use of historic properties, if they exist, in the project area (Figures 3.5-1a – 3.5-1c). The APE-Architecture includes all locations subject to ground-disturbing activities (consisting of the APE for Archaeology [APE-Archaeology]). To account for potential visual or contextual effects, the APE-Architecture extends beyond the actual construction limits of the project to include those properties that may be impacted by visual changes, patterns of use, or may experience a change in historic character associated with the construction of the proposed project.

The Proposed Action would expand the NBB footprint to the north, creating a wider structure. At 265 feet, the overall height of the new bridge would not change substantially from its current maximum height of 263 feet and its visibility from the surrounding area would remain largely unchanged. To verify the visibility of the new bridge, a 0.75-mile buffer was considered based on the Federal Communication Commission's guidance for cellular towers measuring between 200 and 400 feet. Within the 0.75-mile buffer, GIS-based viewshed modeling delineated areas of visibility and non-visibility based on the proposed height of the NBB replacement bridges and intervening topography to determine areas in which the Proposed Action has the potential to be seen from street level. The viewshed modeling resulted in unnecessarily broad views due to the flat nature of the surrounding landscape. However, visibility was generally low to the horizon with little or no potential to affect historic properties, especially at greater distances. Further analysis using available street views indicated that intervening development and vegetation greatly reduced overall visibility to areas immediately fronting on the roadway, open space, and water. Accordingly, a 500-foot study buffer limit was adopted to account for reasonable visual, atmospheric, or audible effects. Using available street views that were verified during field survey, the APE-Architecture was further refined to only include resources directly or partially within the line of sight of the proposed undertaking to ensure full coverage.

The western portion of the APE-Architecture in Newark includes certain industrial and commercial properties adjacent to the Newark Viaduct and NBB West Approach and south of Interchange 14. Based on current project plans, the proposed Interchange 14 connector ramps to the east of the EWR are within an area of dense transportation infrastructure and will likely be at a similar height as the existing routes around the Port Street overpass. The potential for the proposed undertaking to create indirect visual impacts on any historic properties west of the NJ Turnpike main stem within the EWR complex is negligible and would not introduce new incompatible visual elements within the current setting. As a result, the APE-Architecture was drawn more narrowly in this area, along the west side of the NJ Turnpike main stem and excludes the EWR. Over Newark Bay, the APE-Architecture follows the 500-foot buffer. In the dense urban environment of Bayonne and Jersey City east of Newark Bay, the southern boundary of the APE-Architecture was more narrowly defined to encompass portions of Sunset Avenue, JFK Boulevard, West 54th Street, West 55th Street, West 56th Street, West 57th Street, West 58th Street, Avenues B and C, Garfield Avenue, and Interchange 14A. The eastern boundary of the APE-Architecture encompasses parcels flanking the NB-HCE, as well as certain industrial properties south of Caven Point Road (also known as New Jersey Route 185). The northern boundary line of the APE-Architecture in Jersey City and Bayonne follows a railroad embankment and the Hudson-Bergen Light Rail (HBLR) right-of-way. The railroad corridors, combined with the raised elevation of New Jersey Route 440 and surrounding pockets of dense vegetation, provide a visual barrier from the NB-HCE and thereby limit potential visual indirect impacts on adjacent residential neighborhoods and commercial development to the north and west of the highway. The APE-Architecture terminates adjacent to the east of Linden Avenue.

Figure 3.5-1a. Areas of Potential Effect—Newark

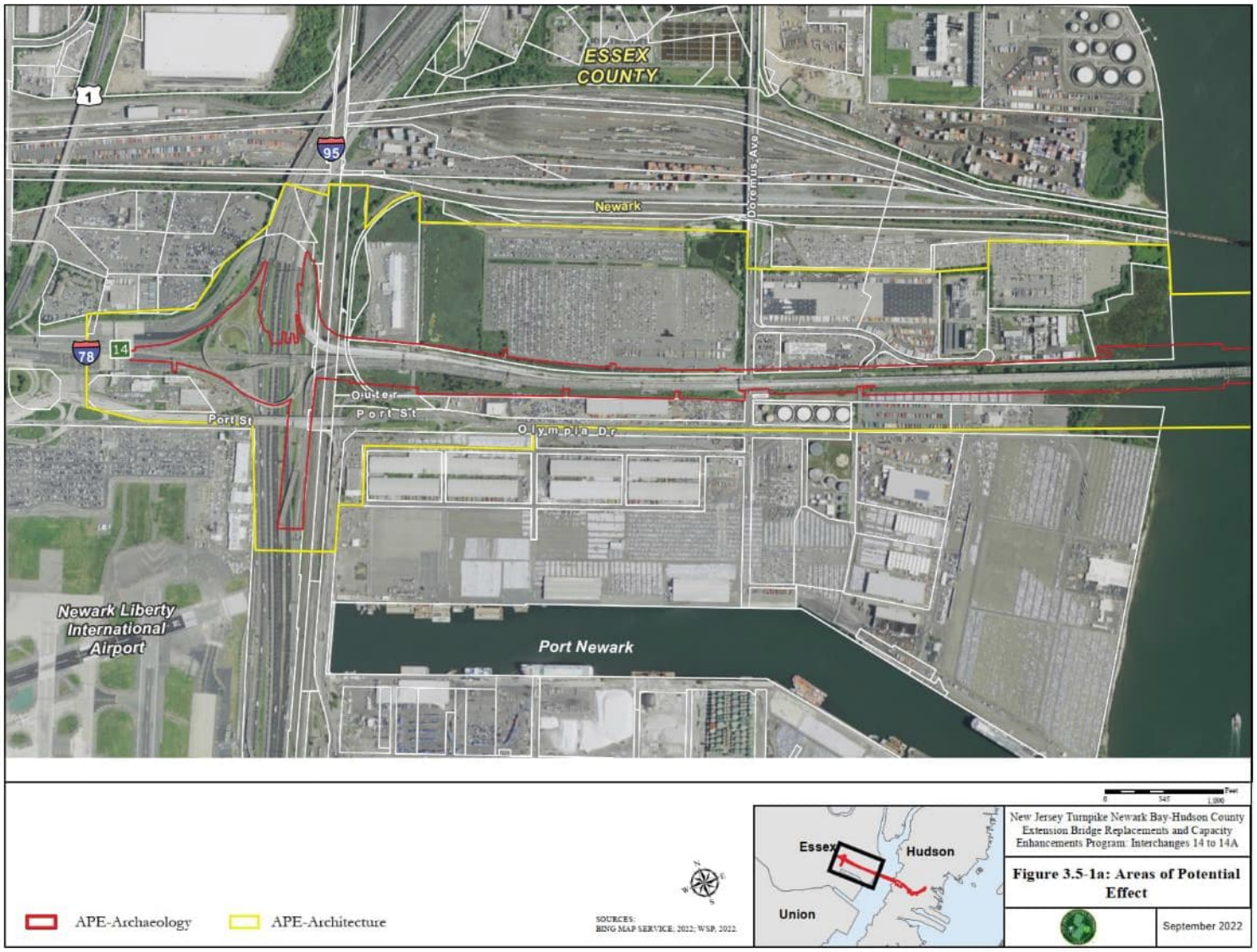


Figure 3.5-1b. Areas of Potential Effect—Bayonne and Jersey City

Figure 3.5-1c. Areas of Potential Effect—Jersey City

3.5.2.2 APE-Archaeology

The APE-Archaeology encompasses any area of land disturbance required for obtaining permits or for successful completion of the project (see Figure 3.5-1a-c). Land disturbances include, but are not limited to, areas subject to excavation or deep grading, wetlands mitigation sites, construction staging areas, or borrow areas opened expressly for the project. It includes the expected limits of disturbance for the proposed Interchange 14 improvements, Newark Viaduct, NBB, east at-grade segment, stormwater management areas, temporary and permanent parking areas, and construction staging and laydown areas. Because project plans remain in the early stages of development, vertical and horizontal areas of direct physical disturbance have not been fully identified, including the final plans for potential stormwater basins and infrastructure.

3.5.3 Cultural Resources Survey Methodology

To identify historic properties and assess potential impacts in accordance with Section 106, a cultural resources survey was performed within the APE for the Proposed Action (see Appendix A: Cultural Resources). The investigation consisted of a Phase I archaeological survey and an Intensive-level historic architectural survey. The purpose of the Phase I archaeological survey was to assess the archaeological sensitivity of the APE-Archaeology to determine if previously identified archaeological sites and archaeological historic properties are present in the APE-Archaeology, and to determine if previously unidentified pre-Contact or historic archaeological resources are present within the APE-Archaeology. The purpose of the Intensive-level historic architectural survey was to assess the NRHP-eligibility of newly identified above-ground historic architectural resources within the APE-Architecture and to assess potential project effects on above-ground historic properties listed in the NJR and/or NRHP or eligible for listing in the NRHP within the APE-Architecture. Although the National Register Criteria for Evaluation requires a historic resource to be at least 50 years of age, the intensive-level historic architectural survey expanded the minimum age requirement of previously unevaluated historic resources to account for the potential extended timeline of the Proposed Action. The cultural resources survey evaluated the significance and integrity of previously unevaluated historic architectural resources within the APE-Architecture and assessed the significance of identified archaeological resources in the APE-Archaeology according to the National Register Criteria for Evaluation. The criteria of adverse effect (36 CFR 800.5) were applied to assess whether the Proposed Action would result in an adverse effect on any listed or eligible historic properties. In addition to Section 106 regulations, the cultural resources survey adhered to the archaeological and historic architectural survey guidelines of the New Jersey Historic Preservation Office (NJHPO) (1994, 1996) (Splain 1999).

Research for the cultural resources survey was conducted to determine if any archaeological sites or historic properties have been previously identified within the APE-Archaeology and APE-Architecture and to assess the potential for unidentified archaeological resources or historic properties. Research at the NJHPO's facilities in Trenton to identify listed or eligible historic properties and examine previous historic sites surveys and regulatory surveys on file was not possible due to COVID-19 restrictions. However, a good faith effort was made by the project's cultural resource consultants, Richard Grubb & Associates, Inc. (RGA), to conduct NJHPO research by reviewing the NJ-GeoWeb database (NJDEP-GIS 2022), the updated list of historic properties, and the list of cultural resources survey reports on the NJHPO's website, and surveys on file in RGA's in-house library. For historic architectural resources, background research included the examination of accessible local historic sites inventories, the New Jersey historic bridge and roadway surveys, as well as master plans from Bayonne, Newark, and Jersey City to identify previously surveyed and/or locally significant historic resources within the APE-Architecture. Files at the New Jersey State Museum (NJSM) were checked for the presence of registered archaeological sites within or near the APE-Archaeology. The National Oceanic and Atmospheric nautical maps showing shipwrecks were examined and the NJHPO was asked for mapping it has on file regarding previously identified submerged targets in the Newark Bay. Additional background research consisted of a review of pertinent primary and secondary sources available online, including maps, historic photographs, and local histories.

3.5.4 Existing Conditions

3.5.4.1 Historic Properties

In April 2023, a Phase I archaeological survey and Intensive-level historic architectural survey report was submitted to the NJHPO for review and comment (Richard Grubb & Associates, Inc. 2023a). A supplemental Phase I archaeological survey dated November 2023 that included a detailed review of geotechnical boring log data was subsequently submitted to the NJHPO, which is discussed further in Section 3.5.4.2. The Intensive-level historic architectural survey identified 41 historic architectural resources over 45 years of age in the APE-Architecture, including four historic properties previously listed in the NJR and NRHP or eligible for listing in the NRHP at the time of the survey (Figure 3.5-2a – Figure 3.5-2d):

- Newark and Elizabeth Branch of the Central Railroad of New Jersey (SHPO Opinion: 8/29/2000)
- Pennsylvania Railroad New York Bay Branch Historic District (SHPO Opinion: 12/17/2019)
- Lehigh Valley Railroad Historic District (SHPO Opinion: 3/14/2002)
- Morris Canal (NJR: 11/26/1973; NRHP: 10/1/1974; SHPO Opinion: 5/27/2004)

In addition, one archaeological historic property is present and previously identified within the APE-Archaeology:

- Site 28-Hd-45 (Jersey Eagle archaeological Site) (a.k.a. The Jersey Eagle Site; SHPO Opinion: 5/17/2013)

Among the historic architectural resources identified within the APE-Architecture, the NJHPO previously determined the New Jersey Turnpike main stem, i.e., the first roadway in the New Jersey Turnpike System opened in 1951, not eligible for listing in the NRHP and as such, this historic resource was not evaluated further as part of the current survey. Similarly, the PSE&G Building and Former Tide Water Oil Company Pumping Station, were previously surveyed resources not recommended NRHP-eligible and not further evaluated as part of the intensive-level historic architectural survey. The Intensive-level Architectural Survey forms for the entire NB-HCE Corridor were submitted by the Authority on March 15, 2023, recommending no other portion of the NB-HCE corridor as eligible for listing in the NRHP. On April 4, 2023, the NJHPO concurred with the assessment "due to a lack of significance in the broad patterns of automotive transportation history under National Register Criterion A; a lack of associations with significant persons under Criterion B; and a lack of technological significance or aesthetic distinction under Criterion C" (HPO Project #21-1041-6; HPO Log #D2023-005). None of the remaining 32 historic architectural resources identified within the APE-Architecture and surveyed at the intensive level were recommended eligible for listing in the NRHP, as a result of the intensive-level historic architectural survey.

Figure 3.5-2a. Cultural Resources — Newark

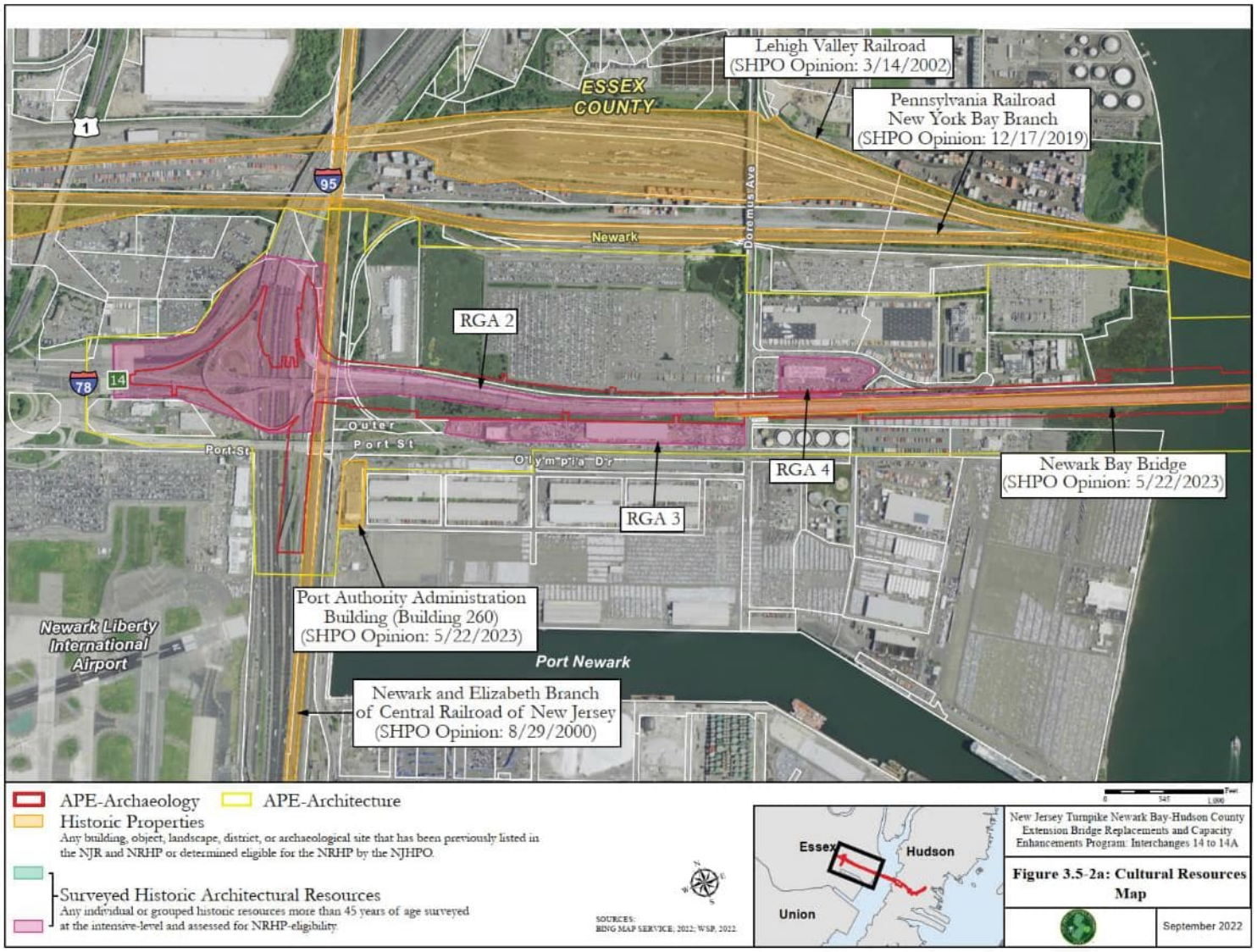


Figure 3.5-2b. Cultural Resources — Bayonne and Jersey City

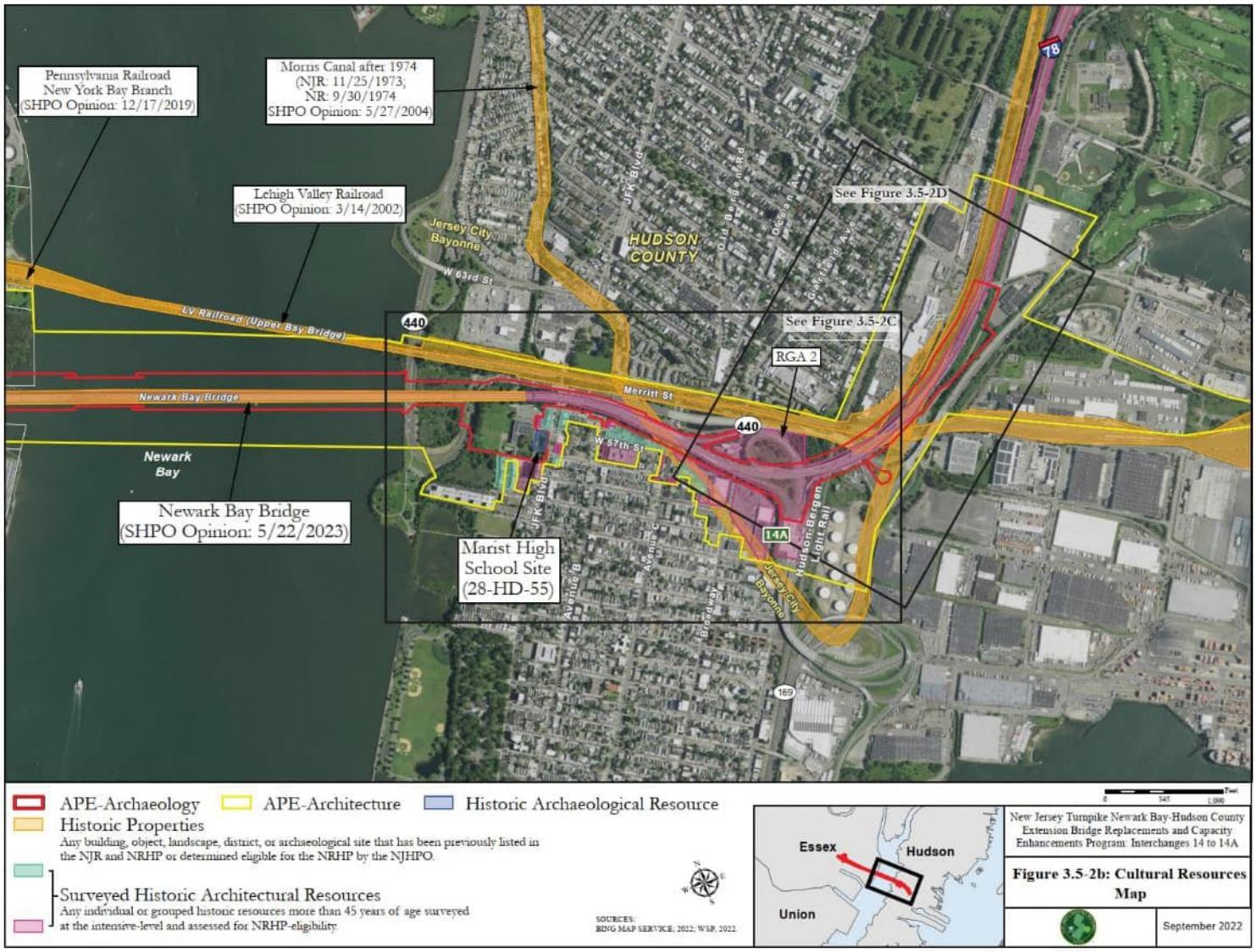


Figure 3.5-2c. Cultural Resources — Bayonne and Jersey City (detail)

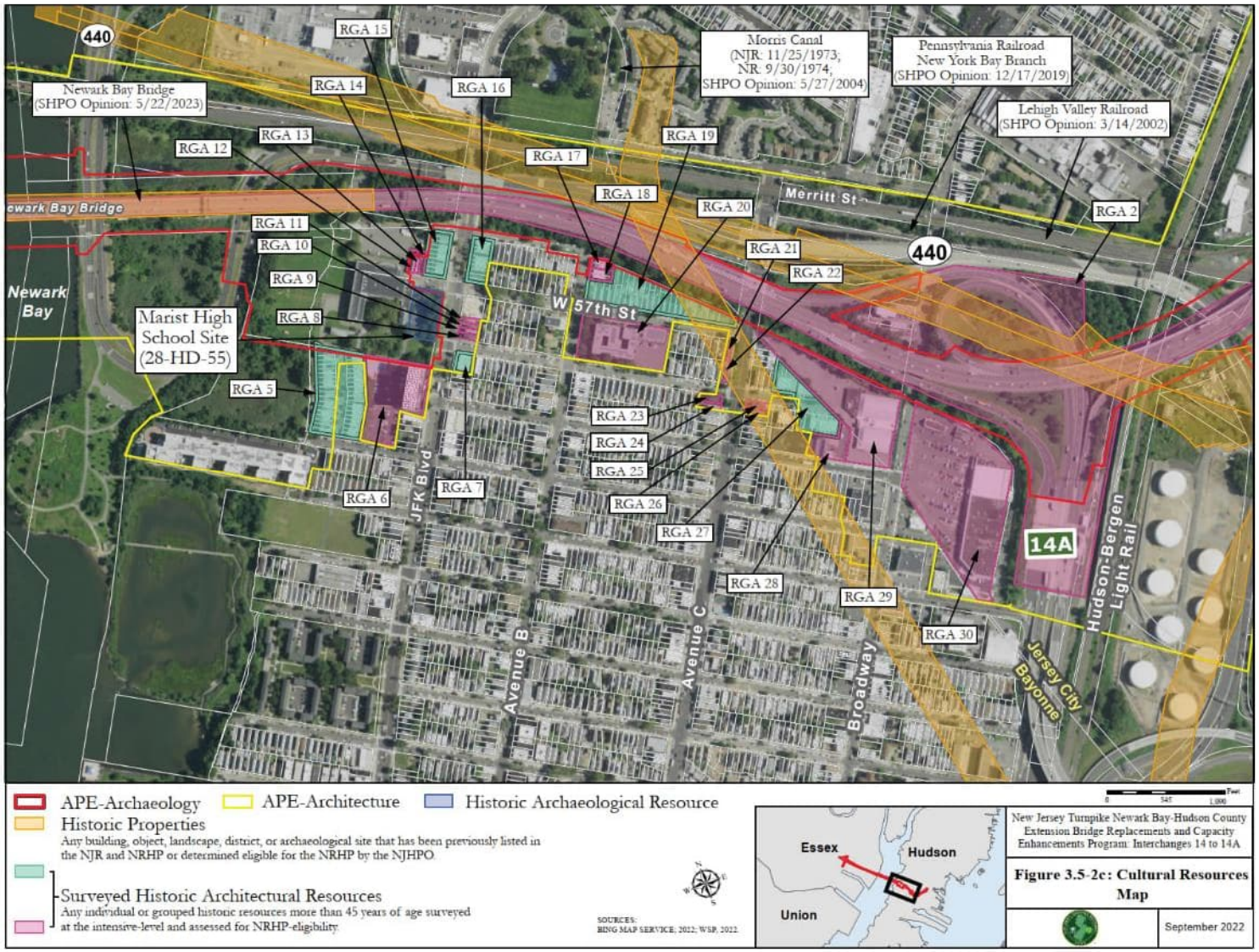
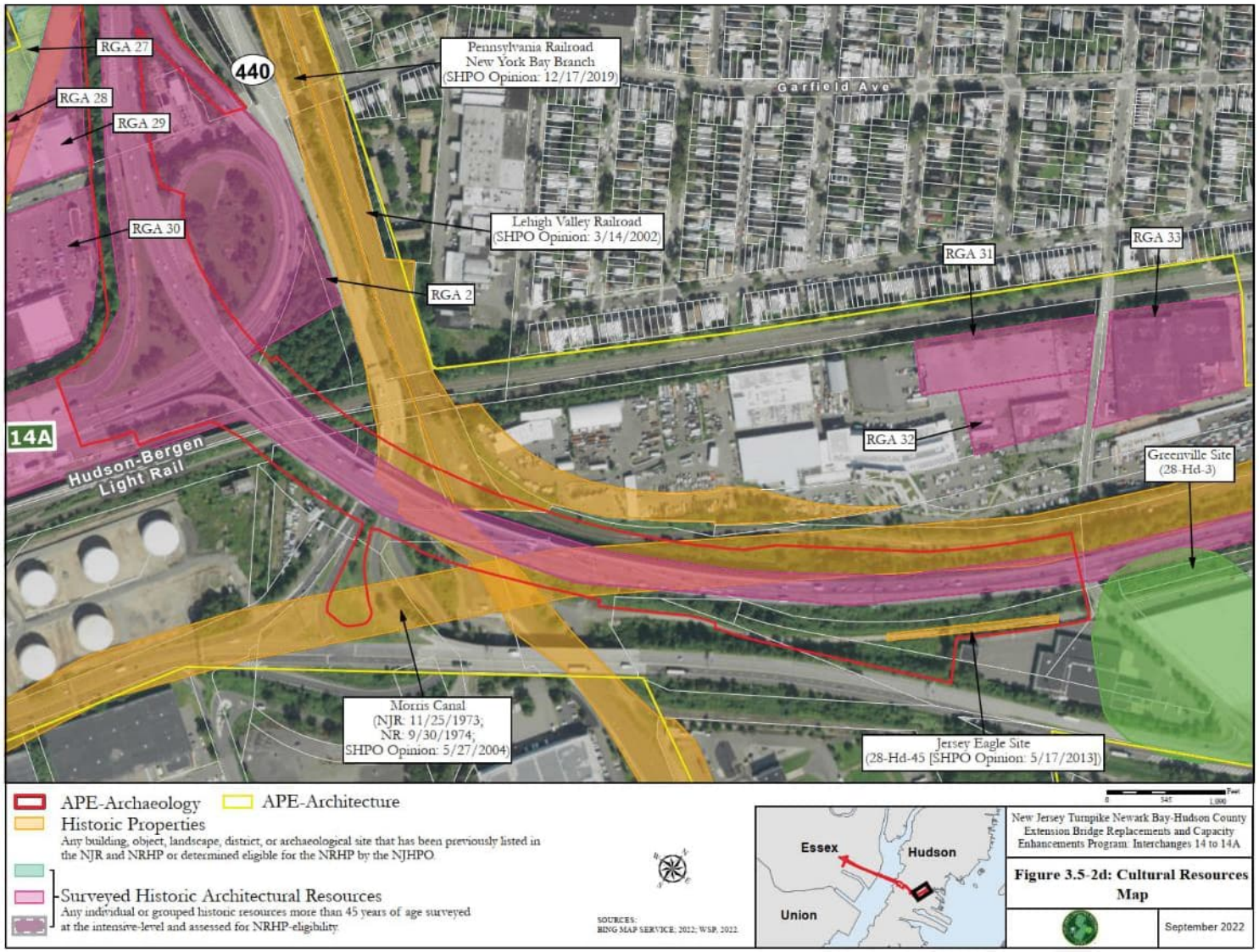


Figure 3.5-2d. Cultural Resources — Jersey City (detail)



Newark and Elizabeth Branch of the Central Railroad of New Jersey Historic District (SHPO Opinion: 8/30/2000)

The Newark and Elizabeth Branch of the Central Railroad of the New Jersey Historic District is eligible for the NRHP under Criterion A for its role in regional transport of freight and passengers (Guzzo 2000). This traffic includes passengers traveling to vacation locations along the northern New Jersey Shore, excursion riders traveling to the New Jersey Shore and numerous points along the Central Railroad of New Jersey Main Line, and employees commuting to Newark. The branch also handled significant freight traffic to and from Newark, Elizabeth, and the Port of Newark. The original survey forms and the subsequent NJHPO Opinion of Eligibility did not define a period of significance for the Newark and Elizabeth Branch of the Central Railroad of New Jersey; however, the significance period would likely extend from 1870 (i.e., the date the railroad was first chartered) to at least 1938, when previously identified contributing resources were built within the corridor (Richard Grubb & Associates, Inc. 2005). The district boundaries consist of the line's historic right-of-way and extend from the Central Railroad of New Jersey main line at Elizabethport, Union County to the Newark and New York Branch of the CRRNJ at Brills Junction in the City of Newark, Essex County. The NRHP-eligible railroad historic district traverses a portion of the APE-Architecture at Interchange 14.

Pennsylvania Railroad New York Bay Branch Historic District (SHPO Opinion: 12/18/2019)

The Pennsylvania Railroad New York Bay Branch Historic District is eligible for listing in the NRHP under Criterion A in the area of transportation for its contribution to the state's industrial, commercial, and urban expansion. The district is also eligible under Criterion C in the area of engineering and for the district's significant collection of contributing bridges, culverts, yards, and surviving overhead electrified catenary system (Guzzo 2005, Saunders 2015). The railroad's period of significance extends from 1889, when the two predecessor railroads received their corporate charters, to 1945, when the railroad completed the last transfer bridge (Transfer Bridge No. 9) at the contributing Greenville Yard Piers in Greenville Yard, Jersey City. The boundaries of the historic district are limited to the historic right-of-way and extend in two branches from Waverly Yard in Newark to just beyond the Point-No-Point Bridge over the Passaic River in Kearny and from Waverly Yard in Newark to Greenville Yard in Jersey City (Guzzo 2005, Saunders 2015, Marcopul 2019). The railroad is currently operated by Conrail for freight service. The historic district intersects with a portion of the APE-Architecture between Newark Bay and Caven Point Road (NJ Route 185) in Bayonne and Jersey City.

Lehigh Valley Railroad Historic District (SHPO Opinion 3/15/2002)

The Lehigh Valley Railroad Historic District follows a route across the state of New Jersey, spanning seven counties, beginning in Phillipsburg, Warren County, and terminating in Jersey City, Hudson County. The Lehigh Valley Railroad Historic District is eligible for the NRHP under Criterion A in the area of transportation at the state level of significance for its role in transporting coal from Pennsylvania coal fields to the New York market and for its local significance in leading to the industrial development of South Plainfield and various Middlesex County communities, such as Perth Amboy (Guzzo 2002). Subsequent reviews for other projects clarified and elaborated on the significance, integrity, and character of the historic district. While no period of significance is specified in the NJHPO Opinion of Eligibility, researchers have suggested a period beginning in 1875, when the first shipment was sent to Perth Amboy, through 1951, after which it did not meet the test for "exceptional significance" for resources less than 50 years old (ARCH2, Inc 2001: 21). A portion of the historic district extends along the northern boundary of the APE-Architecture from Newark Bay in Bayonne to the Hudson-Bergen Light Rail right-of-way in Jersey City, just north of the NB-HCE Interchange 14A. From the HBLR, the historic district continues northeastward within the APE-Architecture before terminating at a point just west of the existing NB-HCE between New Jersey Route 440 and Linden Avenue.

Morris Canal (NJR: 11/26/1973; NRHP: 10/1/1974; SHPO Opinion: 5/27/2004)

The Morris Canal, which was completed in 1836 after little more than a decade of construction, was listed on the NJR and NRHP in the early 1970s as a linear historic district under Criteria A, B, C and D. The canal is

significant under Criterion A for its association with canal transportation, American technical education, and the demographic and industrial growth in northern New Jersey, New York City, and the Lehigh Valley. Because several inventors, engineers, and important men were associated with the construction and operation of the canal, the canal is significant under Criterion B. The Morris Canal meets Criterion C as a major technological feat of construction and operation, including the inclined plane design. The potential information relating to canal engineering and construction as well as the lifeways of nineteenth-century canal culture that archaeological investigations may yield makes the canal significant under Criterion D (Guzzo 2004). The period of significance established in the Morris Canal Historic District nomination form cover the years from 1836 to the turn of the century (Guzzo 2004). In 2004, the NJHPO expanded the period of significance for the Morris Canal to 1930 when the closure of the canal was complete (Guzzo 2004). Portions of the APE-Archaeology cross the footprint of the infilled Morris Canal in a right-of-way south of I-78/NJ Turnpike in the City of Bayonne and on Block 30203, Lot 3; Block 30204, Lots 3 and 4; Block 30306, Lots 2, 3, and 4; and Block 30303 in the City of Jersey City.

Port Authority Administration Building (Building 260) (SHPO Opinion: 5/22/2023)

The Port Authority Administration Building (Building 260) is a multi-story, steel-frame building constructed in 1967 in the northwest corner of Port Newark. The building assumes a T-shaped footprint comprised of a three-story office block and garage/storage area extending from the northeast elevation. The office block exterior contains a distinctive angular façade treatment characterized by the composition of full-height, precast concrete vertical panels and alternating glass and spandrel panels. The remaining building exterior consists primarily of glazed face brick and translucent, insulated fiberglass panels framed by structural steel mullions. The subject building is eligible under NRHP Criterion C as an intact and representative example of the New Formalism style, a mid-twentieth century architectural style that characterized many high-profile cultural, institutional, and civic buildings of the period (NJDEP 2023). The boundaries of the historic property encompass the property boundaries, and the period of significance is 1967, the date of construction. Character-defining features include the building's form, precast concrete vertical panels, glass and spandrel panels, glazed brick veneer, insulated fiberglass panels with structural steel mullions, and aluminum sash windows.

Newark Bay Bridge (SHPO Opinion: 5/22/2023)

The NBB, also known as the Vincent R. Casciano Memorial Bridge, was built in 1956 as part of the NB-HCE to carry the highway over Newark Bay between the cities of Newark and Bayonne. The main span consists of a three-part, cantilevered through-truss with east and west anchor arms and a central shouldered tied-arch span. A 43-span west approach and 32-span east approach comprised of a combination of steel stringer beam spans and steel riveted girder spans flank the main bridge span. Two types of reinforced concrete piers support the entire bridge superstructure. Since its construction, the structure has undergone various alterations, including the replacement of its deck, median, and parapet walls, along with the addition of new overhead directional signs, lighting, and security fencing.

The NBB was among the last of the bridge structures erected for extensions to the original (main stem) NJ Turnpike, a limited-access highway first envisioned in the early 1930s as part of a nationwide network of superhighways. As part of the larger NJ Turnpike corridor, the bridge and NB-HCE helped reduce travel times and served as a feeder into the NJ Turnpike system, but as an element of a limited-access expressway serving Hudson County, the NBB contributed little to appreciable changes in patterns of growth in Bayonne or Jersey City.

Architecturally, the NBB embodied widespread, mid-twentieth-century design standards adopted by the Authority and highway builders for major bridges across the country, including along the NJ Turnpike's main stem. These design features included the use of concrete bridge piers, beam and girder spans, parapet walls, and a cantilevered through-truss and shouldered tied-arch span. The Newark Bay Bridge is eligible under NRHP Criterion C as an example of a mid-twentieth century cantilevered truss bridge. The cantilevered through truss structure is no longer a preferred bridge design by engineers and is one of three remaining twentieth century

structures of its type in New Jersey (NJDEP 2023). As indicated in the NJHPO opinion of eligibility for the structure, the historic property boundaries encompass the entire bridge and its period of significance is limited to the year of its construction (1956) (NJDEP 2023).

Site 28-Hd-45 (SHPO Opinion: 5/17/2013)

Site 28-Hd-45 (Jersey Eagle archaeological Site) (a.k.a. The Jersey Eagle Site; SHPO Opinion: 5/17/2013) is a multi-component archaeological site on the western shore of the Hudson River situated within the footprint of a Conrail railroad access road on Block 30306, Lot 7 in the City of Jersey City just south of Linden Avenue in the northern portion of the APE-Archaeology. The archaeological site was identified within the footprint of a natural gas pipeline and its full horizontal extent was not delineated. While no pre-Contact period cultural features were found, the pre-Contact period artifacts recovered indicate stone tool manufacture and maintenance, as well as subsistence-related resource processing activities were conducted at the site. The historical component of the site yielded artifacts related to eighteenth- to twentieth-century domestic refuse. One historic feature was identified consisting of a stone wall feature that may represent a property subdivision marker (PAL 2013a, 2013b). The artifacts were recovered from buried plowzone layer, which had a top subsurface depth ranging from roughly 2.3 feet in the northern portion of the site to 7.9 feet below grade in the southern portion of the site. The site was determined eligible for listing in the NRHP under Criterion A for its association with events that made a significant contribution to the broad patterns of history and Criterion D for the potential to yield new, important information in Native American per-Contact history and the early colonial settlement of Hudson County from 0 to 1850 AD.

None of the remaining 32 historic architectural resources identified within the APE-Architecture and surveyed at the intensive level were recommended eligible for listing in the NRHP.

3.5.4.2 Archaeological Resources

Phase I Archaeological Survey and Intensive-Level Historic Architectural Survey Report (April 2023)

In April 2023, a Phase I archaeological survey and Intensive-level historic architectural survey report was submitted to the NJHPO for review and comment (Richard Grubb & Associates, Inc. 2023a). The archaeological survey included archaeological site file research, historic and pre-Contact cultural settlement research, a review of prior cultural resources survey reports, an examination of existing conditions, an archaeological sensitivity assessment, and, on Block 13, Lot 1 in the City of Bayonne, Hudson County, Phase I archaeological testing was conducted in an area of assessed high archaeological sensitivity.

<u>Jersey Eagle Archaeological Site (28-Hd-45) (SHPO Opinion: 5/17/2013)</u>

A review of NJSM site files and published accounts (Cross 1941; Skinner and Schrabisch 1913; Public Archaeology Laboratory, Inc. [PAL] 2013) indicated that there is one registered archaeological site within the APE-Archaeology (Figure 3.5-2d). The aforementioned Site 28-Hd-45 (Jersey Eagle archaeological Site) (a.k.a. The Jersey Eagle Site; SHPO Opinion: 5/17/2013) is a multi-component pre-Contact and historic period site found within the footprint of a natural gas pipeline corridor on Block 30306, Lot 7 in the City of Jersey City, just south of Linden Avenue in the northern portion of the APE-Archaeology. This site was determined eligible for listing in the NRHP under Criterion A for its association with events that made a significant contribution to the broad patterns of history and Criterion D for the potential to yield new, important information in prehistory and history regarding the pre-Contact period occupation and the early colonial settlement of Hudson County from 0 to 1850 AD. While the full site boundaries of the deeply buried deposits associated with the site were not defined in the prior 2013 archaeological survey, the area proximate to the site boundaries is sensitive for deeply buried archaeological deposits related to the site.

Proposed nearby stormwater basin HUC3-F has a base depth of 5.0 feet below grade and does not appear to exceed the identified top depth of 6.0 to 6.5 feet for the nearby 28-Hd-45 Site. Further, examination of a soil

boring log revealed the presence of truncated, hydric subsoil at the basin location that is capped by historic fill. The proposed associated stormwater outfall pipe between the basin and Linden Avenue may be in or proximate to the existing natural gas pipeline trench excavation footprint that measured 16 feet in width.

Greenville Site (28-Hd-3)

The Greenville Site (28-Hd-3) is a Woodland period Native American site on the western shore of the Hudson River adjacent to the northeast terminus of the APE-Archaeology near Linden Avenue (see Figure 3.5-2d). This site was first recorded by Skinner and Schrabisch in 1913 who reported that "potsherds daubed over with red paint" were said to have been collected on the point at Greenville (Skinner and Schrabisch 1913: 42). Based on the proximity of the Greenville and the Jersey Eagle sites, it is possible that the pre-Contact components of the sites are related and represent the same archaeological resource.

Sites 28-Hd-12 and 28-Hd-47

Files also indicate that two previously identified sites are located within 1,000 feet of the APE-Archaeology. Site 28-Hd-12 is a temporally and functionally undetermined pre-Contact period Native American site located roughly 200 feet north of the APE-Archaeology. The Morris Canal Fiddler's Elbow Segment Archaeological Site (28-Hd-47) is situated roughly 1,000 feet south of the APE-Archaeology and is associated with the abandonment and filling of the Morris Canal, circa 1920-1940.

Submerged Targets Near the APE-Archaeology

Eight submerged targets have been documented in proximity to APE-Archaeology between the NBB and the Conrail Line Bridge based on information provided by the NJHPO in an email dated July 1, 2021 (USGS 1955a, 1955b). The closest of these targets is located within the footprint of the proposed bridge replacement temporary construction trestle and the farthest is situated at the Conrail Line roughly 700 feet north of the APE-Archaeology. According to the NJHPO, these targets may represent "debris of some kind and/or pilings." In an email dated July 1, 2021, the NJHPO specified that the submerged targets would require survey to confirm if the target represents an archaeological resource.

Examination of historic United States Geological Survey map from 1955 indicates that three of the targets are located within an area containing wooden piling along the Newark shoreline along the west side of the dredged navigation channel, while the other submerged targets, one of which is in the APE-Archaeology near the east side of the bridge span, appear to align with the east side of the dredged navigation channel, strongly suggesting that they correspond with pilings installed to ensure large vessels did not venture from the dredged channel in this portion of the bay (USGS 1955a, 1955b).

Additionally, a visible shipwreck is also mapped about 480 feet to the south (Latitude 40.692181, Longitude -74.113403) of the NJ Turnpike Extension bridge and a submerged wreck is mapped roughly 600 feet to the north (Latitude 40.699108, Longitude -74.121117) of the NB-HCE bridge, in proximity to the Conrail bridge (NOAA 2021). Both previously identified wrecks are outside of the APE-Archaeology and are not registered as archaeological sites.

Additional Areas of Archaeological Sensitivity

Three additional areas of archaeological sensitivity were identified. The footprint of the infilled Morris Canal (SHPO Opinion: 4/27/2004; NJR: 11/26/1973; NR: 10/1/1974), a NRHP and NJR-listed resource, crosses the eastern portion of the APE-Archaeology in two locations. Therefore, buried archaeological features associated with the Morris Canal may be present in a right-of-way south of I-78/NJ Turnpike in the City of Bayonne and on Block 30203, Lot 3; Block 30204, Lots 3 and 4; Block 30306, Lots 2 and 4; and Block 30303

of Jersey City. These areas have an assessed moderate to high sensitivity for intact buried archaeological elements associated with the canal's towpath and prism.

During the early twentieth century, several railroad related structures were present within the APE-Archaeology that have likely been destroyed through subsequent construction, however, a circa 1908 New York Bay Railroad Co. turntable was present within the proposed stormwater detention basin HUC3-C located southeast of the NB-HCE on Block 30306, Lot 2 in the City of Jersey City. This area contains a moderate to high sensitivity for archaeological resources associated with the railroad turntable. Additionally, a grassy area just east of the former Marist High School building on Block 13, Lot 1 in the City of Bayonne, measuring 75 feet by 200 feet in plan, was identified as having archaeological sensitivity for Pre-Contact period Native American resources. Phase I archaeological testing was conducted at this location on August 17, 2022, that included the excavation of 13 hand-dug shovel test pits. No cultural features were identified. Soils encountered appeared to have been reworked and re-deposited and recovered artifacts were assessed as not potentially significant due to compromised integrity. No further archaeological survey was recommended for Block 13, Lot 1 in the City of Bayonne.

NJDEP Letter (May 22, 2023)

In the NJDEP letter dated May 22, 2023, that was issued following the submission of the April 2023 Phase I archaeological survey and intensive-level historic architectural survey report to the NJHPO, the NJHPO concurred that no further archaeological survey was necessary in the portion of the APE-Archaeology located in the City of Newark, Essex County or within the Newark Bay. The NJHPO assessed upland portions of the APE-Archaeology in the City of Bayonne and the City of Jersey City, Hudson County with a high sensitivity for pre-Contact period Native American and historic period archaeological resources and specified that analysis of geotechnical data is needed to identify areas of prior grading disturbance and the thickness of fill layers from previous road construction in the APE-Archaeology.

Marist High School Site (28-Hd-55)

The NJDEP letter specified that a historic period archaeological resource identified on Block 13, Lot 1 in the City of Bayonne, Hudson County required Phase II archaeological survey. The resource was subsequently registered with the New Jersey State Museum as the Marist High School Site (28-Hd-55). This archaeological resource measures 78 feet by 193 feet in plan and is confined to a grassy area on the parcel. Where present, subsoil at the site was generally identified between 1.2 and 4.2 feet below ground surface (bgs). The site area was bounded to the west and south by significant grade cuts over 3.0 feet in depth. Following the submission of the initial survey report, the Authority determined that the site location will be avoided during construction and protected via the placement of a barrier, such as orange silt fencing or jersey barriers, between the site and the construction excavation/staging area. The avoidance measures will be detailed in an avoidance and protection plan. As the site will be avoided, no further archaeological survey was recommended at site 28-Hd-55.

Supplemental Phase I Archaeological Survey and Geotechnical Boring Log Review (November 8, 2023)

A supplemental Phase I archaeological survey and geotechnical boring log review report was prepared on November 8, 2023, in response to the NJHPO's May 22, 2023 review comments (Richard Grubb & Associates, Inc. 2023b). The report included a detailed and thorough review of 20 soil borings and 3 mechanical test pits excavated in 2022 for this Proposed Action, as well as a review of 160 soil borings excavated in 1954 for the initial construction of the NB-HCE. The soil boring review resulted in an updated archaeological sensitivity assessment for the APE-Archaeology in the City of Jersey City and City of Bayonne.

Soil boring data reveals that all proposed basin locations, except for Basin HUC2-I on the former Marist High School property in the City of Bayonne west of John F. Kennedy Boulevard, will be confined to the vertical footprint of recently imported and/or disturbed soils, resulting in a low archaeological sensitivity assessment and a recommendation for no further archaeological survey.

Basin HUC3-C

An area of previously assessed archaeological sensitivity for a twentieth-century turntable and roundhouse at proposed Basin HUC3-C was no longer recommended archaeologically sensitive based on an examination of the Test Pit 10 soil profile, which reveals the presence of extensive, deep disturbance caused by the New Jersey Department of Transportation's (NJDOT) construction of Route 185 and an existing basin at this location. Historic aerial images depict construction equipment grading soils at the former turntable location during the construction of Route 185 for basin and highway construction. Additionally, historic photographic data reveals that the structural footprint of the Morris Canal was not situated at Basin HUC3-C as previously assessed. Instead, the portion of the Morris Canal proximate to proposed Basin HUC3-C existed within the footprint of present-day Route 185 just southeast of the APE-Archaeology.

No further archaeological survey was therefore recommended at Basin HUC3-C based on the unlikelihood of encountering any intact archaeological features due to deep twentieth-century excavation and infill disturbances. Soil boring analysis, an examination of historic aerial photographs, and the review of project plans demonstrate that significant ground disturbance exists within much of the remainder of the APE-Archaeology and a recommendation of no further archaeological survey was made, with exceptions for specific locations listed below.

Basin HUC2-I

Geotechnical soil borings and historic images identified an area of assessed moderate to high pre-Contact and historic archaeological sensitivity in notably deeply buried natural soils at proposed Basin HUC2-I in the City of Bayonne west of John F. Kennedy Boulevard in an area at and north of the former Marist High School building. Soil boring SWM-35OW excavated at the proposed basin revealed a possible 2.0-foot-thick natural buried A-horizon starting 6.0 feet below ground surface (bgs) (27.3 feet above mean sea level [alms]) that capped subsoil. Currently, proposed Basin HUC2-I will extend to a depth of 10 feet bgs (24.3 feet amsl) into the buried A-horizon and subsoil.

This proposed basin is on land previously used as a staging and construction area by the prior property owner. Phase IB archaeological survey via mechanical excavation assistance was recommended once the Authority assumed control of the property. (Due to the need for a backhoe to assist in deep excavation at a previously inaccessible location, Phase IB archaeological survey could not be conducted at the time of the November 2023 supplemental Phase IB archaeological survey and geotechnical boring review report.)

Morris Canal Historic Property

The deeply buried Morris Canal historic property extended through the footprint of the proposed abutments for Structure N3.24R carrying the NB-HCE over Avenue C in the City of Jersey City. There, the existing NB-HCE embankment prevents Phase IB archaeological survey from taking place. Archaeological monitoring of construction excavation of the 5-foot-deep proposed bridge abutments is recommended to record structural elements of the Morris Canal that may exist and mitigate project-related adverse effects to the NJR- and NRHP-listed historic property.

Based on a review of soil boring logs from 1954, archaeological monitoring was recommended at proposed Piers 13–15, a portion of Pier 17, and the eastern abutment for Structure No. N3.73R (Southeast Viaduct) to document the deeply buried Morris Canal historic property. There, proposed piers will be excavated via a 6- to

8-foot-diameter screw auger to bedrock through very deep fills emplaced in 1954 and earlier for the construction of twentieth-century railroads and the NB-HCE's Southeast Viaduct. Due to the proximity of existing piers, limited space, the presence of notably deep 1954 fill (i.e., 7.0 to 20 feet thick), Phase IB archaeological survey was not feasible at this location and could compromise the structural integrity of the viaduct structure if mechanical excavations completed exclusively for pre-construction archaeological survey were carried out. Therefore, archaeological monitoring of construction excavations at the aforementioned piers and abutment was recommended to document structural elements of the Morris Canal, if present.

Jersey Eagle Archaeological Site (28-Hd-45) (SHPO Opinion: 5/17/2013)

The multi-component NRHP-eligible pre-Contact and historic-period Jersey Eagle Site (28-Hd-45 [SHPO Opinion: 5/17/2013]) was previously identified on Block 30306, Lot 7 in the City of Jersey City in and near the northern terminus of the APE-Archaeology during a natural gas pipe installation project north of proposed Basin HUC3-F. The proposed 5.0-foot-deep basin will not penetrate the natural, deeply buried soil present 7.0 feet bgs based on soil boring SWM-12(OW) and will have no effect on the Jersey Eagle Site. The proposed basin outfall pipe may be within the disturbed 16-foot-wide trench footprint for the existing natural gas pipeline. Archaeological monitoring of the proposed Basin HUC3-F outfall stormwater pipe trench excavation was recommended if the outfall pipe trench extends below a depth of 2.3 feet bgs (i.e., the northernmost top depth of the Jersey Eagle Site closest to Linden Avenue) and is to be placed outside the existing 16-foot-wide natural gas pipeline trench. There, archaeological monitoring is recommended to mitigate potential project related adverse effects to the archaeological historic property. The southwestern portion of the Jersey Eagle Site is more deeply buried and present at 6.6 feet bgs. No monitoring is recommended where project-related excavations will be above the top depth of the Jersey Eagle Site. Due to the presence of a deeply buried high-pressure natural gas pipeline adjacent to the proposed basin outfall pipe footprint, Phase IB archaeological survey via mechanical excavation cannot be safely conducted and was not recommended. The nearby pre-Contact period Greenville Site (28-Hd-3), mapped immediately north of the APE-Archaeology and identified in the early twentieth century, may represent the same archaeological deposits as those at the Jersey Eagle Site.

NJHPO Letter (January 9, 2024)

In a letter dated January 9, 2024, the NJHPO concurred with the findings presented in the November 28, 2023 supplemental Phase I archaeological survey and geotechnical boring log review report, which included a recommendation for:

- the preparation of an avoidance and protection plan for the Marist High School Site (28-Hd-55);
- the completion of a Phase IB archaeological survey at proposed Basin HUC2-I;
- archaeological monitoring during construction at the east and west proposed abutments for Structure No. N3.24R carrying the NB-HCE over Avenue C in the City of Bayonne;
- archaeological monitoring for Piers 13-15, a portion of Pier 17, and the eastern abutment for Structure No. N3.73R (Southeast Viaduct) in the City of Jersey City;
- and archaeological monitoring for the stormwater outfall pipe associated with proposed Basin HUC3-F in the City of Jersey City if the outfall pipe trench extends deeper than 2.3 feet below current grade.

The NJHPO stated that the Phase IB archaeological survey for proposed Basin HUC2-I can be deferred until the Authority assumes control over the property containing the proposed basin. The NJHPO concurred that an archaeological resource avoidance plan will be required for the Marist High School Site (28-Hd-055) that includes provisions during construction protecting the site via the placement of a barrier, such as orange silt fencing or jersey barriers, between the site and the construction excavation/staging area. The NJHPO also requested the submission of an Application for Project Authorization under the New Jersey Register of Historic Places Act to determine if the project will be considered an Encroachment to the NJR-listed Morris Canal Historic Property. The NJHPO specified that the Application for Project Authorization includes an archaeological monitoring protocol as a supporting document.

As currently proposed, the Proposed Action will constitute an adverse effect to the Morris Canal. Archaeological monitoring to record the portions of the Morris Canal where the project extends into its vertical footprint is required to mitigate project-related adverse effects to the historic property at proposed Structure N3.24R and at proposed Piers 13-15, a portion of Pier 17, and the eastern abutment of Structure No. N3.73R (Southeast Viaduct). The project may constitute an adverse effect to the Jersey Eagle Site if the proposed Basin HUC3-F outfall pipe extends outside an existing 16-foot-wide natural gas pipeline trench and will require a trench greater than 2.3 feet in depth. Due to the proximity of the existing pipeline to the proposed outfall pipe, for safety reasons, archaeological monitoring must be undertaken to mitigate project-related adverse effects to the NJR- and NRHP-eligible Jersey Eagle Site historic property.

Application for Project Authorization (April 30, 2024)

On April 30, 2024, an Application for Project Authorization was prepared to comply with the New Jersey Register of Historic Places Act that included the required archaeological monitoring protocol. In addition to a protocol for documenting archaeological elements for the Morris Canal, if present, the protocol also included the procedures for documenting archaeological deposits associated with the Jersey Eagle Site, if encountered during outfall pipe installation associated with proposed Basin HUC3-F, as well as a general procedure for notification, consultation and documentation in the event human remains are identified. On May 28, 2024, the NJHPO issued a review letter for the Application for Project Authorization and the archaeological monitoring protocol finding that the document was technically and professionally complete and sufficient pursuant to N.J.A.C. 7:4-7.1(d). In the letter, the NJHPO determined that the Project is in conformance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* and the *Standards and Guidelines for Archaeology and Historic Preservation*, thereby finding that the Project will not constitute an encroachment upon the Morris Canal. Pursuant to N.J.A.C. 7:4-7.2(d), the NJHPO found that the Project may proceed as documented in the Application for Project Authorization.

A draft Programmatic Agreement was provided to the USCG that outlines the steps that would be required to complete remaining cultural resources survey tasks and conclude the Section 106 consultation process (see Appendix A). On May 9, 2024, the USCG issued a Public Notice to the NJHPO and specified that a Programmatic Agreement would be developed to resolve adverse effects and conclude the Section 106 process. In response, in a letter dated June 13, 2024, the NJHPO concurred that additional consultation is necessary in the development of a Programmatic Agreement with any consulting parties that may wish to participate and to identify any additional mitigation measures that may be necessary.

3.5.5 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be undertaken, and the historic and archaeological properties would retain their respective existing conditions and settings. The existing bridge would remain. As such, there would be no effect on historic or archaeological properties under the No Action Alternative.

3.5.6 Proposed Action Alternative

The Proposed Action will affect or potentially affect four historic properties and one archaeological site. As the Proposed Action is the only action alternative that was advanced from the comparative evaluation of alternatives described in Section 2 of the EA, impacts to historic properties are unavoidable. This section describes the effects and measures to be undertaken by the Authority to mitigate the adverse effects.

3.5.6.1 *Historic Properties*

Background research conducted for the cultural resources survey identified four historic properties formally listed in the NJR and NRHP or determined eligible for listing in the NRHP within the APE-Architecture. An additional archaeological historic property in the APE-Archaeology was formerly determined eligible for listing

in the NRHP. As a result of the cultural resources survey, the NBB and Port Authority Administration Building (Building 260) in the APE-Architecture received a formal determination of NRHP-eligibility from the NJHPO in correspondence dated May 22, 2023. Although the NJHPO made no formal determination of eligibility for the NBB and Port Authority Administration Building (Building 260) prior to its review of the cultural resources survey, previous NJHPO technical assistance correspondence indicates that both resources would be considered NRHP-eligible if subject to a formal project review by the state agency (Marcopul 2018, 2022). As such, the cultural resources survey considered project effects on both historic properties.

Additional project effects to historic properties may be identified upon the completion of the recommended Phase I archaeological survey at proposed Basin HUC2-I and any subsequent Phase II archaeological survey needed at the basin, following an NRHP-eligibility evaluation of previously unrecorded archaeological resources that may exist in the APE-Archaeology.

Port Authority Administration Building (Building 260) (SHPO Opinion: 5/22/2023)
The realigned NB-HCE eastbound lanes and ramps within and south of Interchange 14 will be visible from the historic property. The construction of new highway infrastructure will generally be in keeping with the property's existing setting, which includes the main stem of the NJ Turnpike to the west and NB-HCE to the north. The introduction of the realigned NB-HCE into the property's setting will not diminish the overall integrity of the historic property and its significant features that render the building eligible under NRHP Criterion C. The character-defining features identified on the building's exterior will remain visible from the public right-of-way and continue to convey its architectural significance as an example of a mid-twentieth-century New Formalism-style civic building. For these reasons, the indirect visual project impacts associated with the undertaking will have no adverse effect on the Port Authority Administration Building (Building 260).

Newark and Elizabeth Branch of the Central Railroad of New Jersey (SHPO Opinion: 8/29/2000)
The proposed realigned and widened NB-HCE falls within the boundaries of the NRHP-eligible Newark and Elizabeth Branch of the Central Railroad of New Jersey and will likely require a permanent aerial easement over a portion of the railroad corridor within the APE-Architecture as part of its construction. Current project plans do not call for any direct impacts to railroad-related resources within the historic district boundaries. Any project impacts to the rail corridor associated with the installation of new roadway piers within the right-of-way will be temporary and will not alter the existing alignment or tracks within the historic district boundaries.

The proposed NB-HCE is located within a section of the railroad historic district that has experienced significant alterations to its setting since its assumed period of significance (1870 to 1938). These changes include the introduction of multiple highway lanes parallel and over the rail corridor. As a new multi-lane highway, the proposed NB-HCE will not introduce a new visual element incompatible with the district's current setting. Above-grade, multi-lane roads such as the current NB-HCE and Port Street overpass already traverse the railroad corridor at this location and include existing piers within its right-of-way.

The widening of the NB-HCE will be within a small portion of the overall historic district and as currently proposed will not directly or indirectly alter the railroad-related features within the district's setting that contribute to its historical significance and eligibility as an important transportation corridor. The historic district will continue to function according to its historic use as an active railroad corridor. For these reasons, the Proposed Action will not have an adverse effect on this NRHP-eligible historic district.

Pennsylvania Railroad New York Bay Branch Historic District (SHPO Opinion: 12/17/2019)
An approximate 1.20-mile-long section of the Pennsylvania Railroad New York Bay Branch Historic District falls within the APE-Architecture north of the current NB-HCE alignment and parallel to the NRHP-eligible Lehigh Valley Railroad Historic District through Jersey City. Current project plans call for no direct impacts to railroad-related resources within the historic district boundaries; however, the proposed NB-HCE will likely require a permanent aerial easement over a portion of the railroad corridor within the APE-Architecture as part of its construction. Potential visual impacts will be limited to a small portion of the larger district and not

indirectly alter any associated railroad-related features that may contribute to its historical significance as a transportation corridor. Much of the Pennsylvania Railroad New York Bay Branch Historic District within the APE-Architecture has experienced significant alterations to its setting since its defined period of significance (1889 to 1945), including the removal and realignment of tracks and above-grade railroad bridges west of Garfield Avenue and the addition of multiple highway lanes south of and adjacent to the rail corridor. Therefore, the proposed realignment and widening of the NB-HCE will not negatively diminish the district's integrity of setting or introduce a new visual element incompatible with the built environment. Above-grade, multi-lane roads, including the current NB-HCE and NJ Route 440, already traverse the railroad corridor at this location. For these reasons, the Proposed Action will have no adverse effect on the NRHP-eligible Pennsylvania Railroad New York Bay Branch Historic District.

Lehigh Valley Railroad Historic District (SHPO Opinion: 3/14/2002)

The Lehigh Valley Railroad Historic District runs north of the existing NB-HCE and NBB and terminates just northeast of the Hudson-Bergen Light Rail crossing in Jersey City. An approximate 1.35-mile-long portion of the NRHP-eligible railroad historic district from Newark Bay to its eastern terminus in Jersey City falls within the APE-Architecture. Proposed work within the railroad historic district includes the construction of the proposed NB-HCE as well as a permanent easement over a portion of the railroad line as part of the construction of the new highway. Although a portion of the Project Action falls within the historic district boundaries, current plans do not include any direct impacts to the district's railroad-related resources. The construction of the widened NB-HCE will not negatively alter the district's historic use or features within its setting that collectively contribute to its historical significance and NRHP-eligibility as an important New Jersey railroad line. Similar multi-lane highways, such as the existing NB-HCE and NJ Route 440, already run adjacent to the historic district in Jersey City and would therefore not introduce a new visual element incompatible with the district's current setting. As such, the Proposed Action will not adversely affect the Lehigh Valley Railroad Historic District.

Newark Bay Bridge (SHPO Opinion: 5/22/2023)

Under the Proposed Action, the NBB, a historic property individually eligible for listing in the NRHP as an intact example of a mid-twentieth-century cantilevered truss structure, would be removed. The removal of the current NBB would have an adverse effect on the bridge because it would physically destroy all features of the structure that contribute to its NRHP eligibility under Criterion C as a distinctive and increasingly rare bridge type within the State of New Jersey.

Morris Canal (NJR: 11/26/1973; NRHP: 10/1/1974; SHPO Opinion: 5/27/2004).

Based on a review of geotechnical boring logs and as-built maps for the NB-HCE, portions of the Morris Canal may be present where project-related excavations are necessary for bridge and viaduct abutments and piers. In particular, structural elements of the deeply buried Morris Canal may be present at the proposed abutments for Structure N3.24R carrying the NB-HCE over Avenue C in the City of Jersey City and at proposed Piers 13–15, a portion of Pier 17, and the eastern abutment for Structure No. N3.73R (Southeast Viaduct). The proposed undertaking may have an adverse effect on portions of the NJR and NRHP-listed Morris Canal and archaeological monitoring within the canal footprint is proposed to enable recordation of deeply buried canal-related structural features and to mitigate project-related adverse effects to the historic property.

Site 28-Hd-45 (SHPO Opinion: 5/17/2013)

The portion of Site 28-Hd-45 (Jersey Eagle archaeological Site) (a.k.a. The Jersey Eagle Site) in the APE-Archaeology on Block 30306, Lot 7 in the City of Jersey City was only previously defined vertically and horizontally within the footprint of a linear 16-foot wide trench excavation in 2013 for the installation of a natural gas pipeline that parallels the east side of the NB-HCE. There, the top of archaeological deposits associated with the site were identified 2.3 feet below grade in the northern portion of the site and 6.6 feet below grade in the southern portion of the site. Disturbance associated with the Proposed Action near this site will include the construction of stormwater detention basin HUC3-F, which has a base depth of 5.0 feet below grade and an associated outfall pipe between the basin and Linden Avenue that will parallel the existing natural

gas pipeline. Deeply buried natural soils at the proposed basin are present at a depth of 7.0 feet bgs based on soil boring SWM-12(OW). The excavations for the proposed basin will terminate 2.0 feet above natural soils within imported fill material. Due to the proximity of the proposed basin's outfall pipe to the existing natural gas pipeline and its 16-foot wide trench, it is likely that the proposed outfall pipe will be encompassed within the natural gas pipeline trench. Because of the depth of fill present, the necessity for mechanically-assisted trench excavation to facilitate Phase IB archaeological survey of the proposed outfall pipe, and unsafe conditions of mechanical excavation next to a high pressure natural gas pipeline, a recommendation for archaeological monitoring during construction of the outfall stormwater pipe trench excavation was recommended to mitigate potential Proposed Action-related adverse effects to the archaeological historic property if it extends into the outfall pipe footprint.

3.5.6.2 Archaeological Resources

In addition to the above referenced historic properties, the Marist High School Site (28-Hd-55) is present within the APE-Archaeology on Block 13, Lot 1 in the City of Bayonne. Due to design considerations made following the NJDEP's May 22, 2023, letter, the location of site 28-Hd-55 will be avoided during construction through the installation of snow fencing and/or jersey barriers to prevent heavy equipment from entering the site during project construction. An avoidance and protection plan will be issued to the NJHPO prior to construction to document the avoidance measures that will be emplaced. Due to the identification of a deeply buried A-horizon at a depth of 6.0 feet bgs (27.3 feet amsl) in boring SWM-35OW at proposed Basin HUC2-I, and the proposed base excavation depth of the basin at 10 feet bgs (24.3 feet amsl), Phase IB archaeological survey was recommended at the proposed basin to determine the presence or absence of intact archaeological deposits. Given the thickness of imported modern fill over the buried A-horizon, mechanical trench excavation is necessary to facilitate archaeological testing. This proposed basin is on land not currently owned by the Authority and is being used as a staging and construction area by the current property owner. Phase IB archaeological survey via mechanical excavation assistance was recommended once Authority assumes control of the property. Based on the results of the Phase IB archaeological survey at this location, additional evaluation and/or mitigation-level archaeological surveys may be determined necessary.

NJHPO noted in correspondence to the Authority dated January 9, 2024, that, upon review, it concurs with the assessment of supplemental Phase I archaeological survey and geotechnical boring log review report. Further, upon review, the NJHPO concurred that a technically complete Application for Project Authorization pursuant to the New Jersey Register of Historic Places Act is necessary for the project elements within the limits of the Morris Canal and that the application shall include an NJHPO-approved archaeological monitoring work plan. The Application for Project Authorization with an archaeological monitoring protocol was provided to the NJHPO, which found the document to be technically and professionally complete in a letter dated May 28, 2024. The Authority will continue to coordinate with NJHPO prior to construction.

3.5.7 Conclusion

Pursuant to Section 106 of the NHPA, the Proposed Action will have an adverse effect on historic properties due to project-related excavations within the footprint of a potentially intact, buried section of the Morris Canal south of the NB-HCE. Archaeological monitoring during construction excavations that adheres to a monitoring protocol approved by the NJHPO is recommended in mapped portions of the Morris Canal and areas proximate to Site 28-Hd-45 to mitigate Proposed Action-related adverse effects or potential adverse effects to these deeply buried historic properties. In addition, Phase IB archaeological survey was recommended for proposed Basin HUC2-I on Block 13, Lot 1 in the City of Bayonne once the Authority owns the property to determine if deeply buried archaeological resources are present or absent. Such Phase IB archaeological survey must be assisted via mechanical trench excavation. If archaeological deposits are identified at proposed Basin HUC2-I, additional archaeological survey may be determined necessary in the form of evaluation and/or mitigation-level archaeological excavations. No further archaeological survey was recommended elsewhere in the APE-Archaeology based on an assessed low archaeological sensitivity within the horizontal and vertical

footprint of the Proposed Action. The NJHPO concurred with these recommendations in a letter dated January 9, 2024.

In its permit for the NBB Replacement issued April 3, 2024, NJDEP stipulated the following with respect to archaeological resources:

- The Authority will prepare an archaeological monitoring plan for the Proposed Action and submit the plan to the HPO and the NJDEP Division of Land Resource Protection (DLRP). The approved archaeological monitoring plan will be referenced in all project documents, plans, and bid proposals.
- The Authority will immediately cease all ground disturbing activities and contact the HPO if potential human burials or human skeletal remains are encountered. The potential burials and/or human skeletal remains shall be left in place unless imminently threatened by human or natural displacement.
- The Authority will conduct a Phase IB archaeological survey for the proposed Basin HUC2-I on the Marist High School Site in the City of Bayonne, Hudson County, New Jersey to determine the presence or absence of archaeological resources in the proposed basin footprint.
- The Authority will submit a Phase II archaeological survey to the Historic Preservation Office for review if archaeological resources were identified during Phase IB archaeological survey and cannot be avoided.
- The Authority will consult with the HPO upon completion of the Phase II archaeological survey to assess the effects of the proposed project on any resources identified as eligible for listing on the New Jersey and National Registers of Historic Places.
- The Authority will submit a minimization and/or Phase III mitigation plan to the HPO if impacts to resources eligible for listing on the NJR and NHRP cannot be avoided.
- The Authority will ensure the HPO approved archaeological work plans for the Phase II and Phase III data recovery surveys are implemented.
- The Authority will ensure that all phases of the archaeological survey and reporting will be in keeping with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and the archaeological survey and report rules at N.J.A.C. 7:4-8.4 through 8.5. Evaluations to determine the National Register eligibility of archaeological sites should be in keeping with the National Park Service's 2000 National Register Bulletin, The Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation are available on the National Park Service's website: http://www.nps.gov/history/local-law/arch_stnds_0.htm)
- The Authority will ensure that the individual(s) conducting the work meet the Secretary of the Interior's Professional Qualifications Standards for Archaeology and Historic Architecture (48 FR 44738-9).
- The Authority will ensure that all artifacts from State and National Register-eligible archaeological sites will be analyzed, catalogued, and curated in accordance with the National Park Service Standards, codified as 36 CFR Part 79 (Curation of Federally Owned or Administered Archaeological Collections).
- All archaeological reports will identify the repository where the project records and artifacts will be located.

An archaeological monitoring protocol dated April 30, 2024, which included procedures for notification, consultation, and documentation in the event human remains are encountered, was subsequently submitted to and approved by the NJHPO in a letter dated May 28, 2024.

Regarding above-ground historic properties, the proposed removal and replacement of the NRHP-eligible NBB will also result in an adverse effect. The Proposed Action will not have an adverse effect on the remaining above-ground historic properties identified within the APE-Architecture. Further coordination and consultation with the NJHPO are recommended to consider ways to mitigate adverse effects on the NBB.

In its permit for the NBB Replacement issued April 3, 2024, NJDEP stipulated the following with respect to removal and replacement of the NBB:

- Prior to the removal, demolition, or alteration of any components of the Newark Bay Bridge, the Authority, using the services of an Architectural Historian who meets the Secretary of the Interior's Professional Qualifications Standards [48 FR 44738-9] in Architectural History, will document the existing conditions of the bridge to Level III equivalent standards of the Historic American Engineering Record (HAER).
- The Authority, using the services of a qualified consultant meeting the Secretary of the Interior's Professional Qualifications Standards [48 FR 44738-9] in History and/or Architectural History, will develop and install interpretive signage regarding the history and significance of the Newark Bay Bridge, including the structure's involvement in the construction of the NB-HCE and its design as a cantilevered truss bridge. The signage will incorporate historic images of the bridge and will be installed in a publicly accessible location near the bridge such as the Richard A. Rutkowski Park in the City of Bayonne.

Additional mitigation measures will be identified in coordination with the NJHPO and other project consulting parties through the development of a Programmatic Agreement to resolve adverse effects and conclude the Section 106 process. A Draft Programmatic Agreement is found in Appendix A.

Appendix 3.6

Visual Resources

3.6 Visual Resources

3.6.1 Introduction

3.6.1.1 Purpose of the Visual Impact Assessment

This Visual Impact Assessment (VIA) was prepared to assess potential visual effects (or impacts) of the Proposed Action and No Action Alternative.

This VIA was prepared in accordance with FHWA visual assessment policies, which are consistent with established methodologies including the FHWA Guidelines for the Visual Impact Assessment of Highway Projects (FHWA 2015). The purpose and methodology of the VIA is further described in Section 3.6.2.

FHWA's Visual Impact Assessment for Highway Projects and Environmental Impact Statement Visual Impact Discussion provide further guidance on assessing visual impacts (FHWA 1981, 1990).

The FHWA (2015) guidelines represent the agency's current thinking about best practices in visual assessments. These guidelines also recognize that state laws, local laws, and ordinances may be applicable to the project. In accordance with these guidelines, the existing visual character and quality of the affected environment, as well as the viewer response to those resources, provide the framework for assessing the change in visual character that would occur as a result of the Proposed Action.

3.6.1.2 Description of the Alternatives

This VIA evaluates the potential visual effect of the Proposed Action relative to the existing character and quality of the visual environment. The VIA also considers the potential visual effect of the No Action Alternative, which would retain the existing NBB and NB-HCE structures.

No Action Alternative

Under the No Action Alternative, the Authority would retain the existing NBB and continue to conduct repair and maintenance of the existing structures.

Existing visual conditions within the vicinity of the project corridor would remain unchanged under the No Action Alternative, as described in Section 3.6.4. For the purposes of this analysis, the existing conditions (with respect to the visual environment) are assumed to represent conditions under the No Action Alternative.

Proposed Action

The Proposed Action includes widening of the NB-HCE roadway from Interchange 14 to Interchange 14A from two lanes to four lanes in each direction, including replacement of Interchange 14 ramps. West of Newark Bay and over the Bay, the widening is generally to the north of the existing viaducts.

In addition, the existing NBB would be replaced with two parallel cable-stayed bridges to span the 550-foot navigational channel. A new westbound bridge is proposed north of the existing bridge site, while the new eastbound bridge will be in the general location of the existing NBB.

3.6.2 Methodology

3.6.2.1 Visual Impact Assessment Process

This VIA was prepared consistent with the FHWA Guidelines for the Visual Impact Assessment of Highway Projects (FHWA 2015). The steps in the analysis include:

1. Identifying the project's Area of Visual Effect (AVE), which includes the visual range of proposed project elements under the No Action and Proposed Action Alternatives.
2. Identify viewsheds in the AVE, defined as what can be seen in the environment in and near the visible project components after consideration of physical constraints and the limits of human perception.
3. Defining the visual character in the AVE by describing natural and man-made features and identifying visual resources.
4. Identify the viewer groups whose views would be affected by the Proposed Action.
5. Assess the visual quality in the AVE and establish a set of key views that would serve as the basis for the characterization of visual impacts.
6. Assess the compatibility of the Proposed Action with the visual environment and the viewer sensitivity to changes in the visual character of visual resources to determine the degree of impact.
7. Develop mitigation or visual enhancement measures, if and where warranted.

The preparation of the VIA involved collection and review of data, including existing plans and studies relevant to visual resources within the AVE. Land use, topography, property, and other types of data were reviewed.

3.6.2.2 Area of Visual Effect

The visual analysis study area, the AVE, is defined as the area within visual range of Interchange 14 in Newark to Interchange 14A in Bayonne (see Figure 3.6-1). The potential viewshed is shaped by the study area's topography, as well as its built (e.g., structures) and natural (e.g., primarily street trees) environment.[1] For the most part, the viewshed of the NB-HCE from adjoining lands is limited, primarily because of topographic features, vegetative screening, and obstructing structures. The study area is more expansive along Newark Bay to account for the many views possible of the NBB.

Visual quality is most frequently the result of the relationship of all the components of a landscape, rather than the presence of a single feature. Therefore, the landscape's visual features must be objectively identified, and their character and quality assessed. In addition, the assessment must identify the importance to people ("viewer groups"), or sensitivity of views of visual resources in the landscape.

3.6.2.3 Viewer Groups

Viewer groups (i.e., population that could be potentially affected in different ways by project-related changes) are defined in Section 5.3 of the FHWA Guidelines as viewers from the roadway (e.g., motorists) or viewers of the roadway (e.g., residents, users of recreational resources including parks, boaters, pedestrians and bicyclists on other trails, rail travelers, and motorist on local roadways). Viewers are considered in terms of their sensitivity and view duration, with residents considered among the most sensitive viewers because they may view the proposed visual change from a stationary viewpoint for the most prolonged periods of time. Travelers on the roadways, on the other hand, would be much less sensitive because they may only see the proposed visual change for only a short duration. Also considered in the analysis is the distance of the observer from the visual change; as the distance increases, the ability of the viewer to see the details of an object decreases.

[1] FHWA's Visual Impact Assessment for Highway Projects defines a viewshed as the surface area visible from a given viewpoint or series of viewpoints; it is also the area from which that viewpoint or series of viewpoints may be seen (FHWA 2015).

In accordance with the FHWA guidelines on aesthetics and visual quality, two viewer groups were considered in this visual assessment:

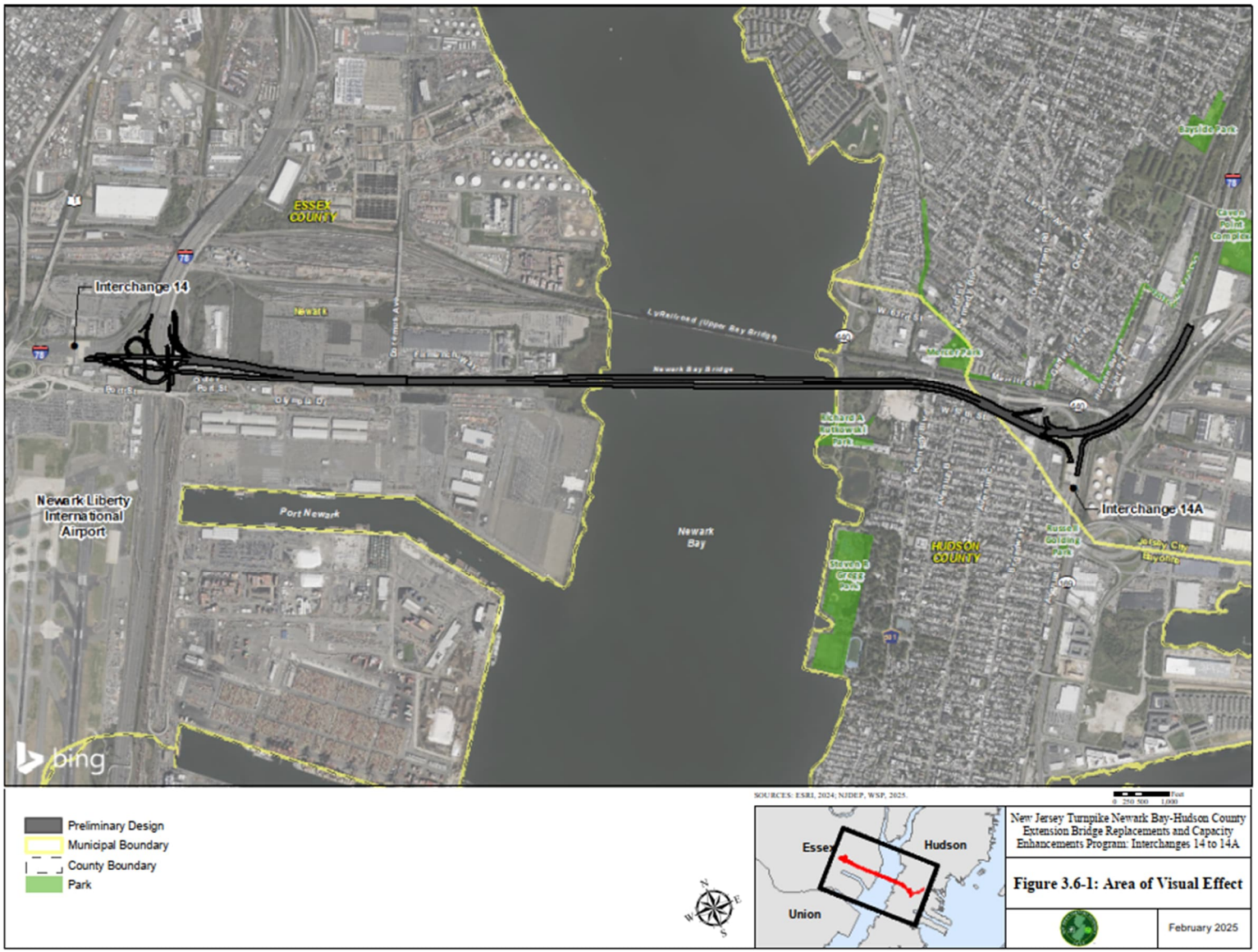
- Travelers (those who would have views from the NB-HCE corridor)
- Neighbors (those who would have views of the NB-HCE corridor)

Travelers

Two types of travelers were identified within the AVE: motorists and commercial trucks.

Motorists are the largest viewer group within the AVE. This viewer group consists of motorists traveling the NB-HCE or using it to access destinations within the study area. Motorists' views are typically in a dynamic mode while moving. Viewer exposure is moderate due to speeds and the number of users and trips. Viewer activity consists of either driving or being a passenger in a vehicle. For drivers, viewer awareness may be moderate, while for passengers, viewer awareness may be high. Motorists traveling in and along the NB-HCE would have low exposure to visual changes in the environment due to limited visibility and short viewer duration. Therefore, overall, motorists have relatively moderate sensitivity to detailed visual changes along the NB-HCE.

Figure 3.6-1. Area of Visual Effect



Commercial travelers use the roadway primarily to move goods. The type of vehicle and the distance traveled vary. Most commercial travel is routine and commercial travelers' primary interests lie in operational considerations, such as traffic, lane changes, etc., to help them arrive at destinations for delivery and pick-up purposes. This viewer group has a low sensitivity to visual change.

Neighbors

As defined in the FHWA's guidelines, the term "neighbor" does not always mean that a person is adjacent to the roadway. Rather, the guidelines refer to people who are not traveling on the roadway but may see it from their geographic location in the AVE.

3.6.3 Existing Conditions

The visual environment of a given project area often consists of that area's natural environment (landform or topography, and cultural environment) buildings, infrastructure (roads, etc.), public utilities (poles and wires), and signage (cultural environment). In general, visibility of the NBB and NB-HCE from within the AVE is limited due to topographic features, existing buildings, and existing vegetation; however, there are locations along the Bayonne waterfront where direct and unobstructed views of the NBB are possible. There are no significant land use or infrastructure development projects within the AVE that would result in significant changes to the visual landscape between existing conditions and future conditions.

3.6.3.1 West of Newark Bay

The AVE west of Newark Bay is primarily characterized by major port intermodal and other transportation infrastructure, including receiving and shipping terminals, warehouses, railroad facilities, highways, and access roads anchored by EWR at Interchange 14 and the Port Newark-Elizabeth Marine Terminal on Newark Bay immediately south of the NBB. The adjacent industrial properties have parking lots and driveways close to the right-of-way line. The residential and business districts of Newark lie to the west of Interchange 14.

Visibility of the existing NB-HCE structure west of Newark Bay from public rights-of-way is limited by existing industrial development along Port Street south of the existing NB-HCE viaduct and other industrial land uses north of the existing NB-HCE viaduct. Where the viaduct is visible, it is not a major visual element or an element that is out of character with the overall industrial landscape. Even along portions of Port Street east of Doremus Avenue, where the viaduct continues to elevate toward the western approach of the NBB, the viaduct is visible within the context of empty industrial lots or large storage tanks. The elevated viaduct and main span of the NBB is visible from East Port Road beyond a car parking lot (currently used by Toyota Logistics Services) and deciduous vegetation on the banks of Newark Bay. On the north side of the NB-HCE viaduct, views are possible from Firmenich Way but within the context of the industrial landscape to the north and with a partial screen of vegetation immediately adjacent to the right-of-way. Partial views of the NBB main span and views of the NBB western approach are possible from the cul-de-sac at the eastern end of Firmenich Way.

Lands north and south of NB-HCE on the waterfront west of Newark Bay are heavily port and industrial related, and there is little public access to waterfront areas that would provide direct line of sight to the NB-HCE viaduct or NBB.

There are no public parks or open spaces east of the NJ Turnpike on the west side of Newark Bay. The closest open space is within the City of Newark, approximately one mile northwest of Interchange 14. Ironbound Little League field occupies the small block bounded by Malvern Street, Denbigh Street, Chestnut Street, and Hanover Street. Views from the field toward Interchange 14 are obscured by intervening buildings.

3.6.3.2 Newark Bay Bridge

The NBB, also known as the Vincent R. Casciano Memorial Bridge, is a component of the NB-HCE and carries that roadway across Newark Bay between the City of Newark, Essex County, and the City of Bayonne, Hudson County (see Figure 3.6-2). It includes a 43-span west approach, a 32-span east approach, and a 3-span main truss carrying a 78-foot-wide roadway consisting of two 12-foot-wide travel lanes and one 12-foot-wide right shoulder in each direction and a 6-foot-wide median. The out-to-out roadway width measures 86 feet, 8.75 inches; the overall truss width totals 89 feet. At its highest, the structure stands 263 feet above Newark Bay and provides a 550-foot-wide navigation channel with a 135-feet minimum clearance above mean high tide.

Figure 3.6-2. Existing Newark Bay Bridge

3.6.3.3 East of Newark Bay

The City of Bayonne occupies the land east of Newark Bay north and south of the NB-HCE. Interchange 14A occupies a small corner of the City of Jersey City. The Port Jersey PAMT on Upper New York Bay occupies a large area to the southeast of Interchange 14A. Mixed-use neighborhoods occupy the southwest to northeast trending major avenues within Bayonne: JFK Boulevard, Avenue B, Avenue C, and Broadway. Visibility of the NB-HCE viaduct is limited to the last few city blocks south of the NB-HCE and primarily along the major avenues. See Figure 3.6-3 and Figure 3.6-4 for representative views looking north toward the NB-HCE from West 54th Street at Broadway and Avenue B, respectively. Residences and businesses immediately adjacent to the NB-HCE have partial views of the viaduct.

Figure 3.6-3. NB-HCE looking north from West 54th Street and Broadway in Bayonne

Figure 3.6-4. NB-HCE looking north from West 54th Street and Avenue B in Bayonne

The NBB is visible from West 54th Street looking west from Avenue B (see Figure 3.6-5), although it is seen within the context of the multi-family housing on the north side of the street.

Figure 3.6-5. NBB as seen from West 54th Street from Avenue B

On JFK Boulevard and Avenue C north of the NB-HCE looking south, views are primarily of the elevated CSX rail line and NJ Route 440 (see Figure 3.6-6).

Figure 3.6-6. CSX Rail Line, NJ Route 440, and NB-HCE viaducts crossing Avenue C. View from Merritt Street, Jersey City

There are several City of Bayonne and Hudson County parks within the City of Bayonne that offer views for the NBB and NB-HCE.

Mercer Park is an approximately 6.5-acre Hudson County Park on JFK Boulevard north of the NB-HCE and NJ Route 440. A football field occupies the park's southernmost area immediately adjacent to a Conrail right-of-way and NJ Route 440. Any views of the NB-HCE or NBB are limited by existing vegetation within the park or within the Conrail or NJ Route 440 ROW.

Richard A. Rutkowski Park is an approximately 40-acre waterfront park maintained by the City of Bayonne approximately 750 feet south of the NBB and NB-HCE. NJ Route 440 immediately abuts this park to the north. Rutkowski Park is primarily a wildlife habitat, including a butterfly garden at its northern end, and includes waterfront walking trails and a boardwalk that connects with Stephen R. Gregg Park to the south. Expansive views of Newark Bay and the NBB are available from multiple locations within Rutkowski Park. Figure 3.6-7 provides a view of the NBB immediately north of the boardwalk trail's southern terminus in Gregg Park.

Figure 3.6-7. NBB as seen from Rutkowski Park Boardwalk

Stephen R. Gregg Park is an approximately 100-acre Hudson County Park south of Rutkowski Park occupying approximately 0.5-mile of waterfront land. The park includes active ball fields and ball courts as well as flower gardens and playground areas within its wooded eastern side (Hudson County 2022). Expansive views of Newark Bay and the NBB are available from multiple locations along the park's waterfront at its western edge. Figure 3.6-8 provides a view of the NBB from an elevated boardwalk crossing a small embayment within the park.

Figure 3.6-8. NBB from Stephen R. Gregg Park

Veterans Park is an approximately 10-acre City of Bayonne Park approximately 1.5 miles south of the NBB. Veterans Park is directly on Newark Bay and provides direct line of sight to the NBB. However, at this distance, prominence of the NBB in views to the north are diminished. PANYNJ's Port Newark and Port Elizabeth are immediately west of Veterans Park approximately 0.75-mile across Newark Bay and are the more prominent elements of this viewshed. Veterans Park includes several lighted ballfields and a large spectator stand as well as a waterfront seating area.

G. Thomas DiDomenico Park is an approximately 27-acre City of Bayonne Park approximately 2 miles south of the NBB. Similar to Veterans Park, views from DiDomenico Park are dominated by Port Elizabeth immediately west of Newark Bay.

Within the Jersey City portion of the study area, views of the Southeast Viaduct portion of the Interchange 14A complex are generally limited to NJ Route 185, a limited-access roadway, or entrance ramps to NJ Route 440.

3.6.3.4 Staten Island

The north shore of Staten Island in the City of New York is approximately 4.5 miles south of the NBB. Mariner's Marsh Park (south of Richmond Terrace) and Arlington Marsh (north of Richmond Terrace on the Kill van Kull waterfront) are approximately 178-acre City of New York parks on reclaimed industrial lands. City of New York Department of Parks and Recreation has prepared a Master Plan for these areas that could include improvement of waterfront access that would allow public views of Newark Bay and, possibly, the NBB. However, distance from Arlington Marsh Park to the NBB and the intervening presence of Port Elizabeth, approximately 1.5 miles north of Arlington Marsh Park and within the line of sight of the NBB, would minimize views of the NBB from this location.

3.6.4 Potential Impacts of the No Action Alternative

Under the No Action Alternative, the Authority would continue to maintain the existing NBB and structures comprising the NB-HCE. Thus, no changes to the visual quality of the AVE would result and there would be no impacts to the viewshed or visual resources within the AVE.

3.6.5 Potential Impacts of the Proposed Action

The largest viewer group that would potentially be affected by the Proposed Action would be motorists within the NB-HCE corridor, including on the NBB, and on the NJ Turnpike and other nearby roadways. Other viewer groups that would potentially be affected by the Proposed Action include workers along the Newark waterfront west of Newark Bay; residents of the Bayonne neighborhood to the east of Newark Bay; and park users along the Bayonne waterfront, south of the existing bridge. Recreational boaters on Newark Bay would also have clear views of the new bridges, but this viewer group is very small in number.

Widening and realigning the NB-HCE on both sides of the existing roadway on the east approach would require right-of-way acquisitions of multiple properties in Bayonne. Impacts are primarily in undeveloped areas, or areas used to convey drainage, park vehicles, or access parts of the property. Widening and realigning the NB-HCE on both sides of the existing roadway alignment at JFK Boulevard would result in right-of-way impacts to 12 properties in Bayonne. Impacts include an existing developed property, and construction easements on residential properties. The roadway widening component of the Proposed Action will not introduce new visual elements into the study area or change the visual environment along the roadway.

The NBB is an historic structure, eligible for listing on the NRHP. In addition, longer-range views of the bridge are possible to the north and south along open waters. The most notable visibility of the Proposed Action would occur from the eastern side of Newark Bay, where the Proposed Action would be visible to pedestrians and recreational users from Mercer Park, Richard A. Rutkowski Park, Stephen R. Gregg Park, and Veterans Park in Bayonne. Because of its location and proposed cable-stayed design (as illustrated in Figure 3.6-9), the

Figure 3.6-9. Rendering of Proposed NBB showing view from Stephen R. Gregg Park

Proposed Action would be a notable change to the AVE. However, given the generally low visual sensitivity of the AVE, this notable change may be considered a positive benefit. Although, the new bridges would be distinct from the mid-twentieth-century bridge, the proposed cable-stayed bridges would be consistent with a bridge type commonly used in the United States for long spans today. It has also become a common bridge form for long spans particularly in the New Jersey-New York metropolitan area. The proposed bridges' superstructure would likely be visually lighter and more transparent than the denser steel truss work of the existing NBB. Because of the lighter superstructure and considerably wider span, the decks of the proposed bridges would create a strong, horizontal form across the water in approximately the same location as the existing NBB. While span length, general alignment, and vertical clearance above the water are similar for the existing NBB, the proposed bridge design could have fewer piers and taller towers. Consequently, the overall visual experience of the Proposed Action over the water would be notably different from the existing one; however, the overall character of this transportation infrastructure would not be changed significantly. The proposed bridges would become a notable visual element reinforcing the commercial and transportation character of the visual environment.

Distant views of the Proposed Action from the parks to the southeast and residential communities to the northeast, would be similar to the existing partially obstructed views and not be considered a significant change or impact.

3.6.6 Conclusion

Based on the preceding assessment, the Proposed Action will have no significant impact on visual resources and no mitigation is required.

Appendix 3.7

Traffic, Transportation, and Utilities

3.7 Traffic, Transportation, and Utilities

3.7.1 Study Area and Data Collection

An element of the Proposed Action's purpose is to address capacity needs on the NB-HCE roadway. This section provides details on the traffic analysis used to identify capacity needs on the NB-HCE roadway, as well as assessments of how the Proposed Action's construction and operation potentially affect railroads and other roadways, major utilities, waterway navigation and ports, and navigable airspace for aviation in the vicinity of the NB-HCE. Additional details on the traffic analysis are found in Appendix B: Traffic Report.

The primary study area for the effects of the Proposed Action on NB-HCE traffic includes the NB-HCE extending from just east of the Interchange 14 toll plaza in Newark to the Interchange 14A area ending at the NB-HCE structure over Linden Avenue in Bayonne and Jersey City, an approximate length of 4.1 miles. A secondary study area for the traffic analysis includes highways comprising parallel or alternate routes to the NB-HCE and includes the following highways: NJ Turnpike (I-95) Mainline north of Interchange 14; NJ Turnpike Mainline south of Interchange 14; I-278 (Goethals Bridge); NJ Route 440 (Bayonne Bridge); U.S. Routes 1/9 Truck; Pulaski Skyway; and NJ Route 7 (Wittpenn Bridge). Two local street (secondary) study areas were used to assess the potential for traffic impact on roadways nearby the NB-HCE, specifically: (1) in Newark, a study area within the Ironbound District bound by South Street, McCarter Highway, Raymond Boulevard, and U.S. Routes 1 and 9; and (2) in Bayonne and Jersey City, a study area bound by West 53rd Street, Newark Bay, West 63rd Street/Pamrapo Avenue/Gates Avenue, and Broadway/Garfield Avenue (see Figures 3.7-1 and 3.7-2).

The study area for railroads and other roadways and utilities encompasses the limits of disturbance of the NB-HCE between Interchanges 14 and 14A. The primary study area for waterway navigation and ports encompasses Newark Bay and a secondary study area encompasses port and intermodal facilities in the vicinity of the NB-HCE. The study area for navigable airspace consists of approach and departure paths for aircraft using EWR that cross the NB-HCE.

3.7.1.1 Traffic Data Collection

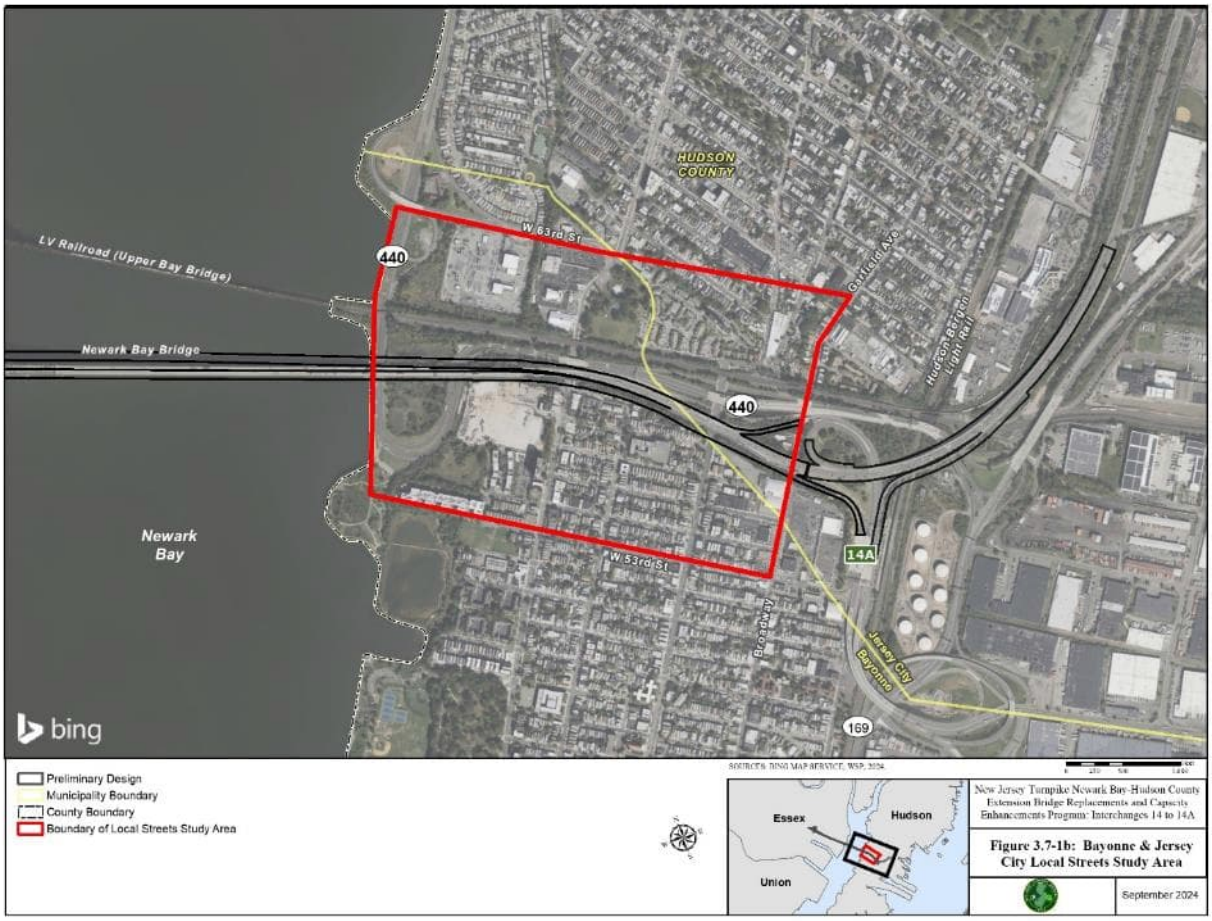
A comprehensive traffic data collection program was undertaken to collect corridor and off-corridor traffic volume data using Automated Traffic Recorder (ATR) machine counts for a period of seven days and manual turning movement counts at intersection locations for six hours during the morning and evening peak periods.

Manual Turning Movement Counts. Single-day, mid-week (Tuesday, Wednesday, or Thursday) manual turning movement counts were conducted at key locations outside the corridor, including the following: U.S. Route 1/9 Truck southbound leaving Communipaw Avenue in Jersey City; U.S. Route 1/9 Truck northbound approaching Communipaw Avenue in Jersey City; U.S. Route 1/9 Truck at Communipaw Avenue; JFK Boulevard to NJ Route 440 Southbound entrance in Bayonne; and Avenue C to NJ Route 440 Southbound entrance in Jersey City. Counts were performed for a total of six hours during the morning and evening peak periods, 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m., respectively. This information was collected during June, July, and September 2021.

Automatic Traffic Recorder Counts. Continuous (24-hour) directional ATR machine counts were conducted for seven days in June, July, and September 2021. ATR machines were placed to record traffic at all entry and exit points to the NB-HCE between Interchanges 14 and 14A and at locations along alternate and parallel routes, including U.S. Route 1/9 Truck, Pulaski Skyway, and NJ Route 440.

Figure 3.7-1. Local Streets Study Area – Newark (Ironbound District)

Figure 3.7-2. Local Streets Study Area – Bayonne and Jersey City



Physical Inventory. Using Straight-line Diagrams available from NJDOT, information from the PANYNJ Traffic Division, and other sources, key local roadways at NJ Turnpike Interchange intersections were inventoried to compile information such as the number and width of travel lanes on each approach roadway, presence and width of shoulders, signal timing, on-street parking regulations, bus stop locations, etc. This information was also supplemented with a desktop survey conducted with aerial imagery from the NJDOT Video Log and Google Maps.

Toll Transaction Data. Origin-and-Destination daily and hourly toll transaction data was obtained from the Authority for the years 2019, 2020, and 2021. This information was compiled, summarized, and analyzed to determine existing travel patterns in the study area. NJ Turnpike Mainline volumes, interchange entry/exit ramp volumes by direction, hourly profiles, vehicle classification, and seasonal factors were estimated using this dataset. This information was also very useful for the analysis and assessment of the impacts of COVID-19 to travel in the study area. Additionally, 15-minute toll transaction data were obtained for selected periods, specifically, June 2019 and June 2021, for Interchanges 14 and 14A and analyzed to understand toll plaza operations.

System Peak Hour. Using ATR data and the NJ Turnpike toll plaza transaction data, localized peak hours were determined for the morning and evening peaks for the NB-HCE and ramps in the study area. To develop consistent and balanced traffic flows for the overall corridor's localized peak hour, results were weighted using traffic volumes. This resulted in the following overall system peak hours: 7:00 a.m. to 8:00 a.m. and 5:00 p.m. to 6:00 p.m. for the morning and evening peak hours, respectively.

Seasonal and COVID-19 Adjustments. To assess the impacts of COVID-19 on travel patterns along the NB-HCE corridor and the project area, the origin-and-destination toll plaza transactions from the NJ Turnpike system were analyzed. This dataset contains daily and hourly toll plaza transactions for the years 2019, 2020, and 2021. This information was used to obtain traffic volumes along the NB-HCE segments between Interchanges 14 and 14A. Traffic volumes were then used to create hourly volume profiles to display and compare the changes in traffic during the COVID-19 conditions. From February to April of 2020, when the lockdown started, there was a large reduction in traffic during the peak periods. However, through 2021 the traffic volumes started to rebound. The results from these comparisons helped to develop seasonal and COVID-19 factors to adjust existing 2021 volumes and reflect typical pre-pandemic traffic conditions.

In addition, these monthly hourly profiles were created to develop seasonal adjustment factors. These figures also demonstrate the seasonal variation in the peak periods. In 2019 the seasonal effects can be seen in June through August when the lowest morning peak hours are seen, and January through May peak hours have the highest volumes in the morning peak. In the evening peak, the maximum volumes can be observed during March and April, and lower volumes during July through September.

Table 3.7-1 shows the COVID-19 and seasonal factors by month for the AM and PM peak periods for the NB-HCE between Interchanges 14 and 14A.

The highlighted months are the months that counts were taken in 2021 (June July, and September). For the segment between Interchanges 14 and 14A the combined averaged monthly factors between 1.165 and 1.662 in the AM peak period, and 1.110 to 1.573 in the PM peak period.

Table 3.7-1. 2021 COVID-19 and Seasonal factors by Month for NB-HCE between Interchanges 14 and 14A

Month	AM Peak Period			PM Peak Period		
	COVID-19 and Seasonal Adjustment Factor (Weighted by Average Annual Daily Traffic)					
	Eastbound	Westbound	Eastbound + Westbound	Eastbound	Westbound	Eastbound + Westbound
Jan	1.615	1.486	1.557	1.619	1.314	1.462
Feb	1.674	1.646	1.662	1.712	1.437	1.573
Mar	1.424	1.350	1.392	1.375	1.192	1.284
Apr	1.378	1.309	1.348	1.276	1.159	1.219
May	1.283	1.249	1.268	1.198	1.141	1.171
Jun	1.251	1.228	1.242	1.139	1.094	1.118
Jul	1.194	1.203	1.198	1.127	1.099	1.114
Aug	1.204	1.203	1.204	1.086	1.081	1.084
Sep	1.163	1.167	1.165	1.132	1.086	1.110
Oct	1.164	1.094	1.133	1.090	1.037	1.065
Nov	1.288	1.144	1.223	1.094	1.107	1.100
Dec	1.326	1.215	1.277	1.103	1.146	1.122

Source: WSP 2022

Similarly, a peak hour analysis was conducted to determine hourly adjustment factors. As shown in Table 3.7-2, the maximum and average volumes are shown for 2019 and 2021. These traffic volumes were used to estimate seasonal factors for the peak hours of 7:00 a.m. to 8:00 a.m. and 5:00 p.m. to 6:00 p.m. For the NB-HCE segment between Interchanges 14 and 14A, the bi-directional average adjustment was 1.24 for the AM peak hour, and 1.13 for the PM peak hour.

Table 3.7-2. 2021 COVID-19 and Seasonal Factors by Peak Hour for NB-HCE between Interchanges 14 and 14A

		EB			WB			EB+WB		
Hour	Volume	2019	2021	Factor	2019	2021	Factor	2019	2021	Factor
AM Peak Hour										
7 am	Avg.	3,761	3,238	1.16	2,917	2,600	1.12	6,678	5,838	1.14
7 am	Max.	4,682	3,238	1.45	3,101	2,600	1.19	7,783	5,838	1.33
		Weighted Average		1.30	Weighted Average		1.16	Weighted Average		1.24
PM Peak Hour										
5 pm	Avg.	3,480	3,211	1.08	3,062	2,975	1.03	6,542	6,186	1.06
5 pm	Max.	3,949	3,211	1.23	3,440	2,975	1.16	7,389	6,186	1.19
		Weighted Average		1.16	Weighted Average		1.09	Weighted Average		1.13

Source: WSP 2022

With both effects analyzed, an overall system factor was estimated resulting in traffic volume factors of 1.40 and 1.20 for the AM and PM peak hours, respectively.

The impacts of the COVID-19 pandemic, while severe, were assumed not to be long-lasting and thus no adjustments were made to future traffic volume projections. This assumption is consistent with long-term travel forecasting used by other transportation agencies in the region, including the North Jersey Transportation Planning Authority (NJTPA, 2021a).

Vehicle Classification. Vehicle classification was calculated using the Authority's toll transaction data. The NJ Turnpike tolling system classifies vehicles based on axles. There are 6 tolling classifications for cars and trucks: two-axles cars, trucks, and motorcycles (Class 1); dual-tire two-axle trucks (Class 2); trucks with three axles, including trailers (Class 3); trucks with four axles, including trailers (Class 4); trucks with five axles, including trailers (Class 5); and trucks with six axles or more, including trailers (Class 6). There are also two classes of buses: buses with two axles (Class B1), and buses with three or more axles (Class B2).

The vehicle mix along the NB-HCE corridor changes based on the location, direction, and time of day. Generally, truck percentages ranged between 2.5 percent at nighttime and 15 percent in the morning peak hour. To measure the impacts of COVID-19 in terms of vehicle mix along the project area, the 2019 and 2021 vehicle mix data were compared. The results indicate a slight increase in truck percentages, likely due to the impact of the imposed lockdown and the reduction in overall car traffic with more people working from home, and the increase of home deliveries leading to the same or a slight increase in truck traffic (Tables 3.7-3 and 3.7-4).

Table 3.7-3. Comparison of Vehicle Mix between 2019 and 2021, AM Peak Hour

Year	Direction	Car Class 1	Truck Class 2	Truck Class 3	Truck Class 4	Truck Class 5	Truck Class 6	Bus Class B2	Bus Class B3
2019	Westbound	90.9%	3.1%	0.8%	0.6%	3.8%	0.1%	0.2%	0.5%
	Eastbound	89.7%	3.2%	0.9%	0.4%	4.0%	0.1%	0.2%	1.5%
2021	Westbound	88.2%	3.6%	1.1%	1.0%	5.5%	0.2%	0.3%	0.1%
	Eastbound	88.3%	3.9%	1.1%	0.5%	5.4%	0.2%	0.1%	0.4%

Source: WSP 2022

Table 3.7-4. Comparison of Vehicle Mix between 2019 and 2021, PM Peak Hour

Year	Direction	Car Class 1	Truck Class 2	Truck Class 3	Truck Class 4	Truck Class 5	Truck Class 6	Bus Class B2	Bus Class B3
2019	Westbound	96.1%	1.4%	0.2%	0.1%	1.1%	0.0%	0.1%	0.8%
	Eastbound	97.3%	0.9%	0.2%	0.1%	0.9%	0.1%	0.1%	0.4%
2021	Westbound	95.7%	1.5%	0.3%	0.2%	1.7%	0.0%	0.2%	0.4%
	Eastbound	96.9%	1.2%	0.4%	0.2%	1.1%	0.0%	0.1%	0.1%

Source: WSP 2022

Similarly, the vehicle mix of the corridor-wide morning and evening peak hours for each segment and direction was analyzed. Table 3.7-5 illustrates the average vehicle classification mix selected for the corridor by time period. Cars, or Class 1, are the majority of the vehicles on the roadways in all time periods with Class 2, dual-tire and box trucks, being the second-largest component of the vehicle mix.

Table 3.7-5. Vehicle Mix for the Peak Hours

Peak Hour	Car Class 1	Truck Class 2	Truck Class 3	Truck Class 4	Truck Class 5	Truck Class 6	Bus Class B2	Bus Class B3
7:00 to 8:00 a.m.	87.15%	3.92%	1.37%	0.79%	6.21%	0.18%	0.17%	0.22%
5:00 to 6:00 p.m.	97.40%	1.00%	0.22%	0.07%	0.52%	0.02%	0.43%	0.34%

Source: WSP 2022

2021 Year Base Traffic Volumes. The 2021 Year Base traffic peak hour volumes were estimated using a combination of the different data sources, including the NJ Turnpike origin-and-destination toll plaza transactions, field traffic counts, and historical data. It should be noted that field counts obtained in 2021 were adjusted using the Seasonal and COVID-19 factors described in previous sections to reflect the 2019 pre-COVID-19 pandemic levels as needed.

3.7.1.2 Railroads and Other Roadways

An inventory of roadways and railroads crossed by the Proposed Action was developed based on a review of as-built plans, NJDOT Straight-Line Diagrams and other mapping sources, and meetings with Conrail, NJDOT, PANYNJ, Essex and Hudson Counties, and Newark, Bayonne, and Jersey City staff. The locations of roadways and railroads were confirmed through field visits.

3.7.1.3 Major Utilities

An inventory of utilities, both underground and above ground, in the vicinity of the Proposed Action was developed based on a review of as-built plans, coordination with utility owners, and field visits to review visible utility mark-outs on site.

3.7.1.4 Waterway Navigation and Ports

An inventory of navigation channels and navigation use in the vicinity of the Proposed Action was developed based on the following data sources:

- Detailed Navigation Chart No. 12337, Passaic and Hackensack Rivers, published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) (NOAA 2020).
- Fact Sheet - Newark Bay, Hackensack and Passaic Rivers, New Jersey: Newark Bay Channels Federal Navigation Channel Maintenance and Stewardship (USACE 2022a).
- Abridged subset of USCG Nationwide Automatic Identification System Historical Data (USCG 2022a).
- Marine Traffic Online Services (MarineTraffic.com 2022).
- Port State Information Exchange (USCG 2022b).
- Automatic Identification Databases (VesselFinder.com 2022, MyShipTracking.com 2022, FleetMon.com 2022).
- Vessel Company Summary and Vessel Characteristics (USACE 2022b).
- Universal Licensing System (FCC 2022).
- U.S. Department of Transportation Maritime Administration List of U.S. Flagged Carriers (USDOT 2021).
- USACE Institute for Water Resources Waterborne Commerce Statistics Center Annual Waterborne Commerce and Trips Data for the most recent reporting year (2020) (USACE 2022c).

Information regarding future plans for port facilities in the vicinity of the Proposed Action was also obtained from the PANYNJ Port Master Plan 2050 (PANYNJ 2019). The inventory was also based on coordination

with USCG, USACE, PANYNJ, the Harbor Safety, Navigation, and Operations Committee of the Maritime Association of the Port of New York - New Jersey, and the container terminal owner and operator CMA CGM.

3.7.1.5 Navigable Airspace

An inventory of navigable airspace in the vicinity of the Proposed Action was conducted through coordination with PANYNJ and the FAA.

3.7.2 Methodology and Criteria

3.7.2.1 NB-HCE Traffic

Travel demand modeling. The NJTPA is the federally authorized Metropolitan Planning Organization (MPO) for 7 million people in the 13-county northern New Jersey region. An MPO is a federally mandated and federally funded transportation planning agency made up of representatives from local government and key transportation agencies. Congress created MPOs to give local elected officials a stronger role in guiding federal transportation investment and to ensure that these decisions are based on a continuing, cooperative and comprehensive planning process.

The NJTPA Board of Trustees includes 15 local elected officials representing 13 counties (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren) and the cities of Newark and Jersey City. The Board also includes a Governor's Representative, the Commissioner of NJDOT, the Executive Director of NJ TRANSIT, the Chairman of the PANYNJ, and a Citizen's Representative appointed by the Governor.

The most recent regional travel demand model, North Jersey Regional Travel Model Enhanced (NJRTM-E), from the local MPO (NJTPA) was obtained and used with some adjustments to ensure all land-use development and transportation projects were included and the model was properly calibrated for 2021 conditions. The NJRTM-E model includes the 13 counties of the NJTPA region and surrounding counties in New York, Pennsylvania, Connecticut, and New Jersey, represented by over 2,900 Traffic Analysis Zones. After coordination with the NJTPA, the latest version of the model (2018) and model runs (2021) were obtained.

NJTPA and other MPOs are required to meet USDOT requirements for metropolitan planning processes found at 23 CFR Part 450. The NJRTM-E model is a key element of NJTPA's planning processes in that it incorporates the latest available estimates and assumptions for population, land use, travel, employment, congestion, and economic activity in the region. The NJRTM-E model reflects the current and projected (to 2050) transportation demand of persons and goods in the region on existing and proposed transportation facilities, e.g., highways (including, NB-HCE) and transit facilities. Per 23 CR 450, the model and other planning products may be used or referenced in preparing a NEPA document. Based on the Authority's pricing methodology, it is acknowledged that over time transactions will likely reduce for customers with access to alternate routes. In the case of this EA, the Federal Highway Administration accepted NJRTM-E is appropriate for use as a basis of the analysis of travel demand, including induced travel, under Existing, No Action, and Proposed Action conditions for the highway and local street analyses.

The NJRTM-E, which includes the existing transportation facilities (highway and transit) in the regional network plus all fiscally constrained transportation projects in the approved 2050 Regional Transportation Plan, is an authoritative source for future projects and development activity between now and 2050. That model is the appropriate tool for the EA's traffic analysis because it has been approved by the Federal Highway Administration and the Federal Transit Administration for modeling the transportation network and air quality effects of future transportation projects contained in the federally approved 2050 regional transportation plan for the 13-county North Jersey region, which includes Essex and Hudson counties.

The basis for the traffic growth projections in the model are the future (2050) estimates of population and employment growth established by NJTPA through coordination with the counties and municipalities. As population and employment are allocated geographically in the model, the model in effect accounts for anticipated future development beyond currently proposed projects. It should be noted that the County Executives of Essex and Hudson Counties, the Mayors of Newark and Jersey City, and the Chairman of the Port Authority of NY &NJ are members of the NJTPA Board of Trustees, and among their responsibilities includes voting to adopt the regional transportation plan and its underlying demographic and traffic assessments).

The NB-HCE Improvements Program's projects are included in the model. In accordance with acceptable modeling standards and protocols, the No Build Alternative traffic volumes were projected by running the model without the NB-HCE Program projects. The traffic analysis in the draft EA includes all "past, present, and reasonably foreseeable" transportation projects in North Jersey to 2050 included in the NJTPA model; is reflective of future growth and development in North Jersey, including the NB-HCE corridor to 2050 as included in the NJTPA model; and includes all the NB-HCE Improvements Program projects.

Within the NJTPA region, the highway network includes most arterial roadways (major and minor classification) and most 500-level and 600-level county roads. Most collector or local roads are not included. Outside the NJTPA region, the highway network is more schematic, generally representing major regional roadways in the National Highway System (NHS). The model covers nine trip purposes ranging from home-based work, shopping, and work-based-other to non-home-non-work-based trips as well as airport trips, university trips made by students to and from regional colleges and universities, and truck trip purposes (i.e., heavy, medium, and commercial). Six modes of travel are considered for most trip purposes covering a range of automotive modes such as single-occupancy vehicles to an increasing degree of high occupancy vehicles, public transit-walk access, public transit-drive access, and trucks. The public transportation network includes NJ TRANSIT rail and bus systems, some private bus lines, and ferry services. Modeled traffic forecasts are generated for four different time periods covering the daily 24-hour journey. The 24-hour model is composed of four separate time periods: AM Peak (6:00 a.m. to 9:00 a.m.), Midday (9:00 a.m. to 3:00 p.m.), PM Peak (3:00 p.m. to 6:00 p.m.), and Night (6:00 p.m. to 6:00 a.m.).

To be able to accurately forecast future travel patterns, the model was updated with the most recent plan-approved sociodemographic data and Transportation Improvement Program (TIP) scheduled projects, and other local known planned and approved land use development and infrastructure projects. To ensure that all relevant projects would be covered by the model, a list of land use and transportation projects was obtained from Jersey City Open Data database, the NJTPA current TIP projects, and the FY2020-2029 Statewide Transportation Improvement Program.[1]

NJTPA-forecasted population and employment growth rates were drawn from its 2050 Regional Transportation Plan update for the 13 counties under the NJTPA jurisdiction. These were included in the NJRTM-E travel demand model. In Hudson County, the expected annual growth in population and employment from 2015 to 2050 is 0.7 percent and 0.8 percent, respectively (Table 3.7-6). These growth rates

[1] The Purpose and Need for the Proposed Action, as well as relevant traffic and environmental studies to assess the impact of the Proposed Action, were completed before Manhattan Central Business District Tolling (also known as "Congestion Pricing") had been initiated. Beginning on January 5, 2025, vehicles entering Manhattan below 60th Street were charged a fee. While implementation of Congestion Pricing will likely result in changes in travel patterns, the Purpose and Need for the Proposed Action remains unchanged. It continues to be focused on safety and the needs of vehicles traveling between Interchange 14 and Interchange 14A. Nearly 80% of the eastbound traffic using the NB-HCE is destined for Jersey City (56%), Bayonne (17%), and other parts of Hudson County (6%), not the Holland Tunnel. Thus, implementation of Congestion Pricing will not affect the Purpose and Need for the Proposed Action, and would only have negligible impacts associated with the Proposed Action.

were used to verify the land-use and sociodemographic inputs required for the trip generation to ensure that the expected 2050 model forecasts were as accurate as possible.

Table 3.7-6. County Population, Employment and Household Forecasts for NJTPA Region

County	Population			Employment		
	2015	2050	Annualized Change 2015-2050	2015	2050	Annualized Change 2015-2050
Bergen	926,330	1,083,869	0.4%	421,284	483,298	0.4%
Essex	791,609	920,335	0.4%	368,662	432,645	0.5%
Hudson	662,619	856,947	0.7%	282,020	366,913	0.8%
Hunterdon	126,250	132,858	0.1%	53,115	56,243	0.2%
Middlesex	830,300	939,723	0.4%	388,309	444,502	0.4%
Monmouth	629,185	669,624	0.2%	262,372	293,290	0.3%
Morris	498,192	528,760	0.2%	291,622	323,287	0.3%
Ocean	583,450	727,653	0.6%	166,005	199,086	0.5%
Passaic	507,574	599,628	0.5%	181,477	206,083	0.4%
Somerset	330,604	363,486	0.3%	185,400	211,386	0.4%
Sussex	145,930	152,337	0.1%	41,935	46,703	0.3%
Union	548,744	652,581	0.5%	233,011	272,803	0.5%
Warren	107,226	115,320	0.2%	35,247	39,410	0.3%
Region	6,688,013	7,743,120	0.4%	2,910,458	3,375,651	0.4%

Source: WSP 2022, NJTPA 2021b

Traffic growth rate. Traffic increases in the NB-HCE corridor for the 2050 No-Build and Build condition were estimated by traffic projections in the NJRTM-E. Traffic demand increases to 2050 under the No-Build condition (which assumes no geometric changes in the Program area) includes growth from demographic changes only. This increase is 8.3% over the 2021 Base Year. The 2050 Build condition includes growth from demographic changes and accounts for the full build of the Program improvements. Forecasted demand estimates on the NB-HCE also include traffic diverted to the NB-HCE corridor from other roadways (i.e., Pulaski Skyway and US Route 1&9T) because of changes in route choice. This increase on the NB-HCE is 32.0% over the 2021 Base Year and 21.9% over the 2050 No-0Build projections.

Vehicle classification. While existing traffic volumes and vehicle mix were obtained for eight different vehicle classes, projected traffic volumes from the NJRTM-E travel demand model are constrained to two vehicle classes only: cars and trucks. Therefore, to estimate a future vehicle mix, projected heavy truck volumes between the 2050 Year No Build (No Action) and Build (Proposed Action) conditions were compared to determine the change (i.e., increase or reduction) in truck percentage.

Capacity analysis. Detailed capacity analyses were conducted within the study corridor using the analytical procedures described in the Highway Capacity Manual, Sixth Edition, published by the Transportation Research Board. The NB-HCE between Interchanges 14 and 14A qualifies as a basic freeway segment for analysis purposes. For basic freeway segments, the LOS is estimated based on the density of the vehicles (a measure that quantifies the proximity of vehicles to each other within the traffic stream) and indicates the degree of maneuverability within the traffic stream. Table 3.7-7 displays the LOS criteria used for basic freeway segments.

Table 3.7-7. Basic Freeway Segments Level of Service (LOS) Criteria

LOS	Density Range (Passenger cars per mile per lane)
A	0 to 11
B	>11 to 18
C	>18 to 26
D	>26 to 35
E	>35 to 45
F	>45

Source: Transportation Research Board 2000

LOS A describes completely free flow conditions, densities of up to 11 passenger cars per mile per lane, while LOS F represents forced breakdown flow with densities in excess of 45 passenger cars per mile per lane. The densities corresponding to LOS A, B, C, and D are equal to or less than 35 passenger cars per mile per lane and are considered acceptable operating conditions. LOS E and F represent unacceptable traffic flow conditions.

Induced travel analysis. Induced travel is a well-established concept in transportation economics. Research has shown that certain highway capacity expansion projects that lower travel costs (time, money, uncertainty) can lead to changes in traveler behavior that, in turn, can increase the overall amount of travel, measured as vehicle-miles traveled (VMT) in a region. Some researchers have correlated highway capacity increases, expressed in lane-miles, to induced travel, expressed in VMT (as summarized in Handy and Boarnet, 2014). The correlation, or elasticity, of these metrics has been indicated by the research to be as high as 1.0, meaning that every one percent of lane-mile added leads to a one percent increase in VMT.

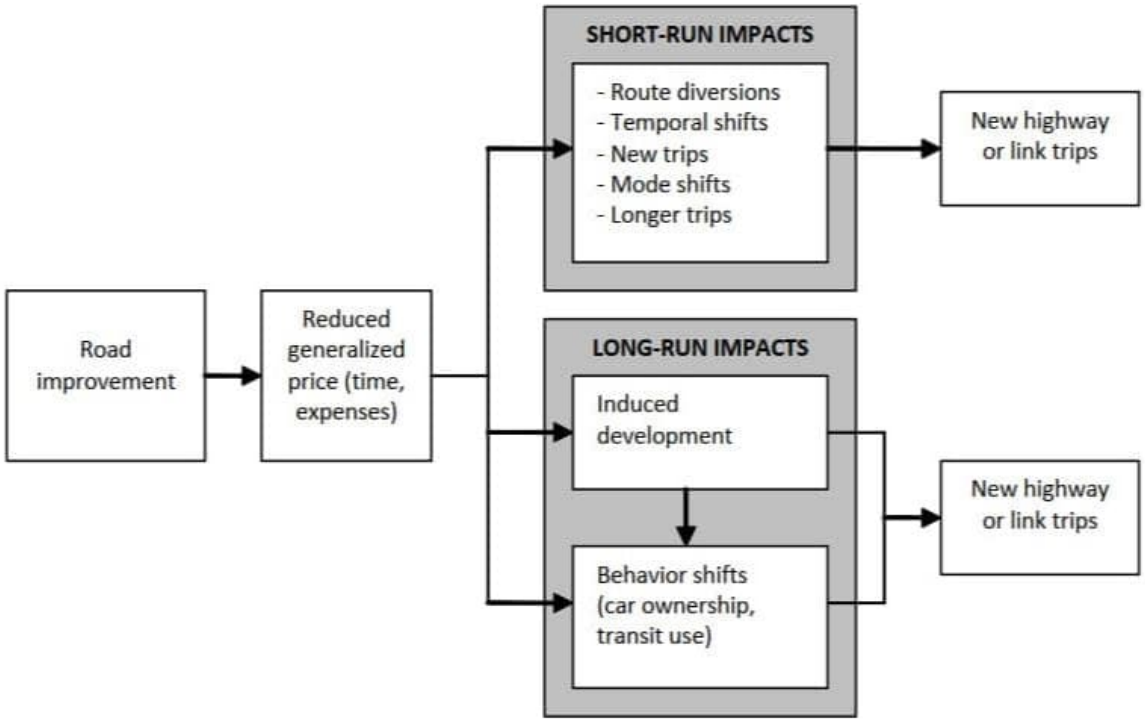
Induced travel from highway capacity expansion projects has been described in research as having several components, specifically:

- Route diversions to the new or expanded facility.
- Shifts from the transit mode of travel to auto travel.
- Induced land development and associated trip generation from improved accessibility.
- Shifts from off-peak to peak hours of highway travel.
- Increased auto ownership, more frequent auto travel, and other traveler behavioral changes.

The induced travel effects have been described in research as being both short-term (about 5 years after the capacity addition) and long-term (about 10 years after the capacity addition) increases in VMT.

The induced travel assessment developed for the EA used quantitative and qualitative analyses to assess the potential for induced travel from the entire NB-HCE Program in 2050 covering all the aforementioned components. Specifically, the Federal Highway Administration's *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA* (FHWA, 2010) The *Interim Guidance* lays out a process and approach for analyzing induced travel that uses a combination of travel modeling and was, therefore, chosen as the analytical framework for assessing the potential for the NB-HCE Program to cause induced travel. That process and approach are illustrated in Figure 3.7-3.

Figure 3.7-3. Short-Run and Long-Run Sources of Induced Travel



Source: FHWA, 2010

The *Interim Guidance* notes that travel forecasting models typically account reasonably well for the following factors that can contribute to short-run induced travel: change in mode of travel, change in route, and change in length of trips. NJTPA's NJRTM-E model, which was used to project travel demand on the NB-HCE for the traffic analyses documented in this section and in Appendix B, is well suited to analyze these factors.

A sub-regional highway network model area was used in the analysis of highway route diversions and highway trip lengths. The sub-regional model matches that used in the mobile source air toxics analyses of the NB-HCE Program documented in section 3.8.5. The NJRTM-E highway sub-area network volumes were used to compare Build versus No Build traffic volumes to estimate travel route diversions attributed to the Program. The principal alternate routes to NB-HCE analyzed were the following: Bayonne Bridge/NJ Route 440, U.S. Truck Route 1/9, the Pulaski Skyway, and the NJ Route 7-Wittpenn Bridge. These are the alternate routes in closest proximity to the NB-HCE where one intuitively would expect the greatest potential for route diversions to occur from a widened NB-HCE.

The NJRTM-E also features the inclusion of a customized NJ TRANSIT mode choice model as the basis for estimation of auto and transit mode shares. The transit network includes NJ TRANSIT rail and bus networks, some private bus lines, and ferry services. Mode Share is the split between person trips made by autos versus person trips made using transit. The entire mode choice model was used to estimate the Program's potential to induce mode shifts by comparing mode shares under modeled Build and No-Build conditions.

FHWA's *Interim Guidance* references National Cooperative Highway Research Program Report 466: *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (NCHRP, 2003) as providing a framework and supporting analyses for estimating the land use effects of proposed transportation projects. Report 466's

analysis framework was used as the primary basis for assessing the NB-HCE Program's potential to induce development and alter land development patterns.

NCHRP Report 466 includes a scoping step which considers the potential of three distinct types of land development effects from highway projects:

1. Projects with an explicit economic development purpose. In other words, the reason for the project being built is to enable development to occur.

2. Land development that is complementary to the project, including highway-oriented businesses such as gas stations, restaurants, and hotels that open in the vicinity of interchanges.

3. Projects that influence where land development occurs by contributing to changes in intraregional land development decisions. Transportation projects that produce a significant change in accessibility between major nodes of employment, housing, and commercial development can make an area more attractive to residential and business development.

A new or expanded highway's potential to change land development can also change travel behavior. This is particularly true of Type 3 projects that can influence where housing and employment occur in a region.

In addition to changes in accessibility (Report 466 framework), travel modes (NJRTM-E application), and travel routes (NJRTM-E application), new or expanded highways can also lead to temporal shifts (when people travel, e.g., peak period vs. off-peak), new trips, longer trips, changes in auto ownership, and other traveler behavioral changes by essentially lowering travel costs by reducing travel times and improving travel reliability. Lane-mile/VMT elasticity research and calculators use lane-mile additions to explain the combined effect of all these factors on VMT. For purposes of this report, the effect of the NB-HCE Program solely on traveler behavior is conservatively measured by comparing the Program's relative lane-mile addition to that of the Freeway/Expressway and Principal Arterial roadway facilities in the modeled sub-region. The effect of the Program's proposed lane-mile addition, however, can be expected to be extremely small as evidenced by VMT trends in New Jersey and northern New Jersey over the past 15 to 20 years wherein VMT growth has been roughly correlated to population growth with no apparent effect on VMT from the many major highway expansion projects which added considerable lane-mile capacity to the roadway network.

3.7.2.2 Railroads and Other Roadways

The NJRTM-E was used to estimate the effect of the entire NB-HCE Program on local street traffic volumes in 2050 compared with volumes under the No Action alternative. NJRTM-E has 57 roadway links (essentially, blocks) in the Newark local street study area and 28 roadway links in the Bayonne/Jersey City local street study area. The model was used to estimate daily traffic volumes for the No Action and Proposed Action conditions in 2050 and the difference in volumes was calculated for each roadway link. An impact would potentially occur if the daily traffic volume on any link (block) of a local street is estimated to increase by more than 10%.

Relevant design standards for roadway and railroad crossings and interfaces include those of the Authority, NJDOT, Conrail, and NJ TRANSIT, as applicable. An impact would potentially occur should the Proposed Action design not meet a relevant and applicable standard (e.g., vertical clearance over a railroad or roadway).

3.7.2.3 Major Utilities

Relevant design standards for utility relocation and protection include those of the utility owner (e.g., fiber optic carriers, gas pipeline companies, PSE&G local gas and electric supply plus any electric transmission corridors, and municipal utility authorities). An impact would potentially occur should the Proposed Action design not meet a relevant and applicable standard (e.g., utility location and protection standards) and could be underground or aerial in nature.

3.7.2.4 Waterway Navigation and Ports

Based on the research and data collection, as well as through coordination with USCG and USACE, the existing NBB completely spans the Newark Bay North Reach Federal Navigation Channel authorized by the U.S. Congress and maintained by USACE at a width of 500 feet and a depth of 35 feet with one exception: an encroachment on the channel by a portion of the southernmost main span pier of the existing NBB, created when the channel was widened pursuant to Congressional authorization in 1966. Construction of the existing NBB was authorized through a Bridge Permit with a 550-foot horizontal clearance and a vertical clearance of 135 feet for navigation needs. An impact on waterway navigation would potentially occur should the Proposed Action design alter an authorized navigation channel or deviate from the authorized horizontal or vertical navigational clearances of the existing NBB.

3.7.2.5 Navigable Airspace

Based on the research and data collection, as well as through coordination with PANYNJ and FAA, the existing NBB is under the departure and approach paths of Runway 29 at EWR. FAA defines aircraft departure and approach surfaces for airports. These surfaces are designed to promote air safety and the efficient use of navigable airspace. The departure surface generally extends at a slope of 34:1 from a point 200 feet from the end of the runway. The approach surface generally extends at a slope of 40:1 from a point 200 feet from the end of the runway. FAA seeks to keep the space below this surface clear of buildings, towers, and other obstacles that pose a safety risk to departing and approaching aircraft. Computer-aided modeling of these surface slopes provides a basis for defining a no-exceed height (NEH) for a potential obstacle. Such modeling of the existing NBB towers indicate an NEH of 265 feet above mean sea level (AMSL) for NBB's western bridge tower and 296 feet AMSL for the eastern bridge tower. An impact on navigable airspace would potentially occur should the Proposed Action design of replacement NBB towers exceed the relevant NEH or the corresponding existing tower heights.

3.7.3 Existing Conditions

3.7.3.1 2021 NB-HCE Traffic

Table 3.7-8 shows the existing freeway conditions on NB-HCE using the existing volumes. As shown, the NB-HCE between Interchanges 14 and 14A currently operates at a LOS E or worse:

- Eastbound roadway operates at LOS F in AM and PM.
- Westbound roadway operates at LOS F in the AM and LOS E in the PM.

Table 3.7-8. 2021 NB-HCE Interchanges 14 to 14A Existing Traffic Conditions

	Weekday AM Peak Hour					Weekday PM Peak Hour			
	Segment	Volume	Density*	v/c	LOS	Volume	Density*	v/c	LOS
Eastbound	14 - 14A	4,533	*	1.31	F	3,852	*	1.04	F
Westbound	14A - 14	3,640	*	1.04	F	3,569	42.3	0.97	E

Source: WSP 2022
Key: v/c = traffic volume divided by roadway lane capacity.
* Density (passenger car equivalents per mile per land) is not calculated when v/c exceeds 1.00.

Eastbound traffic volume on the NBB consists of traffic from Interchange 14, which is fed by I-78, U.S. Route 22, U.S. Route 1/9 and NJ Route 21, and from the NJ Turnpike Mainline from the north and south.

A substantial portion of the traffic volume on the NB-HCE between the interchanges exits or enters the NB-HCE at Interchange 14A as follows:

- In the AM peak hour, 1,696 vehicles (37.4 percent) of eastbound traffic on the NB-HCE exits at Interchange 14A and 1,989 vehicles (54.7 percent) of westbound traffic on the NB-HCE enters at Interchange 14A.
- In the PM peak hour, 1,555 vehicles (40.4 percent) of eastbound traffic on the NB-HCE exits at Interchange 14A and 1,389 vehicles (39.2 percent) of westbound traffic on the NB-HCE enters at Interchange 14A.

The relatively high entering and exiting volumes at Interchange 14A is indicative of trips generated by destinations served by the interchange.

3.7.3.2 Railroads and Other Roadways

Proceeding in order from Interchange 14 to Interchange 14A, the NB-HCE crosses over the following roadways and railroads in Newark:

- NJ Turnpike (I-95) Mainline (12 lanes) and Interchange 14 ramps (five lanes).
- Conrail's Garden State Secondary line immediately east of the NJ Turnpike Mainline. The Garden State Secondary connects Conrail's Oak Island Yard in Newark, located north of the NB-HCE, with the North Jersey Coast Line at Perth Amboy. The number of railroad tracks crossed by the NB-HCE at this location varies between five and seven.
- East Port Street, a two-lane local collector street connecting Corbin and Port Streets within Port Newark to the south of the NB-HCE with Conrail's Oak Island Rail Yard.
- Doremus Avenue, a four-lane principal arterial connecting Port Newark with intermodal and warehouse facilities along Doremus Avenue and with the NJ Turnpike Mainline at Interchange 15E and U.S. Routes 1/9 Truck.
- Warehouse Place, a two-lane local collector connecting Port Street in Port Newark with industrial and warehouse facilities north of the NB-HCE.

Continuing east of Newark Bay into Bayonne, the NB-HCE crosses over the following roadways (no railroads are crossed in the Bayonne portion of the Project):

- NJ Route 440, a state highway maintained by NJDOT. It comprises two segments, a 5.15-mile freeway in Middlesex County linking Interstate 287 (I-287) and the NJ Turnpike Mainline at Interchange 10, in Edison to the Outerbridge Crossing in Perth Amboy and an 8.18-mile four-lane divided highway in Hudson County running from the Bayonne Bridge in Bayonne to U.S. Route 1/9 Truck in Jersey City. These two segments are connected by New York State Route 440, which runs across Staten Island. The NBB's east approach structure crosses over NJ Route 440 immediately east of Newark Bay.
- JFK Boulevard (County Route 501), a principal arterial roadway which provides access to several major parks, educational institutions, and shopping centers among other land uses as it traverses the length of Hudson County beginning at the NJ Route 440/Bayonne Bridge junction in Bayonne and continuing north to NJ Route 63 in North Bergen.

Continuing farther east into Jersey City, the NB-HCE crosses over the following roadways (no railroads are crossed in the Jersey City portion of the Proposed Action):

- Avenue C, a locally important, four-lane retail and residential street that runs the length of Bayonne and terminates at an intersection with Merritt Street immediately north of the NB-HCE.
- Garfield Avenue, a locally important two-lane retail and residential street that runs the length of

Bayonne, where it is named as Broadway, and then continues through Jersey City to Grand Street.

- New Jersey Transit's Hudson-Bergen Light Rail System (HBLR), which provides a key public transportation service through the length of Hudson County, serving portions of Bayonne, Jersey City, Hoboken, Weehawken, Union City, and North Bergen. With 24 passenger stations, HBLR has its southern terminus at the 8th Street Station in Bayonne and its northern terminus at the Tonnelle Avenue Station in North Bergen.
- Conrail's National Docks Secondary freight rail line within Conrail's North Jersey Shared Assets Area in Hudson County, used by CSX Transportation. It provides access for the national rail network to maritime, industrial, and distribution facilities at Port Jersey, the Port Authority Marine Terminal, and Constable Hook as well as carfloat operations at Greenville Yard.

3.7.3.3 Major Utilities

Table 3.7-9 lists major utilities along the NB-HCE between Interchanges 14 and 14A.

Table 3.7-9. Major Utilities Along the NB-HCE Between Interchanges 14 and 14A

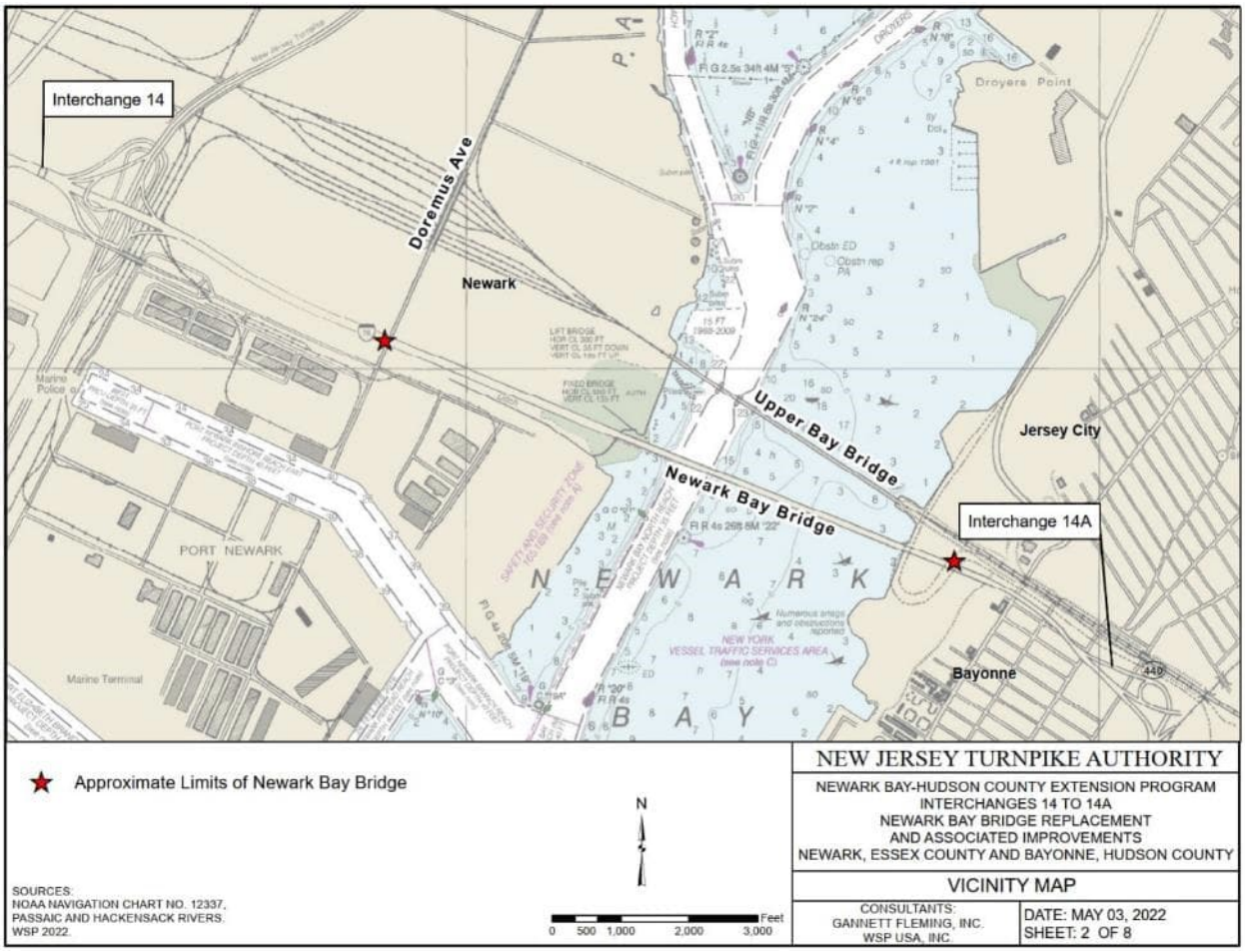
Company	Facility	Longitudinal/Crossing Location
Penta	Bridge-Mounted Fiber Optic	Longitudinal to NB-HCE
	Underground Fiber Optic	Crossing NB-HCE at Interchange 14A
ZAYO	Bridge-Mounted Fiber Optic	Longitudinal to NB-HCE
	Bridge Mounted Cable TV	Longitudinal to NB-HCE
	Bridge Mounted Fiber Line	Longitudinal to NB-HCE
Colonial Pipeline	2" x 14" Liquified Petroleum Pipeline	Longitudinal to NB-HCE eastbound
Williams Companies, Inc.	2"x14" Fuel Pipeline	Crossing NB-HCE at Interchange 14A
Verizon	Overhead Fiber	Crossing NB-HCE eastbound and westbound at Corbin Street
		Crossing NB-HCE eastbound and westbound at Doremus Avenue
PSE&G	Overhead Electric	Crossing NB-HCE eastbound and westbound at Doremus Avenue
		Crossing NB-HCE eastbound and westbound at Warehouse Place
		Longitudinal to 58th Street
	Underground Electric	Crossing NB-HCE at Interchange 14A
Bayonne Municipal Utilities Authority (BMUA)	Culvert over 30" Sanitary Force Main	Crossing NB-HCE eastbound and westbound
	30" Sanitary Main	Crossing NB-HCE westbound between Avenue B and Avenue C
	30" Water Pipe	Longitudinal to 58th Street
	8" Sewer Pipe	Longitudinal to 58th Street
	36" Sanitary Main	Crossing NB-HCE at Interchange 14A
Comcast	Overhead Cable TV	Longitudinal to 58th Street
Passaic Valley Sewerage Commission (PVSC)	12' Sanitary Sewer	Crossing NB-HCE at Interchange 14A

Source: WSP 2022

3.7.3.4 Waterway Navigation and Ports

The NBB spans the federally maintained Newark Bay North Reach (Figure 3.7-4) with one exception: an encroachment on the channel by a portion of the southernmost main span pier of the existing NBB, created when the channel was widened pursuant to Congressional authorization in 1966. The Newark Bay Main Channel North Reach is generally aligned with Newark Bay's general south-to-north orientation. The channel lies within the western one-third of Newark Bay at the NBB mainspan structure location. The width of Newark Bay at the NBB crossing (the mainspan structure and its approaches over water) is approximately 4,250 feet.

Figure 3.7-4. Newark Bay Bridge Relative to Federal Navigation Channels in Newark Bay



The depth of Newark Bay at the NBB crossing varies from -41.5 feet in the navigation channel to depths of -2 to -3 feet in near shore areas. There is a rapid change in depths on either side of the navigation channel with the gradient steeper on the west side of the channel as that side is nearer the shore. Elevation fluctuations are semi-diurnal, with a mean tidal range of approximately 5 feet.

The Newark Bay Channels include the main channel and several branch and pierhead channels. The main channel, including widening and maneuvering areas, is 50 feet deep, 700 feet wide to the branch channel at Port Newark (downstream of the NBB), then 40 feet deep, 500 feet wide, to a turning basin at the junction of the Hackensack and Passaic River channels (upstream of the NBB).

The Newark Bay Channels were authorized by the Rivers and Harbors Acts of 1922 and subsequently modified in 1943, 1954, 1964, 1966, 1975, and 1985, and by the Water Resources Development Acts of 1986 and 1990.

The navigation channel supports deep-draft commercial navigation to the Port of New York and New Jersey. In 2016, approximately 42 million tons of bulk cargo was transported through the approach channels into Port Newark and Port Elizabeth, including 5.5 million tons of petroleum products. Other major commodities include coal, food products, manufactured goods and equipment, vehicles, and crude materials.

The last maintenance dredging cycle included the critically shoaled areas in the Port Newark approach channels in 2021. A prior maintenance dredging cycle included the critically shoaled areas in the Port Newark approach channels in 2020.

Vessels using the navigation channel in the vicinity of the NBB are bound for the western waterfront of Newark Bay in Newark north of the NBB and the Upper Bay Bridge, and for the Hackensack and Passaic Rivers. The largest vessels (70- and 75-foot vessel widths and 20- to 38-foot vessel drafts) using this portion of the channel are tankers serving the petroleum products terminals on the Kearny Point Reach of the Passaic River, which is immediately upstream of the Newark Bay North Reach. There were 14 inbound and outbound tanker trips in 2020 out of a total of 1,706 trips. The other predominant vessel use was by liquid barges (915 trips) and towboats (670 trips). A total of 1,413,821 short tons of cargo was reported in 2020. Of that total, 67.4 percent (952,454 tons) was various petroleum products (gasoline, distillate fuel oil, kerosene, and residual fuel oil), 22.2 percent (313,282 tons) was waste and scrap, and 6.7 percent (95,188 tons) was sand and gravel.

Annual navigational use of the waterway has generally trended downward over the past 40 years from a peak of over 9 million tons in the early 1980s to the present use of less than 1.5 million tons. This decline is due in part to competition from other ports in the region, including, Ports Newark and Elizabeth. Facilities served by the waterway have, however, retained a niche in petroleum products.

Table 3.7-10 provides details on bridges and overhead cables proceeding from the Atlantic Ocean at Lower New York Bay and through waterways into Newark Bay to the confluence of the Passaic and Hackensack Rivers with Newark Bay. As shown, there are two bridge crossings of Newark Bay: NBB and the Upper Bay (Lehigh Valley Railroad) Lift Bridge, located approximately 0.2 mile upstream of the NBB. The Upper Bay Bridge is a limiting factor to navigation in that it has a 300-foot horizontal clearance as compared to the federally maintained channel width of 500 feet. There is no bridge or overhead cable proceeding up the Passaic and Hackensack Rivers that has a vertical clearance greater than the 135-foot vertical clearance of the NBB until the NJ Turnpike (I-95) Mainline bridges over the Passaic and Hackensack Rivers.

Table 3.7-10. Bridges and Overhead Cables Proceeding from Lower New York Bay

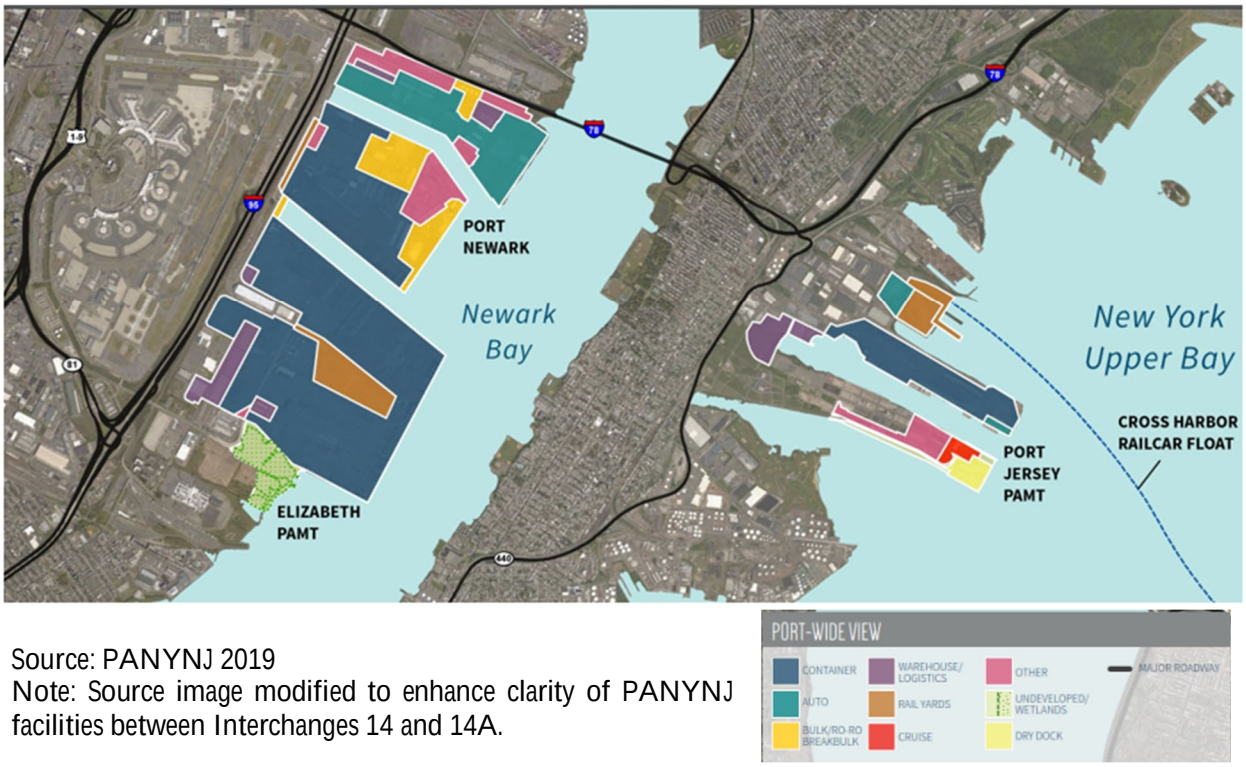
Bridge and Overhead Cables	Horizontal Clearance (feet)	Vertical Clearance (feet)
Verrazzano-Narrows (Lower/Upper New York Bay)	4,259	228
Bayonne (Kill Van Kull)	1,675	215
Outerbridge Crossing (Arthur Kill)	750	143
Overhead Power Cables (Arthur Kill)	-	165
Goethals (Arthur Kill)	768	140
Arthur Kill Vertical Lift	500	31 lowered 135 raised
Newark Bay Bridge	550	135
Upper Bay (Lehigh Valley Railroad) Lift	300	35 lowered 135 raised

Source: WSP 2022

Interchanges 14 and 14A serve as two access points between the roadway network and Port Newark (Interchange 14) and the Port Jersey PAMT and Greenville Yard (Interchange 14A). These facilities are two of the PANYNJ's six marine terminals that make up the largest port complex on the East Coast (see Figure 3.7-5). Port Newark, a 930-acre complex constructed by the City of Newark in 1915, has been leased by the PANYNJ since 1948 and was expanded in 1963. Port Newark's primary activities involve containers, automobiles, bulk, warehousing, and intermodal transport. Approximately 75 to 80 percent of container capacity in the PANYNJ port complex is housed at Port Newark and the neighboring Elizabeth PAMT. The Port Jersey PAMT and Greenville Yard, owned by the PANYNJ, comprises a 386-acre facility in Bayonne and Jersey City. The facility contains the former Military Ocean Terminal at Bayonne, now Port Jersey South.

Primary activities at the Port Jersey PAMT and Greenville Yard include containers (approximately 10 percent of container capacity in the PANYNJ port complex), automobiles, warehousing, cruise ship, and intermodal transport. The facility serves as the western terminus of the Cross-Harbor Rail Car Float.

Figure 3.7-5. Port Authority of New York and New Jersey Port Complex



Source: PANYNJ 2019
Note: Source image modified to enhance clarity of PANYNJ facilities between Interchanges 14 and 14A.

As noted in the Port Master Plan 2050, approximately 85 percent of inbound container activity is currently destined for the local truck market (PANYNJ 2019). The current regional goods distribution network, fed by international cargo entering through the Port Authority's container terminals, focuses on a dominant cluster of warehousing/distribution center activity located along the NJ Turnpike.

In part because of its location relative to port facilities, the NB-HCE is part of the NHS that was established by the National Highway System Designation Act of 1995 and approved by Congress. As such, the NB-HCE is part of the network of nationally significant highways that are important to the nation's economy, defense, and mobility. With the Moving Ahead for Progress in the 21st Century Act of 2012, the scope and extent of the NHS was modified to create the STRAHNET of highways critical to the Department of Defense's domestic operations. The STRAHNET is a system of roads deemed necessary for emergency mobilization and peacetime movement of heavy armor, fuel, ammunition, repair parts, food, and other commodities to support U.S. military operations. The NB-HCE is part of the STRAHNET, and the portion of NJ Route 440 between Prospect Avenue/Port Terminal Road and Interchange 14A is designated as a STRAHNET connector.

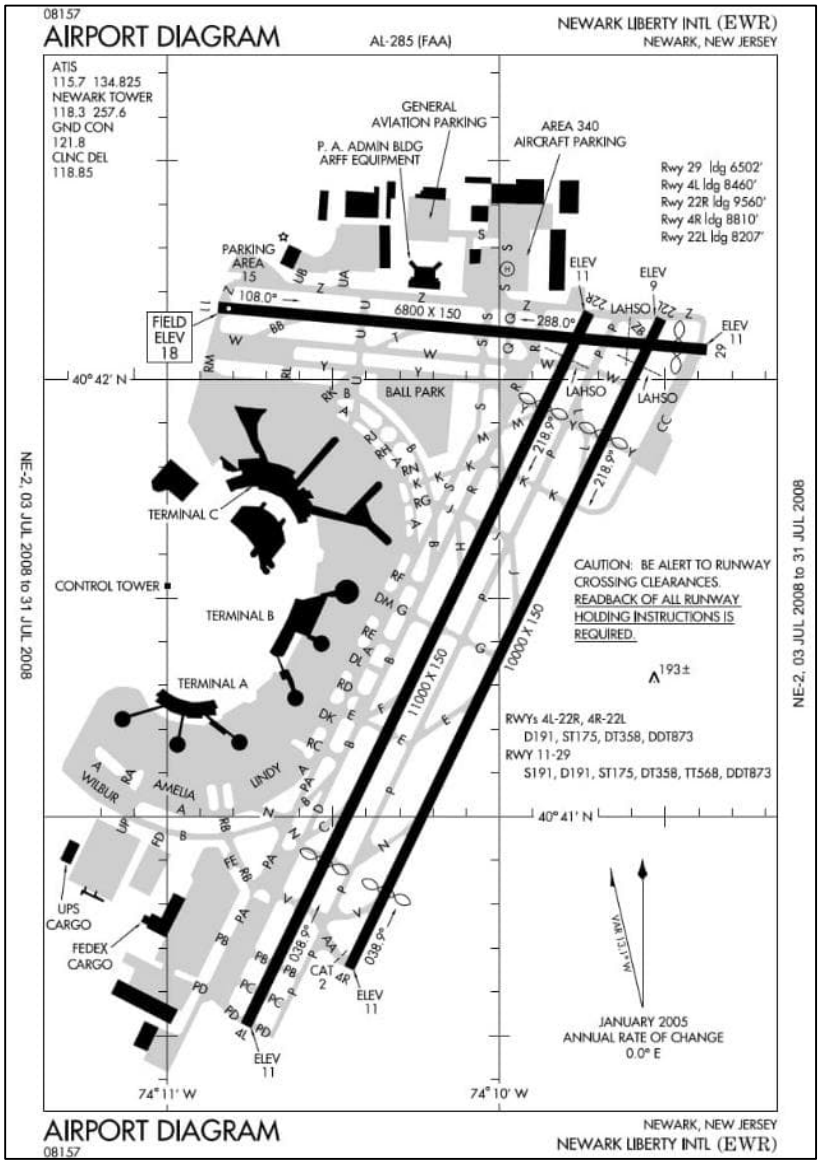
3.7.3.5 Navigable Airspace

Figure 3.7-6 illustrates the runway layout at EWR. The main runways are designated 4L-22R and 4R-22L. Because EWR is a high-volume airline airport, the preferred arrival and departure pattern is to use the main parallel intersecting runways to maximize efficiency. The other runway, designated 11-29, is roughly perpendicular to the main runways. Normally, Runway 29 is used for aircraft arrivals during high west-

northwest wind conditions. The runway is used more frequently when there is construction on the main intersecting parallel runways.

A portion of the existing ramp that provides a connection between NJ Turnpike (I-95) Mainline southbound traffic destined to NB-HCE eastbound at Interchange 14 intrudes on the main runways' approach surfaces.

Figure 3.7-6. Newark Liberty International Airport Runway Layout



Source: FAA 2008

As noted in Section 3.7.2.5, the existing NBB lies under Runway 29's approach and departure paths, with a computed NEH of 265 feet AMSL for NBB's western bridge tower and 296 feet AMSL for the eastern bridge tower.

3.7.4 No Action Alternative

3.7.4.1 No Action Scenario

Under this scenario, the configuration of the NB-HCE between Interchanges 14 and 14A would remain unchanged. That is, the roadway would not be widened, and structures would not be reconstructed. Potential future changes to other roadways, utilities, ports and waterway navigation, and navigable airspace are described in the corresponding subsections.

3.7.4.2 2050 No Action NB-HCE Traffic

Table 3.7-11 displays the projected 2050 No Action freeway conditions on NB-HCE compared with the existing conditions using the projected 2050 No Action volumes. As seen in the table, traffic flow conditions are projected to deteriorate in the future No Action scenario such that LOS F conditions occur in both directions of the NB-HCE during both peak hours.

Table 3.7-11. 2050 NB-HCE Interchanges 14 to 14A No Build Traffic Conditions

	AM Peak Hour Traffic Flow				PM Peak Hour Traffic Flow			
	Traffic Volume	Density	v/c	Level of Service	Traffic Volume	Density	v/c	Level of Service
2021 Existing								
Eastbound	4,533	*	1.31	F	3,852	*	1.04	F
Westbound	3,640	*	1.04	F	3,569	42.3	0.97	E
2050 No Action								
Eastbound	4,909	*	1.41	F	4,172	*	1.13	F
Westbound	3,942	*	1.10	F	3,866	*	1.06	F

Source: WSP 2022.
Key: v/c = traffic volume divided by roadway lane capacity.
* Density (passenger car equivalents per mile per lane) is not calculated when v/c exceeds 1.00.

3.7.4.3 Railroads and Other Roadways

The NJTPA Board adopted Plan 2050 in September 2021 (NJTPA 2021a). Plan 2050 contains an index of current and future candidate transportation improvement projects that have been identified through the metropolitan planning process in northern New Jersey and whose costs can be accommodated based on 2022 to 2050 funding assumptions. Projects are listed by the county in which they are located and by category (i.e., Highway/Bridges, Transit, and Authority categories) as well as by timeframe. Near-term projects are those that can be completed within one to four years. Mid-term projects are scheduled to be completed in years 5 through 10. Projects Under Study are in various stages of project development and are estimated to be completed during the final 15 years of the plan, years 13 to 28, should they move forward towards construction. Projects in the Study and Development Program are included in the "Projects Under Study" category of the index.

The Plan 2050 project index was examined to identify transportation improvement projects with the potential to measurably affect demand for travel on the NB-HCE (e.g., road expansion and transit expansion projects in the primary and secondary traffic study area). Five near- and mid-term transportation improvement projects were identified. The five projects include the following:

- NJ Turnpike Westerly Alignment Mainline Widening between the Southern Mixing Bowl (between

Interchange 14 and Interchange 15E in Newark and Interchange 15W in Kearney.

- PATH Rail Extension to Newark Liberty International Airport Rail Link Station in Newark.
- PATH Railcar Fleet Expansion (systemwide).
- PANYNJ Port Street Corridor Improvement Project in Newark.
- NJ Routes 1 and 9 Truck Extension (New Road) project in Jersey City.

These and other projects included in the travel modeling of Plan 2050 using the NJRTM-E model are accounted for in the travel modeling of the NB-HCE Interchanges 14 to 14A Project, as discussed in Section 3.7.2.1.

One of these projects, the Port Street Corridor Improvement Project, is in the primary study area. The Port Street project improvements are shown in Figure 3.7-7. One of the planned components, the Port Street lead track improvements, crosses under the NB-HCE. None of the other improvements extend into the NB-HCE right-of-way. The Authority and the PANYNJ are coordinating planning of the Interchanges 14 to 14A Project and the Port Street Improvements to avoid or minimize potential conflicts during construction.

Figure 3.7-7. PANYNJ Port Street Corridor Improvement Project in Newark

Source: PANYNJ 2021

No other programmed capital projects of railroads or other roadways in the vicinity of the NB-HCE between Interchanges 14 and 14A were identified from coordination with the railroad and roadway entities.

3.7.4.4 Major Utilities

No future changes in utility locations were identified from coordination with the utility entities. Therefore, the existing conditions for utilities represents the No Action condition.

3.7.4.5 Waterway Navigation and Ports

No future changes in the authorized Newark Bay North Reach Federal Navigation Channel dimensions are proposed nor are any changes proposed to the dimensions of federal navigation channels proceeding from the

North Reach Channel and into and up the Passaic and Hackensack Rivers. Research of proposed or potential development in municipalities abutting Newark Bay upstream of the NBB (i.e., Newark, Kearney, Jersey City, and Bayonne) indicates that while some berths for recreational boats may constructed, no additional berths for commercial shipping are contemplated. Therefore, it is expected that vessel sizes and vessel use of the North Reach Channel under the NBB in the future will be relatively similar to existing conditions.

As for port activities, the Port Master Plan 2050 notes that container volumes are projected to double or triple over the next 30-year time frame (PANYNJ 2019). Specifically, container demand at Port Authority facilities is projected to increase from 7.2 million twenty-foot equivalent units in 2018 to between 12 million and 17 million twenty-foot equivalent units by 2050. Meanwhile, auto demand through the Port is projected to increase from 573,000 vehicle units in 2018 to a range of approximately between 800,000 to 1.3 million units by 2050. Average annual growth ranges from 1.6 percent under low forecast assumptions to 3.3 percent under high forecast assumptions. Cruise demand captured by PANYNJ tenants is projected to increase from 856,000 passengers in 2018 to between 1.3 million and 2.6 million passengers by 2050. While these figures apply to the PANYNJ port complex overall, the Port Jersey PAMT served by Interchange 14A handles and distributes containers, automobiles, and cruise ships.

The Port Master Plan 2050 notes that depending on demand and the ability of the Port Authority and its terminal operators to capture more of the discretionary market, volumes will reach this terminal capacity over the next 10 to 20 years, in the 2030 to 2040 timeframe. To this end, the Port Master Plan 2050 laid out a two-phase approach to addressing capacity. Phase I (first 15 years) includes strategic expansion work at Port Jersey. Specifically, over the next 30 years, the Port Jersey facilities in Bayonne and Jersey City could be expanded to form a major integrated hub of container handling and distribution capacity, relieving the stress on the waterway and road infrastructure currently servicing the Port's Newark and Elizabeth facilities. In addition, PANYNJ will work closely with local officials to continue to support the establishment of a ferry terminal on the Port Jersey South peninsula, and the Cape Liberty Cruise facility could be enhanced with provisions for a potential future second berth. Existing dry dock facilities will be maintained to support their vital function to the harbor and preserve their historic and cultural value to the region. The potential need for additional capacity would depend on the direction of Phase II 30-year plan.

3.7.4.6 Navigable Airspace

No future changes to the configurations or dimensions of EWR's runways are currently programmed nor are any changes currently proposed in the FAA rules regulating airspace. Therefore, the existing conditions for navigable airspace represent the No Action condition.

3.7.5 Proposed Action Alternative

3.7.5.1 2050 Proposed Action NB-HCE Traffic Conditions

The construction of Proposed Action will be staged and sequenced to maintain two travel lanes in each direction between Interchanges 14 and 14A, maintaining the travel lane capacity of the existing roadway.

As shown in Table 3.7-12, by adding two travel lanes in each direction the Proposed Action will improve the LOS over both Existing and No Action conditions and provide LOS D or better traffic flow.

Table 3.7-12. 2050 NB-HCE Interchanges 14 to 14A Existing, No Action, and Proposed Action Traffic Conditions

	AM Peak Hour Traffic Flow				PM Peak Hour Traffic Flow			
	Traffic Volume	Density	v/c	Level of Service	Traffic Volume	Density	v/c	Level of Service
2021 Existing								
Eastbound	4,533	*	1.31	F	3,852	*	1.04	F
Westbound	3,640	*	1.04	F	3,569	42.3	0.97	E
2050 No Action								
Eastbound	4,909	*	1.41	F	4,172	*	1.13	F
Westbound	3,942	*	1.10	F	3,866	*	1.06	F
2050 Proposed Action								
Eastbound	5,986	34.2	0.86	D	5,088	26.4	0.70	D
Westbound	4,806	26.2	0.69	D	4,713	24.5	0.65	C

Source: WSP 2022
Key: v/c = traffic volume divided by roadway lane capacity.
* Density (passenger car equivalents per mile per lane) is not calculated when v/c exceeds 1.00.

Induced demand. With respect to Highway Route Choice, the highest levels of roadway traffic and congestion on the NB-HCE and alternate routes on a typical weekday are the morning and afternoon peak hours in the peak direction of traffic flow, specifically, the eastbound direction in the morning peak and the westbound direction in the afternoon peak. By adding travel lanes and capacity to the NB-HCE between Interchanges 14 and 14A, the Proposed Action will attract trips by some roadway users who would otherwise have taken an alternate route for the trip because the NB-HCE with the Proposed Action provides an overall time and cost savings to those users relative to alternate routes, especially in the peak hour/peak direction of traffic flow. In other words, such roadway users would divert from an alternate route to the NB-HCE between Interchanges 14 and 14A upon implementation of the Proposed Action and the entire proposed NB-HCE improvements program of projects.

The results of applying NJRTM-E to estimate peak hour/peak direction traffic volumes on the NB-HCE between Interchanges 14 and 14A and on alternate routes is provided in Table 3.7-13. The model results indicated that the peak hour/peak direction traffic volumes, i.e., eastbound in the AM peak and westbound in the PM peak, show a strong correlation between reduced volumes on alternate routes and increased volumes on the NB-HCE with the Program. This is logical: the alternate routes experience lower traffic volumes leading to less congestion on these routes because some motorists divert to the widened NB-HCE. It is also logical that since the alternate route roadway volumes are lower than the alternate route roadway capacities in the off-peak directions, the model results do not exhibit evidence of significant diversions to the widened NB-HCE in the off-peak direction of the peak hour.

As illustrated in Table 3-7-13, the increase in traffic on the NB-HCE between Interchanges 14 and 14A under the Proposed Action can be attributed largely to traffic diverted to the NB-HCE from the principal alternate routes. Certain roadway users would choose the NB-HCE over the alternate routes because of the relative time and cost savings to those users and the Interchanges 14-14A section represents the maximum route diversions among the NB-HCE sections. The correlation between diverted traffic volumes from the reported routes and NB-HCE traffic volumes is not 1:1 because of traffic diversions estimated by the model on other routes dispersed throughout the sub-regional study area.

Table 3.7-13. Route Diversions from the Principal Alternate Routes to Interchanges 14 to 14A (2050 Proposed Action vs. 2050 No Action Volumes)

AM Peak Hour Eastbound Direction	
Alternate Routes (Combined)[1]	-988
NB-HCE Interchanges 14 to 14A	+1,076
PM Peak Hour Westbound Direction	
Alternate Routes (Combined)[1]	-1,114
NB-HCE Interchanges 14 to 14A	+847

[1] Includes traffic volumes on Bayonne Bridge/NJ Route 440, U.S. Truck Route 1/9, the Pulaski Skyway, and the NJ Route 7-Wittpenn Bridge.

Source: WSP 2024

With respect to Mode Choice, the No-Action model estimates 952,404 transit trips out of 21,775,832 total person-trips in 2050 in the transit network. The Proposed Action model estimates a shift of 3,467 transit trips to auto trips, or a relatively inconsequential reduction of 0.36% in transit trips with the NB-HCE Program constructed as proposed.

With respect to Highway Trip Length, the Program, as proposed, is estimated to increase sub-regional (within the I-287 corridor) VMT from 27,462,357 under the No Action Alternative to 27,556,659 under the Proposed Action Alternative (the proposed NB-HCE Program), or a relatively inconsequential 0.34%.

With respect to Induced Land Development, applying the NCHRP Report 466 screening framework, the Program will not measurably influence land development. The Program's purpose is to improve the long-term integrity of the structures on the NB-HCE and improve mobility between interchanges on the NB-HCE. The Program has no explicit or implicit land development purpose.

Further, no additional development of highway-oriented businesses such as gas stations, restaurants, and hotels is anticipated in the vicinity of the NB-HCE interchanges because of the Program. This is because land in the vicinity of the interchanges is controlled by zoning and already extensively built-out.

Moreover, it is expected that the Program will not have a measurable influence on where land development occurs locally and regionally. The Program is not adding any new interchanges (access nodes) to the NB-HCE from those that have been present on the NB-HCE since its opening in 1956. As noted in Report 466, the influence of highway projects diminishes with successive improvements because each new improvement brings a successively smaller increase in accessibility. In addition, development in Newark, Bayonne, and Jersey City is shaped by zoning ordinances and other land use controls that influence the amount of land available for various uses, the densities permitted, and the costs of development. From discussions with planning and development agencies in these cities, it is unlikely that any of the cities would change zoning requirements because of the Program. Indeed, as demonstrated by the markedly increased development that has occurred in these cities in recent decades and that city and regional planners expect to continue well into the future, the cities are already highly attractive to residential and business development. Traffic growth on the NB-HCE between existing and future No-Build conditions is largely attributable to the cities' projected population and employment growth.

With respect to Travel Behavior Changes, the likely effect of travel cost (time) savings and improved reliability on auto-ownership and frequency of auto trip making from the Program is also extremely small when compared to the average annual cost of owning a vehicle which was estimated by the Bureau of Transportation Statistics to have been approximately $12,000 in 2023. The addition of NB-HCE tolls, including peak period pricing, to this average cost further supports the expectation of an extremely low travel cost effect on VMT because of the Program.

The Program will add approximately 21 lane-miles. This represents about 0.61% of the estimated 3,441 Freeway/Expressway and Principal Arterial lane-miles in the sub-regional model network or 0.31% of the estimated 6,711 total roadway lane-miles in the sub-regional (within I-287) model network, and further reinforces the expectation of an extremely small, induced travel effect from the Program.

It is noted that several studies have identified limitations of the research and results regarding the elasticity of the VMT relationship to lane-miles. These limitations include the following: the age of the research data (most is from periods prior to the early 2000s) and the research data not capturing recent trends, e.g., the effect of the COVID-19 pandemic and the rise of transportation network companies on travel behavior; the research reporting elasticities as an aggregate measure and not distinguishing route diversions which do not create new trips but simply redistribute existing trips; and the research not accounting for other factors that influence travel behavior such as traveler preferences that are not necessarily explained by economically driven ("rational") behavior.

There is evidence suggesting that VMT growth in New Jersey over roughly the past 20 years has been more a function of population growth than of highway lane-mile additions, reversing the previous trend. Between 1975 and roughly 2003, VMT growth in New Jersey (approximately 55%) outpaced road mileage growth (approximately 16%) statewide in New Jersey. Statewide population growth during this same period was approximately 17% (https://new-jersey.reaproject.org/analysis/comparative-indicators/growth_by_decade/population/). Meanwhile, Statewide VMT grew 9.7% between 2003 and 2019 (NJDOT, 2023), a level commensurate with the State's population growth of 10.4% between 2000 and 2020 (U.S. Census, 2020) suggesting that population growth has been the primary driver of VMT growth in the State for about the past 20 years rather than the continued addition of highway lane miles. These trends in New Jersey reflect those of the U.S., generally. Since approximately 2005, U.S. vehicle travel per person has not grown suggesting that the amount of travel on roads with newly increased capacity attributable to additional or longer induced trips is likely modest.

Northern New Jersey also saw a shift in the VMT trendline from the historic pattern of VMT growth far outpacing population and employment growth. This shift occurred at the time of the 2008-2009 great recession, after which VMT growth has tracked closely with population and employment growth. NJTPA projects that population growth in northern New Jersey will grow by 15% and VMT by 11% (NJTPA, 2021) representing a reversal in the pre-2008 trend.

This data suggests several points regarding VMT trends in northern New Jersey and statewide. Robust highway expansion continued in the State through the 1990s and into the early 2000s. Extensive additions to lane miles occurred from such notable projects as:

- Completion of I-287 between Montville and Suffern, New York in 1993 (added approximately 102 lane-miles).
- Construction of an additional lane on I-287 between Bedminster and Parsippany (originally for high-occupancy vehicles and converted to general purpose lanes in 1998; added approximately 54 lane-miles).
- Addition of one-lane in each direction on the New Jersey Turnpike between Interchanges 11 and 14 and increased capacity through the Southern Mixing Bowl between Interchanges 14 and 15E (added approximately 42 lane-miles).
- Completion of I-295 between US 130 in Bordentown and I-195/Route 29 in Trenton in 1994 (added approximately 18 lane-miles).

During this same period, numerous U.S. and State highway routes had capacity increases and grade separations, e.g. U.S. Routes 1/9 between the Tonnele Circle in Jersey City and the Ridgefield Circle, the completion of the NJ Route 21 Freeway in Passaic and Clifton, and the NJ Route 120 Improvement project in the Meadowlands, among others.

Despite these extensive capacity improvements, based on the rapid decline in VMT growth beginning in the early 2000s and exacerbated by the great recession there does not appear to have been a long-term increase in VMT attributable to the additional highway capacity constructed in the 1990s. More recent highway expansions, e.g., Garden State Parkway Exits 63-80 Widening (approximately 34 new lane-miles completed in 2011), New Jersey Turnpike Interchanges 6-9 Widening (approximately 140 new lane-miles completed in 2014), Garden State Parkway Exits 48-63 Widening (approximately 30 new lane-miles completed in 2014), and Garden State Parkway Exits 30-48 Widening (approximately 36 new lane-miles completed in 2018), do not appear to have had short-term or long-term effects on VMT growth trends in northern New Jersey or in the State as a whole.

One can infer that if there was a strong induced travel relationship (elasticity) between lane-mile additions and VMT growth in the State and Northern New Jersey prior to the great recession, that relationship appears to have greatly diminished. Rather, the recent trend and projected trend into the future is that VMT growth is primarily a function of population and employment growth.

3.7.5.2 Railroads and Other Roadways

Under the Proposed Action, there will be no discontinuance (elimination or abandonment) of railroads and other roadways crossed by the Proposed Action or otherwise in proximity to the Proposed Action. The only exception is the existing connector roadway between JFK Boulevard and Avenue C in Bayonne, essentially one block north of West 58th Street, from which point drivers can turn onto Avenue C or continue straight to enter NJ Route 440 southbound. Permanent elimination/closure of the connector roadway will be necessary to minimize the impact on NJ Route 440 and residential properties caused by the Project's addition of two new travel lanes in each direction on the NB-HCE between Interchanges 14 and 14A.

The following can be noted regarding existing traffic volumes and distributions.

- The Connector Ramp carries traffic volumes ranging between 190 and 240 vehicles per hour (vph) during the weekday commuter peak hours.

- Turning traffic from JFK Blvd. southbound accounts for approximately 85% of the total traffic on the Connector Ramp. Most of this traffic, ~~(~~approximately 69%,~~)~~ passes through the Avenue C intersection and continues onto NJ Route 440 southbound. Avenue C southbound is also a significant destination.

- Traffic turning from JFK Blvd. northbound is largely destined for either Route 440 southbound or Avenue C northbound.

The impact on traffic from eliminating the connector roadway will be minimal as there are numerous alternate roadway routes between JFK Boulevard and Avenue C to Route 440. Among the alternate routes for southbound traffic on JFK Boulevard that currently uses the connector roadway, estimated at approximately 200 vehicles in the 2050 AM peak hour, are West 63rd Street to NJ Route 440 Southbound, Pamrapo Avenue to Avenue C and NJ Route 440 southbound via Old Bergen Road and Merritt Street. Among the alternate routes for northbound traffic on JFK Boulevard that currently uses the connector roadway, estimated at 40 vehicles in the 2050 peak hour, are West 56th Street, West 54th Street, and West 53rd Street all of which connect JFK Boulevard and Avenue C.

While not relocated, the portion of West 58th Street near Avenue B will be permanently narrowed by the Proposed Action. The existing single one-way travel lane will be maintained. However, parking on both sides of the street for approximately 100 feet on each side of the roadway, or approximately 9 to 12 on-street parking spaces in total, will be eliminated. Reconnaissance of the affected area indicates that the capacity of on-street parking exceeds the demand for on-street parking, likely because many residential units in the area have off-street parking. Consequently, the elimination of the on-street parking is anticipated to have a minor adverse effect.

The analysis of local street traffic under the Proposed Action indicates minor changes in traffic volumes on local streets relative to the No Action. It is estimated that in 2050 that daily traffic volumes on approximately 65% of the roadway links (blocks) in the Newark local streets study area will be lower in the Proposed Action compared to the No Action, and that overall traffic volumes in the local streets study area will decrease. This overall decrease in traffic volumes in the Newark local streets study area under the Proposed Action can be explained by the diversion of a portion of regional traffic to the NB-HCE under the Proposed Action from such parallel routes as U.S. Route 1 and 9, which forms the eastern boundary of the Newark local streets study area. The roadway links that are estimated to have increased daily volumes, primarily on South Street and on Ferry Street, will have minor increases in daily traffic of approximately 5% or lower.

Meanwhile, it is estimated that in 2050 that daily traffic volumes on approximately 71% of the roadway links (blocks) in the Bayonne/Jersey City local streets study area will be lower with the Proposed Action compared to No Action, and that overall traffic volumes in the local streets study area will decrease. This overall decrease in traffic volumes in the Bayonne/Jersey City local streets study area under the Proposed Action can be explained by the diversion of a portion of regional traffic to the NB-HCE under the Proposed Action from such parallel routes as NJ Route 440. The roadway links that are estimated to have minor increased daily volumes, primarily on West 53rd Street between Avenue C and Broadway in Bayonne, on Avenue C between West 53rd Street and NJ Route 440 in Bayonne, and on Merritt Street between Old Bergen Road and Garfield Street in Jersey City, will have increases in daily traffic of between approximately 3% to 8%. The Proposed Action's design criteria provide for designing crossings of railroads and roadways to provide for existing horizontal and vertical clearances or relevant standards for clearance envelopes, including the following minimum vertical clearances of the new NB-HCE structures over the railroad and other roadways:

- 16 feet over the NJ Turnpike (I-95) Mainline roadways and ramps.
- 23 feet over Conrail's Garden State Secondary line track.
- 16 feet over Corbin Street, Doremus Avenue, and Warehouse Place in Newark, and over JFK Boulevard in Bayonne and Avenue C in Jersey City.
- 16 feet 6 inches over NJ Route 440 in Bayonne.
- 14 feet 6 inches over Garfield Avenue.
- 23 feet over Conrail National Docks Secondary tracks.
- 15 feet over NJT HBLR tracks.

For construction over the railroad and other roadways, temporary closures or outages on those crossings will be required for removing existing superstructure, erecting proposed steel, and placement and removal of shielding. Crossing-specific maintenance and protection of traffic plans will be developed to detail temporary

detours or other measures to be employed to minimize disruption and maintain traffic flow and safety during the construction activities affecting the crossing until railroad and roadway vehicular (automobile, trucks, and emergency vehicles), pedestrian, and bicycle traffic can be restored to full service, pre-construction conditions.

Coordination will occur with Conrail, NJDOT, NJ TRANSIT, Essex County, Hudson County, and the municipalities during Proposed Action design and prior to construction on the design of the Proposed Action on and in the vicinity of the infrastructure on measures to avoid or minimize adverse construction impacts.

3.7.5.3 Major Utilities

Table 3.7-14 lists utilities impacted by the Proposed Action.

Table 3.7-14. Impacts on Major Utilities along the NB-HCE between Interchanges 14 and 14A

Company	Facility	Impact
Penta	Bridge-Mounted Fiber Optic	Relocate 19,222 LF onto new NB-HCE structure
	Underground Fiber Optic	Relocate 500 LF west of new NB-HCE structure
ZAYO	Bridge-Mounted Fiber Optic	Relocate 3,425 LF onto new NB-HCE structure
	Bridge Mounted Cable TV	Relocate 16,706 LF to new NB-HCE structure
	Bridge Mounted Fiber Line	Relocate 16,744 LF to new NB-HCE viaduct
Colonial Pipeline	2" x 14" Liquified Petroleum Pipeline	Relocate 2 by 1,539 LF Liquified Petroleum Pipeline, Newark
Williams Companies, Inc.	2"x14" Fuel Pipeline	Avoid/Protect 400 LF at Interchange 14A
Verizon	Overhead Fiber	Relocate 392 LF to new utility poles at Corbin Street, Newark
		Relocate 168 LF to new utility poles at Doremus Avenue, Newark
PSE&G	Overhead Electric	Relocate 107 LF to new utility poles at Doremus Avenue, Newark
		Relocate 165 LF to new utility pole at Warehouse Place, Newark
		Relocate/Shift two utilities totaling 1,121 LF along West 58th Street, Bayonne
	Underground Electric	Avoid/Protect 205 LF at Interchange 14A
Bayonne Municipal Utilities Authority (BMUA)	Culvert over 30" Sanitary Force Main	Extend 25 LF of culvert and pipe crossing NB-HCE, Bayonne
	30" Sanitary Main	Relocate 471 LF crossing NB-HCE between Avenue B and Avenue C, Bayonne and Jersey City
	30" Water Pipe	Relocate 252 LF along West 58th Street, Bayonne
	8" Sewer Pipe	Relocate 152 LF along West 58th Street, Bayonne
	36" Sanitary Main	Avoid/Protect 245 LF at Interchange 14A
Comcast	Overhead Cable TV	Relocate 631 LF along West 58th Street, Bayonne
Passaic Valley Sewerage Commission (PVSC)	12' Sanitary Sewer	Avoid/Protect 240 LF at Interchange 14A

Source: WSP 2022
Key: LF = linear feet

In addition, Williams Companies' fuel line and two 16-inch gas mains of an unknown owner, all in Newark, will require protection during construction. Utility relocations should be completed in advance of construction to avoid or minimize adverse impacts. Coordination will occur with utility providers during Proposed Action

design and prior to construction on and in the vicinity of the infrastructure on measures to avoid or minimize adverse construction impacts.

3.7.5.4 Waterway Navigation and Ports

The main span of the replacement NBB structures over the 500-foot wide Federal Newark Bay North Reach channel will be approximately 800 feet. The replacement structures' piers and pier foundations will not encroach on the channel and will avoid an impact on the channel. Meanwhile, each of the structures will have minimum navigational clearances of 550 feet horizontal and 135 feet vertical.

There will be a need for temporary use of the channel by construction tugboats and barges. Such use will be coordinated with the USCG to minimize interference with navigation through the channel. Methods such as the use of cantilevered construction of the main spans and trestles outside the navigation channel to serve as platforms to construct the new NBB structures and demolish the existing structure should minimize the need for using tugboats and barges during construction once the trestles are in place.

The Proposed Action will not acquire port property nor interfere with goods movements by rail or roadway except for the temporary closures or detours during construction, as noted in Section 3.7.5. The Authority will coordinate with Conrail and port operators and tenants on the timing of the temporary closures and detours to minimize the impact on goods movement and customers.

By increasing the long-term capacity and improving traffic flow on the NB-HCE between Interchanges 14 and 14A, the Proposed Action complements the goals and objectives of the Port Master Plan 2050 (PANYNJ 2019) by improving the service reliability for an increased volume of containers and automobiles entering the port and shipped by truck from the growing Port Jersey PAMT to distribution centers along the NJ Turnpike (I-95) Mainline and I-78 in Pennsylvania.

3.7.5.5 Navigable Airspace

The maximum height of the replacement NBB structures will be at or below the EWR Runway 29 approach and departure paths no-exceed heights for each structure's respective locations.

FAA regulations, specifically, 14 CFR Part 77, establish that notification of construction or alteration in the vicinity of airports, including potential obstruction and lighting impacts, must be submitted 45 days prior to construction. Given the time required to conduct an aeronautical study, FAA recommends a 45- to 60-day advance notification to accommodate the extensive review process and allow timely issuance of the FAA determination letter. A completed FAA Form 7460-1, "Notice of Proposed Construction or Alteration" along with appropriate supplemental information was submitted to FAA for the Proposed Action. Based on its aeronautical studies, FAA determined that the structures do not exceed obstruction standards and would not be a hazard to air navigation (FAA 2023). The Authority will continue to coordinate with FAA prior to and during construction to make sure all FAA requirements for construction equipment placement and lighting are met.

3.7.6 Conclusion

Based on the preceding assessment, the Proposed Action will have no significant impact on traffic, transportation, or utilities.

Typical of highway capacity expansion projects, the Proposed Action (and the proposed NB-HCE Program) can be expected to create some level of induced travel. However, based on the analyses documented in Section 3.7.5, it can be concluded that the principal induced travel effect of the Proposed Action will manifest as diversions of trips that would otherwise occur from local streets and nearby parallel highway routes. Approximately 65 – 70 percent of local streets in the Newark, Bayonne and Jersey City study areas will

experience lower traffic volumes due to the Proposed Action. These estimated highway route diversions are included in the traffic impact analysis of the Proposed Action, as well as in the air quality impact analysis of the Proposed Action. Little to no induced travel is expected from induced land development, transit to auto mode shifts, or traveler behavior effects attributed to the Proposed Action.

Consequently, the congestion-relief benefit of the Proposed Action is not overstated. Because the VMT and mobile source air toxics analyses results reported for the Proposed Action capture the positive route diversion effects of the NB-HCE Program, those impacts are not understated. The expected limited effect of the Proposed Action on VMT (and air quality) is supported by the past roughly 20 years of VMT data in New Jersey as a whole and in Northern New Jersey, which indicates that VMT growth is strongly correlated to population growth and not to highway lane-mile additions, a trend that is expected to continue well into the future.

The following outlines the measures that the Authority will take to avoid or minimize impacts.

3.7.6.1 NB-HCE Traffic

As existing travel lane capacity on the NB-HCE will be maintained during construction, no mitigation will be necessary. Following construction, no mitigation is necessary on the NB-HCE or local roadways as the Proposed Action addresses rather than causes existing and future No Action congestion.

3.7.6.2 Railroads and Other Roadways

While no roadway, other than the Route 440/Avenue C connector from JFK Boulevard, or rail will be realigned or relocated by the Proposed Action, the Proposed Action will only cause temporary closures or outages while the existing NB-HCE crossing are demolished and replaced with new structures. The temporary closures and outages, as well as any detours, will be kept to the minimum duration necessary. Through coordination with Conrail, NJDOT, NJ TRANSIT, the counties, and municipalities on the schedule of closures and outages, and on any detour routes, the impacts are expected to be manageable, and no further mitigation is necessary. The Authority will continue coordination with Newark, Bayonne, and Jersey City on the potential effect of the Proposed Action on local streets and on measures, such as changes in signal timing or intersection striping, maintenance of traffic during construction, and other Traffic System Management (TSM) options to mitigate any potential localized impacts.

3.7.6.3 Major Utilities

The durations of temporary outages of utility service for those lines being relocated will be kept to the minimum necessary. Through coordination with utility providers on the schedule of outages the impacts are expected to be manageable, and no further mitigation is necessary.

3.7.6.4 Waterway Navigation and Ports

As noted in Section 3.7.5.4, construction methods will be employed to avoid or minimize interference with navigation in the Newark Bay North Reach during construction of the new NBB structures and demolition of the existing NBB. Conflicts between the navigation of vessels and construction work will be resolved through coordination by the Authority and the Coast Guard with vessel operators. Conditions placed on construction to accommodate navigation will be incorporated into construction contracts if needed. No further mitigation is necessary. As the replacement NBB structures avoid the channel and maintain the existing authorized clearances, no mitigation regarding the location or design of the new NBB structures is necessary.

3.7.6.5 Navigable Airspace

As noted in Section 3.7.5.5, the maximum height of the replacement NBB structures will be at or below the EWR Runway 29 approach and departure path no-exceed heights for each structure's respective locations.

Therefore, no mitigation of the location or design of the new NBB structures is necessary. Construction activities along the NBB that could impact EWR airspace and safety will be coordinated with FAA and any conditions on construction activities that result will be incorporated into construction contracts. No further mitigation is necessary.

Appendix 3.8

Air Quality

3.8 Air Quality

3.8.1 Study Area Definition and Data Collection

An air quality study was performed to ensure the Proposed Action conforms with regulations established under the Clean Air Act (CAA). Hot-spot analyses were performed for the NB-HCE corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) under 2050 No Action and 2050 Proposed Action Alternatives as well as at localized intersections (Port Street and Doremus Avenue, JFK Boulevard and 63rd Street, and JFK Boulevard and 57th Street) affected during the peak construction year of 2034.

The mobile source air toxics (MSAT) air quality study area for the Proposed Action includes the NB-HCE corridor as well as beyond the NB-HCE corridor to include roadways that would experience changes in traffic because of the overall proposed NB-HCE Program. The MSAT regional emissions inventory analysis includes specific roadways bound by the I-287 corridor, including the NB-HCE roadway. The roadways within the regional emissions inventory analysis includes roadways within the area bounded by I-287 in northern New Jersey within the NJRTM-E transportation model. The study area for the MSAT, therefore, includes all of Essex, Hudson, and Union Counties and portions of Middlesex, Somerset, Morris, Passaic, and Bergen Counties.

The Proposed Action will be constructed over a 12-year period, commencing in 2026 and ending in 2037. A General Conformity applicability analysis was performed for heaviest construction years for activities in Newark (Essex County), Jersey City and Bayonne (Hudson County) during calendar years 2033, 2034 and 2035. Construction-related emissions were estimated for all activities necessary to construct the Proposed Project and compared to *de minimis* thresholds.

3.8.2 Methodology and Criteria

3.8.2.1 Criteria Pollutants

The federal Clean Air Act (CAA) sets forth the framework and goals for improving air quality to protect public health and the environment. It requires the United States Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for the following 'criteria' pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with an aerodynamic diameter smaller than or equal to 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter smaller than or equal to 2.5 micrometers ($PM_{2.5}$), and lead (Pb). The current NAAQS are shown in Table 3.8-1. Units of measure for the standards are parts per million by volume, parts per billion by volume, or micrograms per cubic meter of air.

Table 3.8-1. National Ambient Air Quality Standards

Pollutant	Averaging Period	Primary Standard	Secondary Standard
Carbon Monoxide	1 hour 8 hour	35 ppm 9 ppm	- -
Ozone	8 hour	0.070 ppm	0.070 ppm
Nitrogen Dioxide	Annual 1 hour	53 ppb 100 ppb	53 ppb -
Lead	Rolling 3-month Average	0.15 µg/m^3	0.15 µg/m^3
Sulfur Dioxide	3 hour 1 hour	- 75 ppb	0.5 ppm -
Inhalable Particulates (PM_{10})	24 hour	150 µg/m^3	150 µg/m^3
Fine Particulates ($PM_{2.5}$)	24 hour Annual[1] Annual[2]	35 µg/m^3 12 µg/m^3 9 µg/m^3	35 µg/m^3 15 µg/m^3 15 µg/m^3

Source: EPA 2024

[1] 2012 annual $PM_{2.5}$ standard
[2] 2024 annual $PM_{2.5}$ standard

Key:
µg/m^3 – micrograms per cubic meter of air
ppb – parts per billion
ppm – parts per million

The NAAQS are divided into two types of criteria: primary standards, which are intended to protect the public health with an adequate margin of safety; and secondary standards, which are intended to protect the public welfare from any known or anticipated adverse effect of a pollutant (e.g., soiling, vegetation damage, material corrosion).

CO and $PM_{2.5}$ hot-spot analyses for 2050 No Action and 2050 Proposed Action Alternatives were performed for emissions resulting from the Project corridor, i.e., NB-HCE roadway and ramps between Interchange 14 and Interchange 14A. Hot-spot analyses are required per 93.109(e) because the Project lies in a CO and $PM_{2.5}$ maintenance area. In addition, CO, NO_2 and $PM_{2.5}$ hot-spot analyses were performed for the peak construction year (2034) at certain Project-affected intersections, specifically, those along haul routes with relatively high traffic volumes and in close proximity to residential areas, parks, and schools and in close proximity to construction staging areas. Emissions resulting from background traffic and construction-related vehicles were performed along approach/departure roadways and adjacent construction activities within 1,000 feet. Resultant concentrations for both the 2050 Project corridor and local intersections during 2034 construction period were compared to corresponding NAAQS.

Vehicle Emissions – Motor vehicle emissions for CO and $PM_{2.5}$ (including brake wear and tire wear), representing 2050 No Action and 2050 Proposed Action, were computed using EPA's Motor Vehicle Emission Simulator (MOVES) based on a Project-specific fleet mix and speed data for multiple roadway segments (links) on the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A). In addition, motor vehicle emissions for CO, NO_2 and $PM_{2.5}$ (including brake wear and tire wear) representing peak construction year (2034) were also computed using EPA's MOVES model based on Project-specific

vehicle counts and additional construction-related vehicles (worker vehicles, steel delivery trucks, dump trucks and cement trucks) necessary to construct the Project.

The MOVES model calculates emissions for various vehicle types based on the fuel type, vehicle speeds, vehicle age, road types, and various other factors that influence emissions, such as inspection and maintenance programs. The inputs and use of MOVES4 (version MOVES4.0.1; EPA, 2023a) incorporated the most current guidance available from EPA at the time the analysis was completed in 2024. MOVES4 incorporated the rule adopted by the USEPA on December 20, 2022 (EPA, 2022), that established revised emission standards for oxides of nitrogen, or NO_x, from medium- and heavy-duty on-highway engines. MOVES4 accounts for the reduction in emissions resulting from this rule regarding heavy-duty engines that contribute to ambient levels of ozone, particulate matter, NO_x, and carbon dioxide. EPA projects that by 2045, this final rule will result in a reduction of NO_x emissions from the in-use fleet of heavy-duty trucks by almost 50%. In addition, the MOVES4 database eliminates post-2007 heavy-duty vehicles with engines not meeting 2007 or 2010 emission standards in analyses for calendar years 2020 and later.

Among recent regulations anticipated to reduce mobile source emissions from the levels accounted for in this chapter is Advanced Clean Cars II (ACCII). On December 18, 2023, NJDEP adopted ACCII regulations for the State. ACC II sets the State on a path to lower vehicle emissions by setting gradually increasing sales targets beginning in 2027 so that every new light-duty vehicle sold in New Jersey will be a zero-emissions vehicle (ZEV) by 2035. NJDEP projects that all light duty vehicles registered in New Jersey in 2050 will be ZEVs resulting in cumulative reductions of over 26,000 tons of NO_x as well as substantial reductions in CO, $PM_{2.5}$, and other tailpipe emissions between 2024 and 2050. Many nearby states from which travel occurs on the NJ Turnpike system, including the NB-HCE, e.g., New York, Massachusetts, and Virginia, are also adopting ACC II and such widespread adoption of ACCII will lead to additional emissions reductions from vehicles from other states using the Turnpike system.

It is noted that the analysis documented in this chapter did not account for recently adopted State regulations (ACCII) that is expected to substantially reduce motor vehicle emissions in the future. Consequently, the actual air pollutant emissions and concentrations with adoption of these regulations are expected to be substantially lower than the air pollutant emission levels presented in this chapter.

The emissions modeling utilized county-specific data, including hourly meteorological data, provided by the NJTPA. To gain seasonally varying emissions, MOVES4 was executed for four months (January, April, July and October). All Project corridor roadways (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) included in the hot-spot analysis were assigned to urban restricted roadway type (Road Type 4). Roadways included in the hot-spot analysis at individual local intersections for the peak construction year were assigned to urban restricted roadway type (Road Type 4) and urban unrestricted roadway type (Road Type 5).

CO emission processes, such as running exhaust (Process ID 1) and crankcase running exhaust (Process ID 15), were calculated. The CO NAAQS is based on 1-hour and 8-hour averages, and therefore, the AM (7:00 AM – 8:00 AM) and PM (5:00 PM – 6:00 PM) peak traffic hour emissions were used for the CO hot-spot analysis associated with the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A). The CO hot-spot analyses performed for the peak construction year were based on the AM and PM peak traffic hour associated with each individual intersection. The annual NO_2 hot-spot analysis performed for the peak construction year was based on the running exhaust (Process ID 1) and crankcase running exhaust (Process ID 15) for the weekday AM and PM peak hour associated with each individual intersection as well as 12:00 PM – 1:00 PM, a representative midday hour, and 9:00 PM – 10:00 PM, a representative overnight hour.

$PM_{2.5}$ emission processes, such as running exhaust (Process ID 1) and crankcase running exhaust (Process ID 15), brake wear (Process ID 9) and tire wear (Process ID 10), were calculated in accordance with the USEPA's

Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas (EPA, 2021c), hereinafter referred to as EPA's 'PM Hot-spot Guidance'. For the $PM_{2.5}$ hot-spot analysis associated with the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A), MOVES4 was executed for a total of four weekday time periods, including an AM peak hour from 7:00 AM – 8:00 AM, a representative midday hour from 10:00 AM – 11:00 AM, a PM peak hour from 5:00 PM – 6:00 PM, and a representative overnight hour from 8:00 PM – 9:00 PM. The $PM_{2.5}$ hot-spot analysis performed for the peak construction year was based on the AM and PM peak hour associated with each individual intersection as well as 12:00 PM – 1:00 PM, a representative midday hour, and 9:00 PM – 10:00 PM, a representative overnight hour.

As detailed within EPA's PM Hot-spot Guidance, re-entrained road dust must be included within PM hot-spot analyses only if the EPA or state air agency has determined such emissions are a significant contributor to the $PM_{2.5}$ air quality issue in a nonattainment or maintenance area. NJDEP has determined that re-entrained road dust is not a significant contributor for the New Jersey portions of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia $PM_{2.5}$ nonattainment areas. As detailed within New Jersey's SIP (NJDEP, 2021d), re-entrained road dust is not included in the transportation conformity budget and therefore, is not necessary to be included within this air assessment.

Dispersion Model – The latest version of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD Version 23132) dispersion model (EPA, 2023b) was used to predict 1-hour and 8-hour concentrations of CO, annual NO_2 and 24-hour and annual concentrations of $PM_{2.5}$ for comparison to their respective NAAQS. Each roadway link was modeled as a line source within AERMOD, accounting for travel width plus a 10-foot mixing zone on either side of each link. A receptor grid at 25-meter spacing outside the mixing zone along areas of public access, as well as within Mercer Park in Jersey City, was generated to predict pollutant concentrations at a breathing height of 6 feet (1.8 meters). A receptor grid at 25-meter spacing was extended 105 meters outside the mixing zone and 100-meter spacing extended to the Project limits for the NO_2 and $PM_{2.5}$ analyses. CO, NO_2 and $PM_{2.5}$ analyses were also performed at a height approximately equivalent to second-story windows in Jersey City and Bayonne due to the elevated roadway structure through sections of the study area. The intersection of JFK Boulevard and 57th Street is located within 520 feet of the Woodrow Wilson Community School (101 W 56th Street) in Bayonne. Therefore, discrete ground-level and elevated receptors, representing classroom windows, were placed along the building perimeter of the school within CO, NO_2 and $PM_{2.5}$ hot-spot analyses for the JFK Boulevard and 57th Street intersection. Construction activities being performed within 1,000 feet of each intersection were also included within the modeling assessment.

Five consecutive years of National Weather Service surface meteorological data from Newark Liberty International Airport (2016 – 2020) and concurrent upper air data collected at Brookhaven, New York, were obtained from NJDEP and used within AERMOD for the Project analysis. Tier 2 Ambient Ratio Method Version 2 (ARM2) was invoked within AERMOD to assess the conversion of NO_x to NO_2, which uses the EPA polynomial equation to predict this ratio.

Analysis Years – The estimated year of opening the Proposed Action is 2037. Conservatively, CO and $PM_{2.5}$ hot-spot analyses for the No Action and Proposed Action Alternatives were performed for the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) based on the 2050 analysis year of the NJRTM-E. Additionally, CO, NO_2 and $PM_{2.5}$ hot-spot analyses were performed for 2034, representing the peak year of construction, as shown in Figure 3.8-1.

Traffic Volumes/Speeds – Traffic volumes and speeds utilized for the hot-spot CO and $PM_{2.5}$ analyses, representing the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) for year 2050 No Action and Proposed Action Alternatives and the CO, NO_2 and $PM_{2.5}$ hot-spot analyses representing peak construction year (2034) were provided using the NJRTM-E regional transportation model as applied to the Project's traffic analysis. The transportation model also used socioeconomic data from the

latest NJTPA demographic projections as well as development and redevelopment information obtained from the Jersey City Open Data Portal.

Analysis Locations – The CO and $PM_{2.5}$ hot-spot analyses for the Project corridor included roadway links along NB-HCE roadway and ramps between Interchange 14 and Interchange 14A. The CO, NO_2 and $PM_{2.5}$ hot-spot analyses for the peak construction year of 2034 were performed at three Project-affected intersections. Of the 15 project-affected intersections studied, the two highest volume intersections near a work/staging area are Port Street and Doremus Avenue and JFK Boulevard and 63rd Street (the JFK Boulevard and 63rd Street intersection is also near a residential area and a park). The closest Project-affected intersection near a school is JFK Boulevard and 57th Street. Therefore, the Project-affected intersections of Port Street and Doremus Avenue in Newark, JFK Boulevard and 63rd Street in Jersey City and Bayonne, and JFK Boulevard and 57th Street in Bayonne were chosen for analysis during the peak construction year (2034). Intersection volumes and a Level of Service (LOS) table are provided within Section C-1: Intersection Volumes and Peak Construction Year (2034) Level of Service Table in Appendix C: Air Quality.

Grade – The change in roadway elevation, represented as the grade for each link of the current and proposed NB-HCE roadway as well as local roadways were accounted for in emission calculations.

3.8.2.2 Mobile Source Air Toxics

The CAA also specifies a list of regulated hazardous air pollutants (HAPs) and establishes a regulatory framework to reduce emissions, and thus, reduce public exposure to HAPs. The most prevalent HAPs emitted from motor vehicles are referred to as mobile source air toxics (MSATs). Based on the FHWA Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA, 2023), federal agencies should use an interdisciplinary approach for actions that adversely impact the environment (42 USC 4332) within the planning and decision-making process. EPA has identified nine compounds primarily resulting from mobile sources that are cancer risk indicators. Priority MSATs include 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter (POM). The scientific methods to determine project-specific health effects resulting from MSAT exposure are limited at this time. However, FHWA has provided guidance to address MSATs in NEPA documents based on the type of project and the potential to result in meaningful differences in MSAT emissions between alternatives being considered. Projects that include either of the following are considered to have the potential to create meaningful differences in emissions by FHWA:

- Create or significantly alter a major intermodal freight facility with the potential to concentrate high levels of diesel particulate matter in a location.
- Create new capacity or add significant capacity to urban highways (e.g., interstates, urban arterials, urban collector-distributor routes) with projected Average Annual Daily Traffic volumes between 140,000 and 150,000 or greater by the design year.

Regional emissions inventory analyses were performed for the Proposed Action using procedures in the FHWA Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents and the EPA Air Toxic Emissions from Onroad Vehicles in the MOtor Vehicle Emission Simulator (EPA, 2020). The roadways within the regional emissions inventory analysis includes all roadway types within the area bounded by I-287 in northern New Jersey within the NJRTM-E transportation model. The study area for the MSAT analyses, therefore, includes all of Essex, Hudson, and Union Counties and portions of Middlesex, Somerset, Morris, Passaic, and Bergen Counties.

Regional emissions inventory analyses were conducted to compare MSAT emission quantities for the No Action and Proposed Action conditions in the 2050 analysis year. As stated in FHWA's guidance, 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter, ethylbenzene, formaldehyde, naphthalene, and POM are considered the priority MSATs and were included in the analysis.

Vehicle Emissions – Motor vehicle emissions for all MSAT pollutants in the regional analysis were computed using EPA's MOVES4 in a similar manner as the hot-spot analyses. Emissions modeling utilized county-specific data for roadways including urban restricted (Road Type 4) and urban unrestricted roadways (Road Type 5).

Analysis Years – For the purpose of this analysis, the estimated year of opening the Proposed Action is 2037. Conservatively, CO and $PM_{2.5}$ 2050 No Action and Proposed Action Alternatives regional emissions inventory analyses were performed based on the 2050 analysis year of the NJRTM-E.

Vehicle Miles Traveled/Speeds – Vehicle miles traveled (VMT) and speeds utilized for the regional emissions inventory analyses for year 2050 No Action and Proposed Action Alternatives were provided using the NJRTM-E (see Appendix B for details). The transportation model also used socioeconomic data from the latest NJTPA demographic projections as well as development and redevelopment information obtained from the Jersey City Open Data Portal. VMT and speed data tables are provided in Section C-2: 2050 No Action and 2050 Proposed Action Regional MSAT/ VMT/Speed Data Table in Appendix C: Air Quality.

Grade – Due to the numerous roadway links involved in the regional emissions inventory analysis, grade 0 was used for all roadways for year 2050 No Action and Proposed Action Alternatives.

A quantitative regional MSAT analysis was performed to determine whether the Proposed Action would result in meaningful differences (±10 percent) in MSAT emissions as compared with the No Action Alternative. Should meaningfully different MSAT emissions be predicted from the Proposed Action versus No Action comparison, mitigation options must be identified and considered.

3.8.2.3 General Conformity

The CAA requires federal agencies to ensure that proposed federal actions in nonattainment or maintenance areas conform (i.e., do not interfere) with the state's SIP to attain and maintain NAAQS. Federal actions, such as projects requiring federal permits, located in nonattainment and maintenance areas are subject to EPA's conformity regulations (40 CFR Parts 51 and 93), which ensure that emissions of air pollutants from planned federal actions would not affect the state's ability to meet the NAAQS. Section 176(c) of the CAA requires that federal actions conform to the purpose of the SIP, meaning that federal actions would not cause any violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestone.

The conformity requirements of the CAA and its regulations limit the ability of federal agencies to assist, fund, permit, and approve projects that do not conform to the applicable SIP. When subject to this regulation, the federal agency is responsible for demonstrating conformity for its proposed action. Conformity determinations for federal actions other than those related to transportation plans, programs, and projects that are developed, funded, or approved under title 23 U.S. Code (USC) (FHWA projects) or the Federal Transit Act at 49 USC 1601 et seq. (Federal Transit Administration [FTA] projects) must be made according to the federal general conformity regulations (40 CFR 93 Subpart B). The Proposed Action is not an FHWA or FTA project as defined by the regulation as no funding or other approvals from these agencies is necessary to implement the Proposed Action.

Approvals are, however, needed from two federal agencies, the USCG and the USACE, prior to construction. Issuance of these approvals, a Bridge Permit and Sections 404 and 408 Permits, respectively, constitute federal actions. Because the Proposed Action is located within an O_3 severe nonattainment and CO and $PM_{2.5}$ maintenance areas, it must be demonstrated that the Proposed Action conforms with New Jersey's SIP. Consequently, compliance with General Conformity requirements is necessary before the federal approvals can be issued.

Recognizing that most federal actions do not result in a substantial increase in emissions, EPA has established emissions thresholds below which a proposed federal action is deemed to conform and for which general conformity requirements are not applicable. These thresholds are commonly known as *de minimis* thresholds which are presented in Table 3.8-2. An applicability analysis is completed to determine whether a project is subject to General Conformity.

Certain actions and activities are exempted from general conformity review, including the following:

- Stationary source emissions regulated under major or minor New Source Review (air permitting) programs.
- Alteration and additions of existing structures as specifically required by new or existing applicable environmental legislation.
- Actions where the emissions are not reasonably foreseeable.
- Actions that have been defined by the federal agency or by the state as "presumed to conform."
- Activities with total direct or indirect emissions (not including stationary source emissions regulated under New Source Review programs) below *de minimis* levels.
- Emissions from construction activities are subject to air conformity review unless they are shown to be below the applicable *de minimis* levels.

Table 3.8-2. General Conformity Rule De Minimis Thresholds for the Proposed Action

Pollutant	De Minimis Thresholds (Tons/Year)
CO	100
NOx (O_3 Precursor)	25
VOC (O_3 Precursor)	25
$PM_{2.5}$	100

Source: 40 CFR Section 93.153(b)(1)

A proposed action would have a significant impact on air quality if "the action would cause pollutant concentrations to exceed one or more of the NAAQS, as established by the EPA under the CAA, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations."

General conformity regulations require an analysis of total direct and indirect emissions from the action and must reflect emission scenarios that are expected to occur under each of the following cases, as detailed within 40 CFR Section 93.159(d):

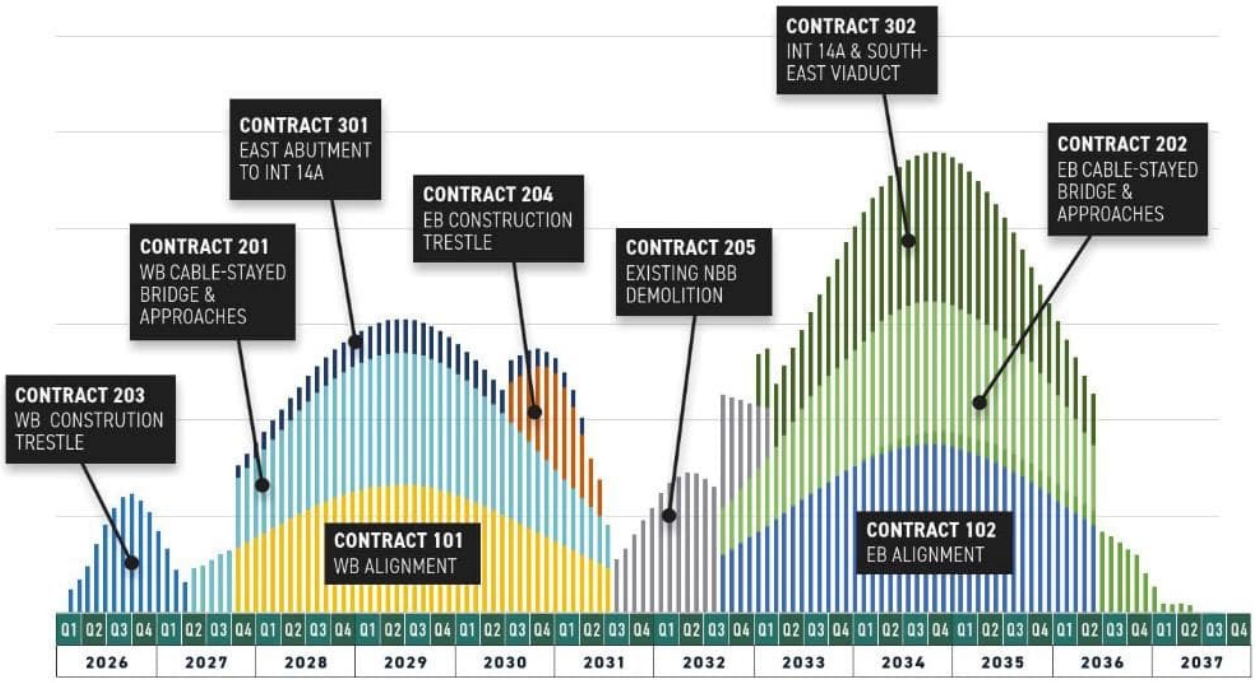
1. The Act mandated attainment year or, if applicable, the farthest year for which emissions are projected in the maintenance plan;
2. The year during which the total of direct and indirect emissions from the action is expected to be the greatest on an annual basis; and
3. Any year for which the applicable SIP specifies an emissions budget.

The latest proposed New Jersey SIP revision was submitted on June 6, 2024 for the required 2017 70 ppb 8-hour O_3 NAAQS attainment date of August 3, 2024 in its Northern New Jersey-New York-Connecticut (NJ-NY-CT) nonattainment area and its southern New Jersey-Pennsylvania-Delaware-Maryland (NJ-PA-DE-MD) nonattainment area, and addresses O_3 and precursors including NO_x and VOCs. The build year for the Proposed Action is 2037 and postdates the SIP required attainment date (2024). In addition, the SIP does not provide emission budgets (with the exception of McGuire Air Force Base and Lakehurst Naval Air Station).

Therefore, emission estimates for scenarios (1) and (3) are not required. However, since the Proposed Action will be constructed over multiple years, direct and indirect emissions would be greatest during the construction phase. Therefore, an assessment of construction-related annual emissions was performed and compared to *de minimis* thresholds.

Figure 3.8-1 presents the preliminary construction intensity schedule and concurrent construction activities over the 12-year construction period, assuming a 6-day work week. The proposed Project will initiate in 2026 with construction of the westbound temporary construction trestle and be completed in the second quarter of 2037 with completion of the eastbound cable-stayed bridge and approaches.

Figure 3.8-1. Preliminary Newark Bay Bridge Construction Intensity



Source: HNTB

Due to the large-scale and overlapping construction activities, a General Conformity applicability analysis was performed for the heaviest years of construction (e.g., 2033, 2034 and 2035). Table 3.8-3 presents the preliminary construction schedule for 2033, 2034 and 2035 by quarter. Table 3.8-4 presents the number of crews and workers estimated by analysis year. In addition, Table 3.8-5 presents the number of worker vehicles, steel delivery trucks, dump trucks and concrete trucks estimated by analysis year.

Table 3.8-3. Preliminary Proposed Action 2033, 2034 and 2035 Construction Schedule

Design Sec.		DS1											DS2														DS3									
Description		WB Alignment					EB Alignment					WB Construction Trestle		WB Cable Stay & Approaches				EB Construction Trestle		Demo Existing	EB Cable-Stay & Approaches				Abutment to 14A					Int 14A & SE Viaduct				
Major Activity		Demolition	Foundations	Substructure	Superstructure	Roadway	Demolition	Foundations	Substructure	Superstructure	Roadway	Foundations	Structure	Foundations	Substructure	Superstructure	Fender System	Foundations	Structure	Demolition	Foundations	Substructure	Superstructure	Fender System	Demolition	Foundations	Substructure	Superstructure	Roadway	Demolition	Foundations	Substructure	Superstructure	Roadway
2033	Q1						x				x									x	x									x				x
	Q2						x	x			x									x	x									x				x
	Q3						x	x			x										x	x								x	x			x
	Q4						x	x	x		x										x	x								x	x			x
2034	Q1						x	x	x		x										x	x	x							x	x	x		x
	Q2						x	x	x	x	x										x	x	x							x	x	x		x
	Q3						x	x	x	x	x										x	x	x							x	x	x	x	x
	Q4							x	x	x	x										x	x	x							x	x	x	x	x
2035	Q1							x	x	x	x										x	x	x								x	x	x	x
	Q2								x	x	x										x	x	x								x	x	x	x
	Q3								x	x	x											x	x									x	x	x
	Q4									x	x											x	x									x	x	x

Note: DS (Design Section) 1 = Contracts 101 & 102 (shown in the previous figure). DS2 = Contracts 201-205. DS3 = Contracts 301 & 302.

Table 3.8-4. Preliminary Proposed Action 2033, 2034 and 2035 Per Quarter Construction-Related Crew Type and Number of Workers

Construction Activity	2033 # Construction Crews / # Workers	2034 # Construction Crews / # Workers	2035 # Construction Crews / # Workers
Eastbound NB-HCE			
Crane Crews:	4/8 (Q1- Q4)	4/8 (Q1-Q4)	4/8 (Q1-Q4)
Demolition			
Excavation Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q3)	
Demolition Crews:	3/21 (Q1-Q4)	3/21 (Q1-Q3)	
Foundations			
Excavation Crews:	3/21 (Q2-Q4)	3/21 (Q1-Q4)	3/21 (Q1)
Drilled Shaft Crews:	3/15 (Q2-Q4)	3/15 (Q1-Q4)	3/15 (Q1)
Carpenter Crews:	2/10 (Q2-Q4)	2/10 (Q1-Q4)	2/10 (Q1)
Lather Crews:	2/10 (Q2-Q4)	2/10 (Q1-Q4)	2/10 (Q1)
Concrete Pour Crews:	2/14 (Q2-Q4)	2/14 (Q1-Q4)	2/14 (Q1)
Substructure			
Carpenter Crews:	2/10 (Q4)	2/10 (Q1-Q4)	2/10 (Q1-Q3)
Lather Crews:	2/10 (Q4)	2/10 (Q1-Q4)	2/10 (Q1-Q3)
Concrete Pour Crews:	2/14 (Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q3)
Superstructure			
Steel Erection Crews:		3/15 (Q2-Q4)	3/15 (Q1-Q4)
Carpenter Crews:		2/10 (Q2-Q4)	2/10 (Q1-Q4)
Lather Crews:		2/10 (Q2-Q4)	2/10 (Q1-Q4)
Concrete Pour Crews:		2/14 (Q2-Q4)	2/14 (Q1-Q4)
Roadway			
Excavation Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q4)
Asphalt Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q4)
Eastbound NB-HCE Cable-Stayed Bridge and Approaches			
Crane Crew:	4/12 (Q1-Q4)	4/12 (Q1-Q4)	4/12 (Q1-Q4)
Demolition			
Excavation Crews:	4/28 (Q1-Q2)		
Demolition Crews:	4/28 (Q1-Q2)		
Foundations			
Cofferdam Sheeting Crews:	2/10 (Q1-Q4)		
Excavation Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q2)
Drilled Shaft Crews:	6/30 (Q1-Q4)	6/30 (Q1-Q4)	6/30 (Q1-Q2)
Carpenter Crews:	4/20 (Q1-Q4)	4/20 (Q1-Q4)	4/20 (Q1-Q2)
Lather Crews:	4/20 (Q1-Q4)	4/20 (Q1-Q4)	4/20 (Q1-Q2)
Concrete Pour Crews:	4/28 (Q1-Q4)	3/21 (Q1-Q4)	3/21 (Q1-Q2)
Substructures			
Carpenter Crews:	4/20 (Q3-Q4)	4/20 (Q1-Q4)	4/20 (Q3-Q4)

Construction Activity	2033 # Construction Crews / # Workers	2034 # Construction Crews / # Workers	2035 # Construction Crews / # Workers
Lather Crews:	4/20 (Q3-Q4)	4/20 (Q1-Q4)	4/20 (Q3-Q4)
Concrete Pour Crews:	4/28 (Q3-Q4)	3/21 (Q1-Q4)	3/21 (Q3-Q4)
Superstructures			
Steel Erection Crews:		4/20 (Q1-Q4)	4/20 (Q1-Q4)
Carpenter Crews:		4/20 (Q1-Q4)	4/20 (Q1-Q4)
Lather Crews:		4/20 (Q1-Q4)	4/20 (Q1-Q4)
Concrete Pour Crews:		2/14 (Q1-Q4)	2/14 (Q1-Q4)
NB-HCE Interchange 14A and South-East Viaduct			
Crane Crews:	3/6 (Q1-Q4)	3/6 (Q1-Q4)	3/6 (Q1-Q4)
Demolition			
Excavation Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	
Demolition Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	
Foundations			
Excavation Crews:	2/14 (Q3-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q2)
Drilled Shaft Crews:	2/14 (Q3-Q4)	2/14 (Q1-Q4)	2/10 (Q1-Q2)
Carpenter Crews:	2/14 (Q3-Q4)	2/10 (Q1-Q4)	2/10 (Q1-Q2)
Lather Crews:	2/14 (Q3-Q4)	2/10 (Q1-Q4)	2/10 (Q1-Q2)
Concrete Pour Crews:	2/14 (Q3-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q2)
Substructure			
Carpenter Crews:		2/10 (Q1-Q4)	2/10 (Q1-Q4)
Lather Crews:		2/10 (Q1-Q4)	2/10 (Q1-Q4)
Concrete Pour Crews:		2/14 (Q1-Q4)	2/14 (Q1-Q4)
Superstructure			
Steel Erection Crews:		2/10 (Q3-Q4)	2/10 (Q1-Q4)
Carpenter Crews:		2/10 (Q3-Q4)	2/10 (Q1-Q4)
Lather Crews:		2/10 (Q3-Q4)	2/10 (Q1-Q4)
Concrete Pour Crews:		2/14 (Q3-Q4)	2/14 (Q1-Q4)
Roadway:			
Excavation Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q4)
Asphalt Crews:	2/14 (Q1-Q4)	2/14 (Q1-Q4)	2/14 (Q1-Q4)
Total Workers	1700	2540	1780

Source: HNTB

Table 3.8-5. Preliminary Proposed Action Construction-Related Daily Vehicles (per quarter)

Vehicle Type	2033 Project-Related Vehicles				2034 Project-Related Vehicles				2035 Project-Related Vehicles			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Worker Vehicles*	187	228	270	290	340	369	395	375	323	282	222	202
Steel Delivery Trucks	1	2	3	4	5	6	7	7	7	6	5	4
Dump Trucks	15	17	15	15	15	15	15	12	9	7	3	3
Concrete Trucks	6	8	13	14	20	23	25	25	25	23	16	15

Note: * -- Two contractors per vehicle.
Source: HNTB

The air quality assessment was accomplished using the latest version of models and databases for evaluating Project effects on air quality. To address General Conformity, emission inventories were estimated for construction of the Proposed Action as representing the peak three years of construction activities. Detailed information regarding computer modeling methodologies and data input are presented below.

Air Emissions – Emission rates representing passenger trucks (worker vehicles), single-unit short-haul trucks (dump and concrete trucks) and combination short-haul trucks (steel delivery trucks) were computed using EPA's MOVES4 model for each analysis year. Emissions modeling utilized county-specific data provided by NJTPA. Emission rates were developed for passenger trucks (source type ID 31), single-unit short-haul trucks (source type ID 52) and combination short-haul trucks (source type ID 61) traveling on urban restricted (road type ID 4) and urban unrestricted roadways (road type ID 5). It was assumed that two contractors would travel within each passenger truck and Project-related trucks (steel delivery trucks, dump trucks, concrete trucks) would travel 30 miles each way to the site daily and 0.5 miles while on-site. In addition, due to the nature of cement truck operations, the analysis assumed each cement truck would operate on-site for an hour each. Since no overnight construction activities are expected to construct the Proposed Action, emissions were estimated based on an 8-hour workday (7:00 AM to 3:00 PM). MOVES4 emissions were evaluated for January, April, July, and October to represent four seasons per analysis year and a six-day work week was assumed.

As previously discussed, the study area is designated by the EPA as a severe nonattainment area for O_3 and maintenance for CO and $PM_{2.5}$. Therefore, pollutants of concern are CO, PM_{10}, $PM_{2.5}$, and O_3 precursors (oxides of nitrogen [NO_x] and VOCs). Nonroad emissions were also computed using EPA's MOVES4, which incorporates NONROAD2008a (NONROAD). The model was executed for the 2033, 2034 and 2035 construction analysis years for both construction and commercial equipment categories assuming diesel-powered equipment. In addition, since construction is being conducted in both Essex and Hudson counties, the maximum emission by vehicle/equipment was used for modeling purposes.

A Project commitment by the Authority has been incorporated to utilize equipment meeting EPA Tier 4 engine emission standards equal to or greater than 100 hp. A list of assumed equipment and associated horsepower by construction crew over the 2033, 2034 and 2035 years are provided within Section C-3: 2033, 2034 and 2035 Construction Equipment Tables in Appendix C: Air Quality.

Engine Load – Equipment types and reasonable equipment quantities likely to be used were identified. NONROAD provided emission rates for each equipment type by most reasonable horsepower. Equipment load factors, by equipment type, were obtained using guidance within EPA's Median Life, Annual Activity, and

Load Factor Values for Nonroad Engine Emissions Modeling (EPA, 2010). A list of assumed equipment horsepower and engine load factors associated with each construction crew over the 2033, 2034 and 2035 years are provided within Section C-3: 2033, 2034 and 2035 Construction Equipment Tables and Section C-8: 2033, 2034 & 2035 General Conformity Applicability Analysis Tables in Appendix C: Air Quality.

Fugitive Dust – Construction-related fugitive dust emission rates were calculated based on EPA's AP-42, Compilation of Air Pollutant Emissions Factors, Fifth Edition (EPA, 2021). According to EPA's AP-42 guidance, a fugitive dust PM_{10} emission factor of 1.2 tons per acre disturbed per month during construction and demolition activities was used. Conservatively, 25 percent of the Project area was assumed to be disturbed per month and a 75 percent dust control efficiency through daily watering was also assumed.

Construction Crew Size – Each construction crew was assumed to operate with varying number of workers, depending on the Project element. Table 3.8-4 details the number of crews and workers assumed for each Project element over calendar years 2033, 2034 and 2035.

Marine Vessels – Construction activities over Newark Bay were assumed to require two forms of marine vessels: tugboat (1559 kilowatts [kW]) and barge with auxiliary engine (622 kW). Emissions were obtained based on the EPA's Ports Emission Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions (EPA, 2022a). Marine vessels were assumed to be necessary to transport materials and equipment for construction activities over Newark Bay. Two tug boats and two barges with one auxiliary engine each were assumed to operate two hours per day, in all quarters, of calendar years 2033, 2034 and 2035.

The resulting calculated emissions of nonattainment or maintenance pollutants are compared to the applicable *de minimis* thresholds to assess whether a more detailed emissions analysis is warranted under the General Conformity Regulations.

3.8.2.5 Transportation Conformity

The Transportation Conformity Regulation was promulgated by EPA under the CAA and requires states to develop state-specific criteria and procedures for determining the conformity of transportation investments with the applicable SIP. The criteria and procedures apply both to FHWA and FTA projects and to certain transportation projects that are not FHWA or FTA projects, such as regionally significant projects. The Proposed Action meets the definition of a regionally significant project under the regulation because it is on a facility that serves regional transportation needs. Therefore, it must be demonstrated that the Proposed Action meets applicable Transportation Conformity Regulation criteria and procedures. Specifically, it must be included in the regional emissions analysis of a conforming regional long-range TIP of the pertinent MPO, in this case NJTPA.

3.8.3 Existing Conditions

3.8.3.1 Criteria Pollutants

NJDEP provides air quality monitoring throughout the State; however, not all pollutants are monitored at each location. To determine which NJDEP monitoring station would best represent existing conditions within the study area, a 20-year wind rose was calculated for the closest NOAA meteorological station (Newark Liberty International Airport). Based on the wind rose provided within Section C-4: 20-Year Newark Liberty International Airport Wind Rose in Appendix C: Air Quality, the most conservative NJDEP monitoring stations for the Proposed Action are located at 2828 John F. Kennedy Boulevard in Jersey City which monitors CO, NO_2, SO_2, Veterans Park in Bayonne which monitors O_3, and the Jersey City Firehouse at 355 Newark Avenue in Jersey City which monitors PM_{10} and $PM_{2.5}$. It is important to note that the only lead (Pb) monitoring station in New Jersey was discontinued in September 2022. 2023 air measurement data representative of existing conditions are presented in Table 3.8-6.

Table 3.8-6. Existing Ambient Air Quality Monitoring Data

Pollutant	Averaging Period	Concentration
CO	1-hour 8-hour	2.7 ppm 2.4 ppm
O_3	8-hour	0.068 ppm
NO_2	Annual 1-hour	19 ppb 60 ppb
Pb	3 months	NA
SO_2	1-hour	3.3 ppb
PM_{10}	24-hour	41 µg/m^3
$PM_{2.5}$	24-hour Annual	27.7 µg/m^3 8.6 µg/m^3

Source: NJDEP, Luis Lim email, October 2, 2024.

NAAQS Compliance Notes:

CO compliance is based on second-highest maximum value.
O_3 compliance is based on the three-year average value of the fourth-highest maximum eight-hour concentration.
NO_2 compliance is based on a three-year average of the 98th percentile of daily maximum one-hour average concentrations.
Pb compliance is based on the maximum rolling three-month average over a three-year period.
SO_2 compliance is based on a three-year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations.
PM_{10} compliance is based on the second highest annual average over a three-year period.
$PM_{2.5}$ compliance is based on the 98th percentile 24-hour concentration averaged over three years. The annual $PM_{2.5}$ compliance is based on the average of three consecutive annual means.
NA – Data unavailable

The CAA, as amended in 1990, defines regions that have been designated as not meeting one or more of the NAAQS. Areas with measured air quality concentrations lower than a given NAAQS are designated 'attainment' for that standard. Areas that exceed the NAAQS are designated 'nonattainment'. An area can be designated 'attainment' for one pollutant and 'nonattainment' for others. Areas that previously did not meet one of the NAAQS but have since attained the standard are subject to a SIP for air quality 'maintenance.' Such areas are commonly referred to as 'maintenance areas.' Maintenance areas can also be classified as attainment, maintenance, or nonattainment for other pollutants. The Proposed Action is located within Essex and Hudson Counties, both of which are designated attainment for NO_2, Pb, SO_2, and PM_{10}, serious nonattainment for O_3, and maintenance for CO and $PM_{2.5}$.

Essex and Hudson Counties are part of the Ozone Transport Region classified as 'New York-North New Jersey-Long Island, NY-NJ-CT'. This area is designated as being in moderate nonattainment for the 1997 8-hour O_3 NAAQS of 0.080 ppm. This area is also designated as being in severe nonattainment for the 2008 8-hour O_3 NAAQS of 0.075 ppm, which requires this area to meet the standard by 2027. In addition, this area is designated as being in moderate nonattainment for the 2015 8-hour O_3 NAAQS of 0.070 ppm, which requires this area to meet the standard in 2024. Since meeting the milestone is unlikely, this area may be designated as being in serious nonattainment for the 2015 8-hour O_3 NAAQS of 0.070 ppm, which will require this area to meet the standard by 2027.

This area is designated as being in maintenance for the 1971 1-hr and 8-hr CO NAAQS of 35 ppm and 9 ppm, respectively. The area is also designated as being in maintenance for the 2006 24-hour $PM_{2.5}$ NAAQS of 35 µg/m^3. This area is designated as being in attainment for the 1997 annual $PM_{2.5}$ NAAQS of 15 µg/m^3 and 2012 annual $PM_{2.5}$ NAAQS of 12 µg/m^3. EPA lowered the annual $PM_{2.5}$ NAAAQS to 9 µg/m^3 in 2024; however,

EPA has not yet completed the formal designation process for identifying nonattainment areas under this new standard.

Criteria pollutant design values are used to describe the air quality status of an area, relative to the NAAQS. EPA's design values are published annually by the EPA to designate and classify nonattainment areas and assess progress towards meeting the NAAQS. When determining compliance of a Proposed Action with the applicable NAAQS, the receptor with the highest modeled concentration is added to the applicable background concentration (background design value) to account for nearby sources not included within the air quality dispersion model. This total concentration is subsequently compared to the applicable NAAQS. The closest and most conservative NJDEP CO and NO_2 monitors are located on the roof of 2828 John F. Kennedy Boulevard, Jersey City. The closest and most conservative NJDEP $PM_{2.5}$ monitor is located on the roof of the Jersey City Firehouse at 355 Newark Avenue, Jersey City.

Hot-spot analyses were performed for the 2050 Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) and the peak construction year of 2034. Ambient design values added to modeled Project-related concentrations to determine compliance of the Proposed Action with the NAAQS are summarized in Table 3.8-7.

Table 3.8-7. *Existing Ambient Air Quality CO, NO_2, and $PM_{2.5}$ Design Values (Jersey City, NJ)*

Pollutant	Averaging Period	Design Value
CO	1-hour 8-hour	3.7 ppm 2.40 ppm
NO_2	Annual	19 ppb
$PM_{2.5}$	24-hour Annual	21.0 µg/m^3 7.8 µg/m^3

Source: EPA 2023 Design Value Reports.

NAAQS Compliance Notes:

CO compliance is based on second-highest maximum value.

NO_2 compliance is based on highest annual arithmetic average over three years.

$PM_{2.5}$ compliance is based on the 98th percentile 24-hour concentration averaged over three years.

Annual $PM_{2.5}$ compliance is based on the average of three consecutive annual means.

3.8.4 No Action Alternative

The results of the analyses of the No Action Alternative conditions for CO and $PM_{2.5}$ hot-spot, MSATs and regional emissions for the Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A) are presented in Section 3.8.5 through comparison with the Proposed Action condition.

Other projects in close geographic proximity to the Proposed Action have construction schedules that overlap to a certain extent with that of the Proposed Action. The identified projects include the following:

- The rehabilitation of certain bridges throughout the limits of the NB-HCE in Jersey City between Interchanges 14A and the eastern terminus at Jersey Avenue (construction is anticipated between September 2024 and December 2027).
- The Authority's proposed NB-HCE Improvements Program east of Interchanges 14A in Jersey City includes projects with independent environmental approvals and stakeholder engagement for which construction is scheduled to commence in the 2030s, including:

  - The Interchanges 14A to 14B Improvements Project (construction timeline is uncertain at this time).
  - The Interchanges 14B to Columbus Drive Improvements Project (construction timeline is uncertain at this time).
  - The Columbus Drive to Jersey Avenue Improvements Project, the second priority project of the Program with construction estimated to commence in 2031.
- The Port Authority of New York & New Jersey's Port Street Improvement Project, Newark (currently underway and scheduled for completion in 2028).
- The U.S. Army Corps of Engineers' New York and New Jersey Harbor Deepening and Channel Improvements (scheduled to occur between 2024 and 2040).
- The USEPA's Diamond Akali Superfund Site Operable Unit 3 (Newark Bay Study Area) Cleanup (the cleanup schedule is anticipated to be identified in 2025; however, EPA has indicated to the Authority that while it expects there will eventually be cleanup activity in the vicinity of the Newark Bay Bridge, the cleanup will be scheduled to avoid overlap with the Newark Bay Bridge reconstruction).

Of these projects, the NB-HCE rehabilitation of bridges project east of Interchange 14A and the Port Street Project, which parallels the NB-HCE between Interchange 14 and Doremus Avenue, are in closest geographic proximity to the Proposed Action. However, these projects are expected to be substantially complete by the time of the start of construction of the Proposed Action and be completed well before the peak years of the Proposed Action's construction: 2033 to 2035. The Authority has been coordinating with the Port Authority of New York and New Jersey to minimize impacts of the Port Street Project and the Proposed Action on each other.

Except for the Interchanges 14A to 14B Improvements and Interchange 14B to Columbus Drive Improvements projects, whose construction timing is uncertain currently, the other projects are between 0.70 and 2.75 miles away from the Proposed Action at their closest points. It is expected that some of these projects could use portions of haul routes anticipated to be used during construction of the Proposed Action, specifically, the NB-HCE, NJ Route 440, and U.S Truck Route 1/9. The exact timing and volume of truck hauling by the other projects relative to the Proposed Action cannot be determined. However, by maintaining two travel lanes in each direction during construction, the Proposed Action will minimize impacts of that portion of the truck hauling by the other projects that may occur on the NB-HCE.

The EA has been updated to identify the numerous initiatives, being undertaken by the Authority to reduce emissions from its facilities and from the vehicles that use its roadways, e.g., emissions reductions from such energy efficiency measures as building management systems, using LEED standards in the design of new buildings, transition to LED roadway and facilities' lighting, adding hybrid and electric vehicles to the Authority's fleet, and establishing EV charging stations in Turnpike and Parkway Service Areas.

3.8.5 Proposed Action Alternative

3.8.5.1 Impacts

2050 Project Corridor CO Hot-Spot Analysis. Based on modeling results of the entire Project corridor (NB-HCE roadway and ramps between Interchange 14 and Interchange 14A), peak concentrations of CO would occur closest to the NB-HCE. A receptor grid of 25 meter spacing was utilized within AERMOD for all publicly accessible areas throughout the Project corridor. Table 3.8-8 summarizes maximum modeled and total concentrations for CO compliance determination. Based on modeling results, there are no predicted exceedances of the 1-hour or 8-hour CO NAAQS. 2050 No Action and 2050 Proposed Action hot-spot assessment result spreadsheets and receptor figure detailing the peak concentration location for the Project corridor are provided within Section C-5: 2050 No Action and 2050 Proposed Action Hot-Spot Assessment Results (Project Corridor) in Appendix C: Air Quality.

Table 3.8-8. 2050 Project Corridor CO Hot-Spot Assessment Results

CO Averaging Period	2050 No Action		2050 Proposed Action		NAAQS (ppm)	Exceedance YES/NO
	Maximum Modeled Concentration (ppm)	Total Concentration[1] (ppm)	Maximum Modeled Concentration (ppm)	Total Concentration[1] (ppm)		
1-hour	0.42	4.12	0.45	4.15	35	NO
8-hour	0.19	2.59	0.20	2.60	9	NO

Source: Paul Carpenter Associates, Inc.

Note:

[1] – Total concentrations were calculated assuming a 1-hour CO background concentration of 3.70 ppm and an 8-hour CO background concentration of 2.40 ppm, as detailed within Table 3.8-7. A NAAQS exceedance is determined based on total concentration (background plus modeled concentration) if it is greater than the applicable NAAQS. The estimated values in the table and the extent of the difference between Proposed Action and No Action are conservative as the analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

2050 Project Corridor $PM_{2.5}$ Hot-Spot Analysis. Based on modeling results of the NB-HCE within Project limits, peak concentrations of $PM_{2.5}$ would occur closest to the NB-HCE. A receptor grid of 25 meter spacing was utilized within AERMOD for all publicly accessible areas throughout the Project corridor. Table 3.8-9 summarizes maximum modeled and total concentrations for $PM_{2.5}$ NAAQS compliance determination. There are no predicted exceedances of the 24-hour $PM_{2.5}$ NAAQS. Although EPA has lowered the annual $PM_{2.5}$ NAAQS from 12 µg/m^3 to 9 µg/m^3 in 2024, local conformity requirements for Essex and Hudson Counties with respect to the 2012 annual $PM_{2.5}$ NAAAQS of 12 µg/m^3 would still apply, due to this area's maintenance status. EPA will designate areas under the 9 µg/m^3 NAAQS at a later date. However, the predicted annual $PM_{2.5}$ concentrations under both 2050 No Action and 2050 Proposed Action conditions are both below the 2012 annual $PM_{2.5}$ NAAQS of 12 µg/m^3 and the 2024 lowered annual $PM_{2.5}$ NAAQS of 9 µg/m^3. NAAQS 2050 No Action and 2050 Proposed Action $PM_{2.5}$ hot-spot assessment result spreadsheets and a receptor figure detailing the peak concentration location for the Project corridor are provided within Section C-5: 2050 No Action and 2050 Proposed Action Hot-Spot Assessment Results (Project Corridor) in Appendix C: Air Quality.

Table 3.8-9. 2050 Project Corridor $PM_{2.5}$ Hot-Spot Assessment Results

$PM_{2.5}$ Averaging Period	2050 No Action		2050 Proposed Action		NAAQS (µg/m^3)	Exceedance YES/NO
	Maximum Modeled Concentration (µg/m^3)	Total Concentration[3] (µg/m^3)	Maximum Modeled Concentration (µg/m^3)	Total Concentration[3] (µg/m^3)		
24-hour	2.07	23.07	2.37	23.37	35	NO
Annual[1]	0.83	8.63	0.93	8.73	12	NO
Annual[2]	0.83	8.63	0.93	8.73	9	NO

Source: Paul Carpenter Associates, Inc.

Notes:

[1] – 2012 annual $PM_{2.5}$ standard

[2] – 2024 annual $PM_{2.5}$ standard

[3] – Total concentrations were calculated assuming a 24-hour PM2.5 background concentration of 21.0 µg/m^3 and an annual $PM_{2.5}$ background concentration of 7.8 µg/m^3, as detailed within Table 3.8-7. A NAAQS exceedance is determined

based on total concentration (background plus modeled concentration) if it is greater than the applicable NAAQS. The estimated values in the table and the extent of the difference between Proposed Action and No Action are conservative as the analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

The similarity of the maximum modeled concentrations between the No Action and Proposed Action scenarios for both CO and $PM_{2.5}$ is essentially a function of traffic volumes flowing at congested speeds on the NB-HCE under the No Action Scenario, vs. a higher traffic volume attributed to diversions of traffic from other roadways to the NB-HCE operating at stable flow speed under the Proposed Action scenario. In effect, these factors essentially offset one another resulting in the similarity of the maximum modeled concentrations between the Proposed Action and No Action scenarios.

2034 Construction-Related CO Hot-Spot Analysis. Based on modeling results of the three Project-affected intersections during peak construction year (2034) and concurrent construction activities, peak concentrations of CO would generally occur closest to each individual intersection. Specifically:

- The peak 1-hour and 8-hour CO concentrations at the Port Street and Doremus Avenue intersection are located along the Doremus Avenue public sidewalk, north of the intersection and adjacent to the elevated NB-HCE.
- The peak 1-hour CO concentration at the JFK Boulevard and 63rd Street intersection is located along the 63rd Street public sidewalk, while the peak 8-hour CO concentration is located along the JFK Boulevard public sidewalk, south of the intersection and adjacent to construction work areas in the vicinity of the NB-HCE.
- Both peak 1-hour and 8-hour CO concentrations at the JFK Boulevard and 57th Street intersection are located along JFK Boulevard public sidewalks, north of 57th Street and adjacent to construction work areas in the vicinity of NB-HCE.

Table 3.8-10 summarizes maximum modeled and total concentrations for CO compliance determination. Based on modeling results, there are no predicted exceedances of the 1-hour or 8-hour CO NAAQS. 2034 construction-related hot-spot assessment result spreadsheets and a receptor figure detailing the peak concentration location for each intersection are provided in within Section C-6: Peak Construction Year (2034) Results Tables in Appendix C: Air Quality.

2034 Construction-Related NO_2 Hot-Spot Analysis. Based on modeling results of the three Project-affected intersections during peak construction year (2034) and concurrent construction activities, peak annual concentrations of NO_2 would generally occur closest to each individual intersection. Specifically:

- The peak annual NO_2 concentration at the Port Street and Doremus Avenue intersection is located along the Doremus Avenue public sidewalk, north of the intersection and adjacent to the NB-HCE.
- The peak annual NO_2 concentration is located at the intersection of JFK Boulevard and 63rd Street along the public sidewalk.
- The peak annual NO_2 concentration is located along the JFK Boulevard public sidewalk, north of the JFK Boulevard and 57th Street intersection and adjacent to construction work areas in the vicinity of NB-HCE.

Table 3.8-10. 2034 Construction-Related CO Hot-Spot Assessment Results

Intersection	Peak Construction Year (2034)			NAAQS (ppm)	Exceedance YES/NO
	Period	Maximum Modeled Concentration (ppm)	Total Concentration[1] (ppm)		
Port Street & Doremus Avenue	1-hour	0.82	4.52	35	NO
	8-hour	0.50	2.90	9	NO
JFK Boulevard & 63rd Street	1-hour	0.58	4.28	35	NO
	8-hour	0.31	2.71	9	NO
JFK Boulevard & 57th Street	1-hour	0.93	4.63	35	NO
	8-hour	0.46	2.86	9	NO

Source: Paul Carpenter Associates, Inc.

Note:

[1] – Total concentrations were calculated assuming a 1-hour CO background concentration of 3.70 ppm and an 8-hour CO background concentration of 2.40 ppm, as detailed within Table 3.8-7. A NAAQS exceedance is determined based on total concentration (background plus modeled concentration) if it is greater than the applicable NAAQS. The estimated values in the table are conservative as the analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

Table 3.8-11 summarizes maximum modeled and total concentrations for annual NO_2 compliance determination. Based on modeling results, there are no predicted exceedances of the annual NO_2 NAAQS. 2034 construction-related hot-spot assessment result spreadsheets and a figure detailing the peak concentration location for each intersection are provided within Section C-6: *Peak Construction Year (2034) Results Tables* in Appendix C: Air Quality.

Table 3.8-11. 2034 Construction-Related NO_2 Hot-Spot Assessment Results

Intersection	Peak Construction Year (2034)			NAAQS (ppb)	Exceedance YES/NO
	Period	Maximum Modeled Concentration (ppb)	Total Concentration[1] (ppb)		
Port Street & Doremus Avenue	Annual	1.14	20.14	53	NO
JFK Boulevard & 63rd Street	Annual	0.69	19.69	53	NO
JFK Boulevard & 57th Street	Annual	1.21	20.21	53	NO

Source: Paul Carpenter Associates, Inc.

Note:

[1] – Total concentrations were calculated assuming an annual NO_2 background concentration of 19.0 ppb, as detailed within Table 3.8-7. A NAAQS exceedance is determined based on total concentration (background plus modeled concentration) if it is greater than the applicable NAAQS. The estimated values in the table are conservative as the analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

2034 Construction-Related $PM_{2.5}$ Hot-Spot Analysis. Based on modeling results of the NB-HCE within Project limits, peak concentrations of $PM_{2.5}$ would generally occur closest to the NB-HCE along publicly accessible areas. Specifically,

- Both peak 24-hour and annual $PM_{2.5}$ concentrations are located within a publicly accessible area along Port Street, adjacent to concurrent construction activities just west of the Port Street and Doremus Avenue intersection.
- Peak 24-hour and annual $PM_{2.5}$ concentrations are located at the intersection of JFK Boulevard and 63rd Street along the public sidewalk.
- The peak 24-hour and annual $PM_{2.5}$ concentrations at the intersection of JFK Boulevard and 57th Street are located within a publicly accessible area south of the NB-HCE and adjacent concurrent activities.

Table 3.8-12 summarizes maximum modeled and total concentrations for $PM_{2.5}$ NAAQS compliance determination. There are no predicted exceedances of the 24-hour $PM_{2.5}$ NAAQS. Although EPA has lowered the annual $PM_{2.5}$ NAAQS from 12 µg/m³ to 9 µg/m³ in 2024, local conformity requirements for Essex and Hudson Counties with respect to the 2012 annual $PM_{2.5}$ NAAAQS of 12 µg/m³ would still apply, due to this area's maintenance status. EPA will designate areas under the 9 µg/m³ NAAQS at a later date. However, the predicted annual $PM_{2.5}$ concentrations under both 2050 No Action and 2050 Proposed Action conditions are both below the 2012 annual $PM_{2.5}$ NAAQS of 12 µg/m³ and the 2024 lowered annual $PM_{2.5}$ NAAQS of 9 µg/m³. NAAQS 2050 No Action and 2050 Proposed Action $PM_{2.5}$ hot-spot assessment result spreadsheets and a figure detailing the peak concentration location for each intersection are provided within Section C-6: Peak Construction Year (2034) Results Tables in Appendix C: Air Quality.

Table 3.8-12. 2034 Construction-Related $PM_{2.5}$ Hot-Spot Assessment Results

Intersection	Peak Construction Year (2034)			NAAQS (µg/m³)	Exceedance YES/NO
	Period	Maximum Modeled Concentration (µg/m³)	Total Concentration[3] (µg/m³)		
Port Street & Doremus Avenue	24-hour	1.69	22.69	35	NO
	Annual[1]	0.52	8.32	12	NO
	Annual[2]	0.52	8.32	9	NO
JFK Boulevard & 63rd Street	24-hour	0.53	21.53	35	NO
	Annual[1]	0.27	8.07	12	NO
	Annual[2]	0.27	8.07	9	NO
JFK Boulevard & 57th Street	24-hour	1.20	22.20	35	NO
	Annual[1]	0.39	8.19	12	NO
	Annual[2]	0.39	8.19	9	NO

Source: Paul Carpenter Associates, Inc.

Notes:

[1] – 2012 annual $PM_{2.5}$ standard

[2] – 2024 annual $PM_{2.5}$ standard

[3] – Total concentrations were calculated assuming a 24-hour PM2.5 background concentration of 21.0 µg/m³ and an annual $PM_{2.5}$ background concentration of 7.8 µg/m³, as detailed within Table 3.8-7. A NAAQS exceedance is determined based on total concentration (background plus modeled concentration) if it is greater than the applicable NAAQS.

Mobile Source Air Toxics. In year 2050, the regional MSAT emissions for the Proposed Action are projected to be -1.12 to +0.12 percent higher, as compared to the No Action Alternative. With implementation of EPA's National Low Emissions Vehicle program, Tier 2 and Tier 3 light-duty vehicle emission standards, which began with 2001 and 2004 model year vehicles, respectively, as well as other engine technology changes and 2050 analysis fleet age, expected 1,3-Butadiene emissions for both 2050 No Action Alternative and 2050 Proposed Action are zero. The results reflect the MSAT emissions in future years as a result of the improvement of vehicle emission control technologies under both 2050 No Action Alternative and 2050 Proposed Action conditions. The results of the MSAT analysis indicate no meaningful differences are expected for the Proposed Action in 2050, as compared to the No Action Alternative in 2050. As no meaningful differences in MSAT emissions are predicted, mitigation does not need to be considered. The predicted MSAT emissions and percentage differences are presented in Table 3.8-13. Regional MSAT emission analysis results spreadsheet is included within Section C-7: 2050 No Action & 2050 Proposed Action Regional MSAT Emission Results Table in Appendix C: Air Quality.

Table 3.8-13. 2050 MSAT Pollutant Emissions

MSAT Pollutant	Emissions (kilograms per year)[1]		Difference
	No Action	Proposed Action	2050 Proposed Action vs. 2050 No Action
Benzene	720.81	721.67	+0.12%
Naphthalene Particle + Naphthalene Gas	33.85	33.88	+0.11%
1,3-Butadiene	0.00	0.00	+0.00%
Formaldehyde	539.09	539.21	+0.02%
Acetaldehyde	397.80	397.74	+0.01%
Acrolein	20.91	20.92	+0.04%
Ethyl Benzene	288.76	289.06	+0.10%
Diesel Particulate Matter	698.28	690.48	-1.12%
Polycyclic Organic Matter	14.28	14.30	+0.12%

Source: Paul Carpenter Associates, Inc.

[1] The estimated values in the table and the extent of the difference between Proposed Action and No Action are conservative as the analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

Carbon Emissions. The 2050 Proposed Action carbon emissions for the region is predicted to be 0.17 percent higher compared to the No Action Alternative in 2050. Direct CO_2e emission rates were calculated utilizing the same methodologies that are used for the regional emissions inventory analysis of MSATs. The predicted CO_2e emissions and percentage difference is presented in Table 3.8-14. Regional carbon emission analysis results spreadsheet is included within Section C-7: 2050 No Action & 2050 Proposed Action Regional Emission Results Table in Appendix C: Air Quality.

Table 3.8-14. 2050 Annual CO_2e Pollutant Emissions

Criteria Pollutant	Emissions (metric tons per year)[1]		Difference
	2050 No Action	2050 Proposed Action	2050 Proposed Action vs. 2050 No Action
CO_2e	504,006.20	504,883.02	+0.17%

Source: Paul Carpenter Associates, Inc.

[1] The estimated values in the table and the extent of the difference between Proposed Action and No Action are conservative as analysis did not account for recently adopted New Jersey regulations that will substantially reduce tailpipe emissions from automobiles and trucks.

3.8.5.2 General Conformity Analysis

Construction-related emissions were calculated for ozone precursors (NOx and VOC), CO, PM_{10} and $PM_{2.5}$ for three peak construction years (CY 2033, CY2034 and CY 2035), as presented in Table 3.8-15. Construction-related emissions are the appropriate source of emissions to compare with General Conformity Rule *de minimis* thresholds. Peak construction-related emissions were estimated in CY 2033, 2034 and 2034 since the heaviest and most intense construction activities will occur. The analysis performed demonstrates that the emissions from the Proposed Action's construction do not exceed de minimis thresholds and, therefore, can be presumed to conform to the New Jersey SIP. The General Conformity applicability emission results spreadsheets is included within Section C-8: 2033, 2034 & 2035 General Conformity Applicability Analysis Tables in Appendix C: Air Quality.

Table 3.8-15. Proposed Action Net Year 2033, 2034 and 2035 General Conformity Applicability Emission Results (tons/year)

Source	NO_x	VOC	CO	PM_{10}	$PM_{2.5}$
CY 2033 Construction Emissions	15.5	0.8	8.3	89.4	9.6
CY 2034 Construction Emissions	20.8	1.1	11.2	89.7	9.7
CY 2035 Construction Emissions	16.8	0.7	7.7	89.4	9.5
De Minimis Thresholds	*25*	*25*	*100*	*100*	*100*
Exceeds CAA *De Minimis*?	NO	NO	NO	NO	NO

Source: Paul Carpenter Associates, Inc.

3.8.5.3 Transportation Conformity

The Proposed Action is part of the proposed NB-HCE Program and is located within the planning area of the NJTPA. The NJTPA performs regional emissions analyses to demonstrate that emissions from the area's transportation system are within the limits outlined in the New Jersey SIP. The NB-HCE Program (DBNUM: TPK24001) is included in Appendix B of the fiscal year (FY) 2024 TIP for regionally significant non-federally funded projects. The FY 2022 to FY 2025 TIP was approved on September 13, 2021. The Project listing in NJTPA's approved TIP is included within Section C-9: FY 2024-2027 Transportation Improvement Program Project Listing in Appendix C: Air Quality. Operational emissions resulting from the NB-HCE Program were included in the previous conformity determination for scenario year 2030. NJTPA detailed the analysis demonstrating conformance to the SIP within *The Plan 2050: Transportation, People, Opportunity and the FY 2024-2027 Transportation Improvement Program, dated September 12, 2023*. Consequently, the Proposed Action meets the

CAA Transportation Conformity requirement as it is included in the regional emissions analysis of a conforming Plan and TIP.

3.8.5.4 Conclusion

Based on the preceding assessment, the Proposed Action will have no significant impact on air quality. Pursuant to the CAA, the Proposed Action's construction and operational effects on air quality must conform with the SIP.

The analysis of construction-related emissions shows that the emissions do not exceed the General Conformity Rule *de minimis* thresholds and, therefore, can be presumed to conform to the New Jersey SIP.

Nevertheless, the following measures identified by NJDEP's Bureau of Mobile Sources are among those that may be applied during construction:

- Provide that hydraulic hoses for medium and heavy-duty construction vehicles are frequently checked for leaks, and that operators of these vehicles inspect their vehicles for oil and transmission leaks before, during, and after use of each vehicle.
- Provide that idling of diesel-fueled construction equipment, vessels, and commercial vehicles involved in the process be monitored in times of operation. This could include control strategies and training for equipment operators to ensure that vessel and equipment operating times are minimized and controlled. Project partners should focus on monitoring onshore construction sites and ports used for the offshore stations, as these are located within some nonattainment and maintenance areas.
- That non-road diesel construction equipment operating in a small geographic area over an extended period of time implement the following measures to minimize the impact of diesel exhaust:
    - All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site comply with the three-minute idling limit, pursuant to N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15.
    - Consider purchasing "No Idling" signs to post at the site to remind contractors to comply with the idling limits. Signs are available for purchase from the Bureau of Mobile Sources at 609/292-7953 or http://www.stopthesoot.org/sts-no-idle-sign.htm.
    - All non-road diesel construction equipment greater than 100 horsepower used on the Project for more than ten days have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the California Air Resources Board as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.
- All on-road diesel vehicles used to haul materials or traveling to and from the construction site use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities.
- In accordance with N.J.A.C. 7:27-14 and 15, that diesel vehicles not idle for more than 15 consecutive minutes when the vehicle has been stopped for 3 or more hours and only if the temperature is <25 deg. F.
- In accordance with N.J.A.C. 7:27-14 and 15, that diesel vehicles idle if the engine provides power for mechanical operations such as: refrigeration units for perishable goods, hydraulic lifts, "cherry pickers", or similar equipment.

Meanwhile, the requirements of N.J.A.C. 7:27-8.2(c) 1-22 for stationary permitting requirements will be applied, as applicable, including but not limited to construction equipment-stationary construction equipment or emergency generators that may require air pollution permits if it is located on the site for longer than one year (N.J.A.C. 7:27-8.2(d)15). Included among these requirements are general permits for boilers and emergency generators if the units can meet the prescribed requirement in the general permits. Vehicles involved on the

Project will adhere to the idling standards (less than 3 minutes) stipulated (N.J.A.C. 7:27-14 and 15), that air pollution, including odors that are detectable offsite that are injurious to human health or would result in citizen complaints are prohibited (N.J.A.C. 7:27-5.2) and that dust emissions, either windblown or generated from construction activities, should be controlled to prevent offsite impacts or material tracked onto the roadways (N.J.A.C. 7:27-5.2).

The Proposed Action is included in a long-range transportation plan that has been subject to Transportation Conformity Rule requirements. In addition, no meaningful differences in regional MSAT emissions are expected for the 2050 Proposed Action, as compared to the 2050 No Action Alternative.

CO and $PM_{2.5}$ hot-spot analyses were conducted for the 2050 Project corridor to assess potential concentrations of CO and $PM_{2.5}$ along public sidewalks nearby the NB-HCE as well as at three Project-affected intersections during the peak construction year (2034). The results of the analyses indicate no exceedance of the national ambient air quality standards. Based on 2050 traffic along the Project corridor, 2034 traffic resulting from construction activities, and current motor vehicle tailpipe emission standards, both the Proposed Action modeled concentration and the No Action concentration are not expected to exceed the NAAQS.

In issuing the new $PM_{2.5}$ annual standard on February 7, 2024, USEPA noted that Federal rules and programs, in partnership with state, Tribal, and local partners, will help to improve air quality around the country and reduce particle pollution (https://www.epa.gov/system/files/documents/2024-02/2024-pm-naaqs-final-overview-presentation.pdf). USEPA further notes that most counties with monitors (including Essex and Hudson Counties) already meet the strengthened particle pollution standard and that it projects continued reduction of emissions that cause fine particle pollution such that more than 99% of counties in the U.S. (including Essex and Hudson Counties) are projected to meet the revised standard in 2032.

Standard construction management and dust control protocols, such as frequent "street" sweeping and spraying down with water (during dry conditions) are planned by the Authority to reduce fugitive dust. The Authority will also implement an air quality monitoring program during construction near residences and other sensitive receptors as part of an Adaptive Management Plan (Appendix H), and will employ other measures, as needed, to further reduce PM2.5 concentrations.

The Authority has on-going initiatives to reduce fine particle roadway operational emissions, for example, through routine sweeping of fugitive dust from its roadways, including the NB-HCE, and by annually providing over $500 million to the State to support public transportation. In addition, the Authority is undertaking numerous initiatives to reduce emissions from its facilities and from the vehicles that use its roadways, e.g., emissions reductions from such energy efficiency measures as building management systems, using LEED standards in the design of new buildings, transition to LED roadway and facilities' lighting, adding hybrid and electric vehicles to the Authority's fleet, and establishing EV charging stations in Turnpike and Parkway Service Areas. No further mitigation is necessary.

Appendix 3.9

Noise

3.9 Noise

3.9.1 Study Area and Data Collection

The roadways incorporated in the traffic noise prediction modeling network include the NB-HCE corridor from approximately Interchange 14 to Interchange 14A, associated ramps, and local roadways such as Firmenich Way in Newark, NJ Route 440, JFK Boulevard, Avenue C, Merritt Street, Garfield Avenue, as well as West 58th Street and West 56th Street in Bayonne and Jersey City. Figure D-1 within Appendix D: Noise details the traffic noise modeling roadway network.

A detailed noise measurement study was performed to document peak traffic noise levels within the study area. Ambient noise levels within the study area are affected by vehicular traffic traveling along the NB-HCE corridor, NJ Route 440, associated ramps, and the local roadway network. Other mobile sources within the study area affecting ambient noise levels include rail activity associated with the Conrail freight line that parallels the NB-HCE corridor, as well as aircraft flyovers associated with EWR. The noise measurement study was performed in general accordance with the FHWA Measurement of Highway-Related Noise, Final Report (FHWA-PD-96-046). Noise levels were documented in eight locations within Newark, Bayonne, and Jersey City on Tuesday October 19, 2021, Wednesday November 17, 2021, and Wednesday March 16, 2022 (see Figure D-2 within Appendix D: Noise). Roadway construction on JFK Boulevard during the PM measurement period on Wednesday, March 16, 2022, affected two measurement locations (Sites 2A and 2D), therefore invalidating the data. However, sufficient vehicular traffic and terrain data is available to enable noise modeling of these and other sites.

All noise levels were documented using Rion NL-52 (Type 1) noise level meters set to slow response. Noise monitoring equipment was field calibrated before and after noise measurements were conducted to ensure equipment accuracy. A photo log and laboratory calibration certificates for noise meters and field calibrators are included with Appendix D.

Field noise measurement worksheets were completed to document proper meter settings, hourly on-site weather conditions, including wind speed, temperature, and relative humidity, as well as extraneous events occurring during each measurement period. Atypical noise sources such as barking dogs, car alarms, people shouting, etc., were noted within the field worksheets. In addition, time periods with other mobile sources of noise, including rail passbys and aircraft flyovers, were noted. Subsequently, raw data files were reviewed alongside field notes. To obtain existing noise levels resulting from the NB-HCE corridor and local roadway network, atypical and other transportation noise events (freight rail passbys and aircraft flyovers) were removed from the data set. Certified meteorological data for EWR was obtained from NOAA to vet on-site weather conditions and is included within Appendix D.

Several noise measurement sites were located behind the existing eastbound NB-HCE noise barrier, which stretches from approximately 350 feet west of JFK Boulevard to approximately 75 feet west of Garfield Avenue in Bayonne. Consequently, the measured sound levels at these locations reflect the effect of the existing noise barrier as a noise abatement measure. The existing noise barrier was constructed as part of the 1994 Authority Contract No. R-1234 and ranges from approximately 14 feet to 18 feet high.

Results of the noise measurement study are summarized in Table 3.9-1 and represent peak traffic noise levels documented during AM and PM hours.

Noise measurements were performed during concurrent vehicular traffic volume classification counts at each measurement location, either through manual traffic counts or through use of Miovision cameras. Additionally, toll plaza traffic data was provided by the Authority at Interchanges 14 and 14A during noise measurement periods. Vehicular classification counts included cars and light trucks, medium trucks, heavy-duty trucks, buses,

and motorcycles. Concurrent AM and PM peak period traffic counts were used to validate the project-specific noise model through comparison of AM and PM peak measured noise levels in the same locations.

Table 3.9-1. 2021 Existing Measured Peak Noise Levels dBA (L_{eq})

Noise Measurement Site Number	Noise Measurement Site	AM Peak Noise Level (6:45 a.m. – 7:45 a.m.)	PM Peak Noise Level (4:00 p.m. – 5:00 p.m.)
1	150 Firmenich Way Newark, NJ	61	61
2A	Former Marist High School Bayonne, NJ	67	63
2B	35 Sunset Avenue Bayonne, NJ	61	NA
2C	Bayonne Towers Pool Bayonne, NJ	56	55
2D	1261 JFK Boulevard Bayonne, NJ	67	NA
3	Mercer Park Jersey City, NJ	66	63
4	114 Merritt Street Jersey City, NJ	64	66
5	West 58th Street Bayonne, NJ	64	62

Source: Paul Carpenter Associates, Inc., 2021, 2022
Key: NA = Local roadway construction invalidated measurement period

3.9.2 Methodology and Criteria

3.9.2.1 Noise Fundamentals

Certain critical factors affect noise and the way it is perceived by the human ear. Such factors include the acoustical level (noise), frequency and the length of the exposure period. Sound or noise level is measured in units of decibels (dB). Due to the complex manner in which the human ear functions, measurement of different noise sources does not always correspond to relative loudness or annoyances. Therefore, different scales have been developed to furnish guidance in evaluating the importance of different noise sources. The A-weighted scale (unit expressed as dBA) is utilized almost exclusively in mobile-source vehicular noise measurement and prediction as it reflects the frequency range to which the human ear is most sensitive (1,000 to 6,000 Hertz).

As decibels are based on a logarithmic scale, doubling a noise source equates to a 3 dB increase in the sound or noise level (e.g., 60 dB + 60 dB = 63 dB). Under normal circumstances, a 3 dB change is required for the average person to detect a difference without the use of instruments. A change in 5 dB is considered to be a noticeable change. A decrease in 10 dB is perceived by the average listener as a reduction of noise by one-half, while an increase in 10 dB is discerned as a doubling of noise levels.

The A-weighted sound pressure level (expressed as dBA) can be applicable for noise levels at one single moment. As very few noise sources are constant, an alternative way of describing noise over a period of time was needed. One way of describing fluctuating sound is to address it as if the noise occurred at a steady,

unchanging level over a specific time period. For this condition, the widely used descriptor accepted to express noise levels has become the dBA (L_{eq}) or an A-weighted equivalent noise level. The dBA (L_{eq}) is the equivalent steady-state sound level, which in a specific period of time, contains the same acoustic energy as the time-varying sound level during that same period. For purposes of this project, noise levels were assessed based on the dBA (L_{eq}) noise metric, as it is commonly used to assess traffic noise levels. Typical community noise levels are shown in Table 3.9-2.

Table 3.9-2. Noise Levels of Common Sources

Sound Source	Sound Pressure Level (dBA)
Air Raid Siren at 50 feet	120
Maximum Levels at Rock Concerts (Rear Seats)	110
On Platform by Passing Subway Train	100
On Sidewalk by Passing Heavy Truck or Bus	90
On Sidewalk by Typical Highway	80
On Sidewalk by Passing Automobiles with Mufflers	70
Typical Urban Area	60-70
Typical Suburban Area	50-60
Quiet Suburban Area at Night	40-50
Typical Rural Area at Night	30-40
Isolated Broadcast Studio	20
Audiometric (Hearing Testing) Booth	10
Threshold of Hearing	0

Sources: NYC MOEC 2021, Cowan 1994, Egan 1988

The Proposed Action will result in mobile sources of noise, specifically related to vehicular traffic traveling on roadways within the study area. Mobile source noise levels reduce at a rate of 3 decibels per distance doubling from the source (e.g., 70 dBA at a distance of 50 feet would reduce to approximately 67 dBA at a distance of 100 feet).

3.9.2.2 Regulatory Framework

No federal-aid highway funds are anticipated for the Proposed Action. As such, the traffic noise analysis for the Proposed Action was performed in general accordance with the Authority's traffic noise policy. Although not required from a regulatory perspective, the Authority's intent is to conduct highway traffic noise analyses in general conformance with the FHWA's standards and procedures established within 23 CFR 772 and the FHWA Highway Traffic Noise: Analysis and Abatement Guidance document. The Authority's policy is generally consistent with 23 CFR 772 and includes the consideration of FHWA Activity Categories A, B, C, and D for noise impact and abatement assessment (Table 3.9.3). The Authority's policy also adopts FHWA's Noise Abatement Criteria (NAC) for each corresponding activity category used for assessing traffic noise impacts.

Based on field reconnaissance and review of aerial mapping, noise-sensitive land uses within the study area are located east of Newark Bay and comprise single-, dual-, and multi-family residential structures (Activity Category B), as well as recreational areas, a school, a place of worship, and a community garden (Activity Category C) within Bayonne and Jersey City. The school within the study area would be subject to exterior

NAC (Category C) as well as interior NAC (Category D). West of Newark Bay, within the City of Newark, there are no noise-sensitive land uses recognized by the Authority's policy. For all residential land uses, property records were accessed via njparcels.com to confirm total number of dwelling units for classification as single-, dual-, and multi-family structures. The descriptions of land uses considered under each activity category as well as the corresponding NAC levels are summarized in Table 3.9-3.

Table 3.9-3. Noise Abatement Criteria (Hourly A-Weighted Sound Levels (dBA))

Activity Category	Threshold of Noise Interference		Evaluation Location	Description of Activity Category
	$L_{eq(h)}$	$L_{10(h)}$		
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	70	Exterior	Residential
C	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or non-profit institutional structures, radio studies, recording studies, recreation areas, Section 4(f) sites, schools, and television studios, trails and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.

Source: 23 CFR 772.

3.9.2.3 Criteria for Determining Impacts

Traffic noise impacts related to the Proposed Action are considered if either of the following conditions are met:

1. Predicted future traffic noise levels (dBA L_{eq}) approach within one decibel or exceed the NAC defined in Table 3.9-3.
2. Predicted future traffic noise levels exceed existing noise levels by 10 dBA L_{eq} or more, even though the applicable NAC level is not reached.

For all Activity Category B land use, locations of ground-level exterior areas of frequent human use were identified and prioritized for receptor placement, unless none existed. For single-family residential structures with both ground-level use, such as patios, backyards, stoops, etc., and elevated decks/balconies, only the ground level land use was considered for receptor placement. Alternatively, for single-family residential structures with no ground level exterior use but several elevated decks/balconies, the closest elevated outdoor use area to ground level was considered. For multi-family high-rise residential structures, priority was given to ground-level outdoor common areas/shared spaces, unless none exists, or such areas were physically shielded or located far from the NB-HCE roadway in such a manner that precludes noise impact. In this case, priority was given to patios/balconies with clear line of sight to the NB-HCE roadway for individual dwelling units. In accordance with the Authority's policy, when considering balconies for multi-family residences, receptor

placement was limited to the third floor above the maximum NB-HCE roadway grade within a 500-foot radius of the multi-family residential structure.

In accordance with the Authority's policy, the FHWA's lot size-based "equivalent number of residences" methodology was used to place receptor grids for all Activity Category C land use within the noise study area, following Option 5 for receptor grid placement.[1] For evaluating equivalent number of dwelling units, this methodology requires identifying the average residential lot size and dividing the impacted square footage of Category C land use by that average lot size. Average lot size may be determined in several ways based on FHWA guidance. For the Proposed Action, average lot size was determined based on review of the City of Bayonne Zoning Map, updated December 2020, available within Chapter 35 Zoning Regulations of the City of Bayonne Municipal Code. Category C land use within the noise study area is all located within residential zoning district R-2. Section 35-5.3 of the City of Bayonne Municipal Code requires a minimum lot size of 3,000 square feet (sf) for residential development within the R-2 zoning district. Therefore, equivalent number of residences was determined based on dividing the Category C parcel size by a minimum lot size of 3,000 sf.

Although the Woodrow Wilson School #10, located along West 57th Street, includes outdoor use areas, they are physically shielded by the school building and/or located further from the NB-HCE than highway-facing windows. Receptors were placed in the outdoor use areas to determine potential exterior impacts; however, receptors were also placed along the building façade facing the NB-HCE representing each floor with windows to predict interior noise levels. Interior noise levels were calculated by applying a building noise reduction factor of 10 dB, representative of an open window condition, to exterior predicted noise levels. This level of attenuation is recommended within the FHWA (2011) Highway Traffic Noise: Analysis and Abatement Guidance, which states that an open window condition should be assumed unless there is firm knowledge windows remain closed almost every day of the year.

The Authority's traffic noise policy also includes a provision for the consideration of undeveloped land which has received final subdivision or site plan approval or is "permitted" for development, as evidenced through issuance of a building permit, prior to the Announcement date of the project. The Authority defines "Announcement" as the date official notice is given to the public, which shall be considered the date the Board gives authorization to adopt the annual budget in which the project is listed. Undeveloped land with such approvals prior to the project Announcement shall be assigned the appropriate Activity Category and evaluated for noise impact and mitigation, as necessary. Alternatively, to prevent future traffic noise impacts, the Authority shall inform local officials with an estimate of the distance to the future 66 dBA L_{eq} noise impact level for undeveloped lands without such approvals. Undeveloped land within the noise study area consists of a parcel on the east side of JFK Boulevard in Bayonne, south of the NB-HCE roadway at 1248-1254 JFK Boulevard (Block 17, Lot 1). The City of Bayonne was contacted to confirm that there are no active permits on file for this parcel. Therefore, the parcel was not assigned an Activity Category. However, a receptor grid was modeled to determine the location of the 66 dBA L_{eq} noise contour. Additionally, a developer purchased the former Marist High School property and commenced demolition of the main school building and ancillary structures in the second quarter of 2022. While redevelopment plans indicate intent to construct on the property in the future, there are no known current subdivision or site plan approvals for the property demonstrating a firm commitment to construct. Under the Proposed Action, the Authority would acquire the property to address stormwater management requirements, and for contractor lay down areas and future maintenance needs. Use of the property under the Proposed Action would therefore not be considered noise-sensitive and was not included as part of the noise study.

[1] FHWA, Calculating and Placing Non-Residential Receptors (NRRs), Methodology: Lot Size, FHWA-HEP-17-056, https://www.fhwa.dot.gov/Environment/noise/resources/fhwahep17056.pdf

3.9.2.4 Noise Modeling

All noise modeling was performed utilizing the FHWA Traffic Noise Model Version 2.5 (TNM2.5), which predicts noise levels in the vicinity of highways.

It should also be noted that the noise measurements described in Section 3.9.1 were conducted during the ongoing COVID-19 pandemic. As aforementioned, concurrent traffic counts during noise measurements were necessary to validate the project-specific noise model. However, existing conditions were modeled based on adjusted pre-pandemic traffic data. Specifically, to address any noise and/or traffic disparities caused by the pandemic, origin-and-destination toll plaza transactions from the NJ Turnpike system were analyzed for years 2019, 2020 and 2021 (as of October) for NB-HCE segments between Interchanges 14 and 14A, Interchanges 14A and 14B, and Interchange 14C. Traffic volumes, based on hourly volume profiles, were used to compare 2021 traffic volumes with pre-COVID-19 volumes collected in 2019. Based on this comparison, existing 2021 volumes were adjusted to reflect "typical" traffic conditions for 2021 without the oddity of the pandemic and subsequently were used to predict existing year noise levels at all noise-sensitive sites within the project study area.

TNM2.5 model inputs include roadway geometry, travel volumes and speeds, and areas of shielding due to building rows or natural terrain features. The project-specific TNM2.5 model was considered valid for use in predicting noise levels at additional noise-sensitive receivers within the study area when the differences between measured and modeled levels were less than 3 dB. This is important to note as a 3 dB difference is the lowest change in noise levels that the general public can detect without the use of instruments.

After validation of the project-specific TNM2.5 model at the measurement locations listed within Table 3.9-1, additional receptors were included within the model, representing all noise-sensitive land use in the project study area described above, consistent with Table 3.9-3.

Projected hourly volumes and posted speed limits were utilized within the validated project-specific TNM.5 model to predict No Action Alternative and Proposed Action noise levels within the noise study area. Future year 2050 traffic volumes were determined using projected background growth rates from the NJRTM-E, which incorporates socioeconomic data from the latest NJTPA demographic projections as well as development and redevelopment information obtained from the Jersey City Open Data Portal. The project-specific TNM2.5 model was developed with the following information:

1. Electronic design plans and elevation contours.
2. NJRTM-E traffic volumes and speed limits.
3. Land use identified from field observations and aerial maps.
4. Noise measurement study results.

Additional TNM2.5 model inputs included terrain lines to define significant changes in elevation, as well as locations and heights of rows of buildings that may block line of sight between the highway noise sources and modeled noise-sensitive receptors. The No Action Alternative noise prediction model also included the 14- to 18-foot-high existing noise barrier along the eastbound NB-HCE roadway in Bayonne from approximately 350 feet west of JFK Boulevard to approximately 75 feet west of Garfield Avenue. As part of the Proposed Action, the existing eastbound NB-HCE noise barrier will be removed and replaced. Noise levels under the Proposed Action were evaluated without the noise barrier, and a new wall was investigated to determine length and height requirements to mitigate impacts predicted under the Proposed Action.

3.9.3 Existing Conditions

Using the noise level prediction methodology detailed herein and 2021 existing traffic data adjusted for the COVID-19 pandemic, 30 dual-family residential structures currently experience noise levels that approach (defined by the Authority as being within one decibel of the NAC) or exceed the Activity Category B NAC (67

dBA L_{eq}), equating to 60 residential dwelling units. These residential dwellings are located along JFK Boulevard and West 57th Street, south of the NB-HCE corridor. A portion of Mercer Park, located along JFK Boulevard north of both the NB-HCE and NJ Route 440 corridors, currently experiences noise levels that approach or exceed the Activity Category C NAC (67 dBA L_{eq}). This includes the football field and walking trail that follows JFK Boulevard on the west side of the park (approximately 93,976 sf). Using FHWA's "Equivalent Number of Residences" method, the portion of Mercer Park which currently approaches or exceeds the Activity Category C NAC equates to approximately 32 residential dwelling units. Additionally, fourth floor interior noise levels at the Woodrow Wilson School #10 eastern building, located along West 57th Street, currently approach or exceed the Activity Category D NAC (52 dBA L_{eq}). Without access to school building floor plans, it was assumed the impacted receptors represent three highway-facing classrooms.

3.9.4 No Action Alternative

Under the No Action Alternative, that is, the future 2050 No Build Alternative, the Proposed Action would not be constructed. As such, all NB-HCE roadway geometry would remain the same as under the 2021 Existing Condition. Traffic volumes would increase due to background traffic growth, which was projected to be approximately 8 percent on the NB-HCE corridor relative to the 2021 Existing Condition, during AM and PM peak traffic hours. However, no specific future developments with final subdivision or site plan approvals were identified within the study area. Therefore, all land use and receptors were modeled the same as under the 2021 Existing Condition.

Based on noise prediction modeling, No Action Alternative noise levels would approach or exceed the Activity Category B NAC of 67 dBA (L_{eq}) at 32 dual-family residential structures, equating to 64 dwelling units. These residential structures are located along JFK Boulevard and West 57th Street, south of the NB-HCE roadway, and along Merritt Street at one dual-family residential structure within the Jersey City Housing Authority Curries Woods neighborhood near the corner of Old Bergen Road and Merritt Street. In addition, noise levels would approach or exceed the Activity Category C NAC at a portion of Mercer Park within the football field and along the walking trail that parallels JFK Boulevard (approximately 129,217 sf), equating to approximately 44 residential dwelling units. Fourth floor interior noise levels at the Woodrow Wilson School #10 eastern building, located along West 57th Street, are predicted to approach or exceed the Activity Category D NAC (52 dBA L_{eq}). Without access to school building floor plans, it was assumed the impacted receptors represent three highway-facing classrooms.

It is important to note that demolition of the former Marist High School building by the developer who purchased the property commenced in the second quarter of 2022. As previously discussed, while there are redevelopment plans indicating intent to construct on the property in the future, there are no known currently active final subdivision or site plan approvals demonstrating a definite commitment to build. Therefore, the property was assumed to remain undeveloped under the No Action Alternative. Building demolition removed the shielding from the NB-HCE roadway for several dual-family residences located on Sunset Avenue as well as the Bayonne Towers pool to the south. Under the No Action Alternative, predicted noise levels would not approach or exceed the Activity Category B NAC of 67 dBA (L_{eq}) at any of these residences; however, noise levels for Sunset Avenue structures and the Bayonne Towers pool that were previously shielded by the Marist High School building are predicted to increase by 3 to 11 decibels under the No Action Alternative. A noise level increase of 3 dBA is generally "perceptible" to the average healthy human ear, while an increase of 10 dBA is perceived as a doubling of sound. No Action Alternative noise impacts are presented in Figure D-3 within Appendix D: Noise.

3.9.5 Proposed Action Alternative

3.9.5.1 Proposed Action Roadway Traffic Noise Impacts

In the future with the Proposed Action, the NB-HCE roadway will be widened to four lanes in each direction Traffic volumes were projected to increase by approximately 32 percent on the NB-HCE, relative to the 2021

Existing Condition, during AM and PM peak traffic hours. The effect of the Proposed Action on traffic volumes on other roadways was estimated using the NJRTM-E model with Proposed Action improvements.

Based on noise prediction modeling, noise levels in the future with the Proposed Action would approach or exceed the Activity Category B NAC of 67 dBA (L_{eq}) at 32 single-family, 67 dual-family, and four multi-family residential structures within the noise study area, equating to 179 total dwelling units. Noise levels would approach or exceed the Activity Category C NAC of 67 dBA (L_{eq}) within a portion of Mercer Park (approximately 164,458 sf), equating to 56 total dwelling units. Interior noise levels would approach or exceed the Activity Category D NAC (52 dBA L_{eq}) at the Woodrow Wilson School #10, including all three classroom floors of the east building and the second and third floors of the west school building. Without access to school building floor plans, it was assumed the impacted receptors represent 13 highway-facing classrooms.

Noise impacts in the future with the Proposed Action are illustrated on Figure D-4 within Appendix D: Noise. A summary of receptors predicted to approach or exceed the applicable NAC under the 2021 Existing Condition, as well as impacts predicted under the No Action Alternative and in the future with the Proposed Action are presented in Table 3.9-4.

Table 3.9-4. Summary of Impacts, 2021 Existing, 2050 No Action, and 2050 Proposed Action

Sensitive Site	2021 Existing	2050 No Action	2050 Proposed Action[1]	Noise Level Change (dBA L_{eq})	
				Existing to Proposed Action	No Action to Proposed Action
Activity Category B Structures (Residential Dwelling Unit)	30 (60)	32 (64)	103 (179)	0.4 to 16.9	-0.3 to 16.5
Activity Category C (Equivalent Dwelling Unit)	1 (32)	1 (44)	1 (56)	0.6 to 7.2	0.0 to 5.5
Activity Category D (School)	1 (3)[2]	1 (3)	1 (13)	4.2 to 8.5	3.2 to 7.3

Source: Paul Carpenter Associates, Inc. 2022.

Notes:

[1] 2050 Proposed Action noise levels assume NB-HCE eastbound existing noise wall is removed as a result of the project.

[2] (#) represents total number of assumed highway-facing classrooms with predicted interior noise impact based on a building noise reduction factor of 10 dBA for a windows open condition, in accordance with FHWA guidance.

South of the NB-HCE. As the existing noise barrier would need to be removed to accommodate the proposed widening, the Proposed Action reflects noise levels predicted without a noise barrier. The Authority is committed to replacing the noise barrier, and the proposed noise barrier design is detailed within Section 3.9.5.2, Traffic Noise Mitigation. Predicted traffic noise impacts south of the NB-HCE roadway are primarily located along JFK Boulevard, West 56th, West 57th Street, and West 58th Streets, where the existing noise barrier required removal to accommodate the NB-HCE widening. Additional impacted residential structures include one fourth-floor and one fifth-floor balconies at the Liberty Bay Club multi-family residential structure. Impact to the Liberty Bay Club is likely resulting from a combination of traffic changes on NJ Route 440 as well as changes to the NB-HCE corridor as a result of the Proposed Action. The predicted interior impact would occur at the Woodrow Wilson School #10, located along West 57th Street.

Based on the Authority's second impact criterion, four dual-family residential structures on Sunset Avenue, equating to eight dwelling units, were predicted to experience a noise level increase of 10 dBA or greater under the Proposed Action Alternative, relative to 2021 Existing Condition noise levels. Noise levels were predicted to increase by more than 10 dBA under the No Action Alternative as well, due to the removal of shielding provided by the Marist High School building and associated ancillary structures. In the future with the Proposed Action, noise levels on Sunset Avenue would increase by only one decibel relative to the No Action Alternative, which is not perceivable.

North of the NB-HCE. North of NB-HCE roadway, Activity Category B impacts are located along Merritt Street within the Jersey City Housing Authority Curries Woods neighborhood and on Garfield Avenue. In addition, the Activity Category C NAC would be exceeded at Mercer Park within the football field and along the walking trail that parallels JFK Boulevard (approximately 164,458 sf), equating to 56 residential dwelling units.

Undeveloped Land. In an effort to prevent future traffic noise impacts on undeveloped land, the Authority, under its traffic noise policy, informs local officials of the distance to the future 66 dBA L_{eq} noise level. As discussed within Section 3.9.2.3, one undeveloped parcel on the east side of JFK Boulevard in Bayonne, south of the NB-HCE roadway, was identified at 1248-1254 JFK Boulevard (Block 17, Lot 1). The City of Bayonne was contacted to confirm that there are no active permits on file for this parcel. Therefore, a receptor grid was modeled on this parcel to determine the distance at which noise levels would be 66 dBA L_{eq} under the future with the Proposed Action. Based on Proposed Action modeling, noise levels would reach 66 dBA L_{eq} up to 87 feet from JFK Boulevard. Beyond this distance, noise levels would be below impact criteria.

3.9.5.2 Traffic Noise Mitigation

The Authority primarily considers noise barriers for traffic noise abatement, although other abatement alternatives detailed within 23 CFR 772.15(c) may be investigated on a project-by-project basis, as appropriate. These additional measures include traffic management measures, alteration of horizontal and vertical alignments, acquisition of property, and noise insulation. These measures were not considered for the Proposed Action because the proposed noise barrier is effective as a noise abatement measure.

Noise barriers are effective means of mitigating noise impacts adjacent to roadways. Several areas of impact were identified through noise modeling of the Proposed Action; however, many factors must be considered before noise barriers can be proposed as part of the project. These factors include both acoustic and engineering feasibility as well as the cost per benefited residence. Acoustic feasibility deals with the level of noise reduction attained while engineering feasibility is reviewed to identify potential obstacles that preclude the construction of an effective noise barrier (e.g., drainage, safety or maintenance requirements, topography of a location).

Noise barriers were evaluated to mitigate traffic noise impacts throughout the project study area. All noise barriers were examined in accordance with the Authority's traffic noise policy. Utilizing a construction cost of

$70/sf, the Authority will consider a cost of up to $50,000 per benefited residence for a new noise barrier. An 18-foot maximum noise barrier height has been established under this policy.

A "benefited residence" (primary benefit) is an impacted receptor that results in at least a 5 dBA L_{eq} noise level reduction with a noise barrier. A "supplemental benefit" is a receptor that results in at least a 5 dBA L_{eq} noise level reduction but is not predicted to experience Proposed Action noise levels above the NAC before mitigation. Supplemental benefits are assigned one-half credit in the total benefits tally. In accordance with the Authority's policy, the minimum reduction to be achieved for any noise barrier is 5 dBA to at least 50 percent of first row impacted receptors, which is consistent with 23 CFR 772. As explained by FHWA (2011) guidance, the purpose of establishing a minimum required noise level reduction of 5 dBA from a noise barrier is to ensure the noise barrier achieves at least a discernible level of noise reduction. The noise barrier design goal stated within the policy is to achieve a 7 dBA noise level reduction to at least 50 percent of first row receptors, regardless of whether they are impacted, and a 10 dBA reduction at any receptor, whether impacted or non-impacted and regardless of location (i.e., the receptor achieving 10 dBA noise level reduction does not have to be located within the first row).

It should be noted that impacted receptors can benefit from a noise barrier but remain impacted. If the noise barrier meets all necessary design and cost criteria, the noise barrier would still be recommended for construction. As detailed within FHWA guidance, the NAC, which the Authority has adopted for FHWA Activity Categories A through D, are not considered design goals. The goal of the design criteria is to ensure noise mitigation provides, at a minimum, a discernible level of noise reduction for impacted receptors (i.e., 5 dBA or greater is generally regarded as a noticeable/discernible change in noise levels), however, with a goal of achieving higher noise level reductions. Noise barriers that achieve less than 5 dBA noise level reductions are not recommended for construction because they do not effectively mitigate traffic noise levels.

Noise barrier investigations for each noise impact area examined based on the previously mentioned impact criteria are described below.

South of the NB-HCE – The existing noise barrier along the eastbound shoulder of the NB-HCE roadway will need to be removed to accommodate the proposed widening. The Authority is committed to replacing the impacted existing noise barrier to mitigate future noise impacts predicted under the Proposed Action. A noise barrier was thereby evaluated along the widened eastbound NB-HCE shoulder at a uniform height of 18 feet (i.e., the maximum allowable height under the Authority's policy), from just east of where the NB-HCE roadway crosses over NJ Route 440 to approximately 75 feet west of Garfield Avenue. The eastern terminus is approximately the same as the existing noise barrier's eastern terminus; however, the western terminus was extended approximately 556 feet west. The western extension was evaluated to mitigate Proposed Action noise impacts predicted at three dual-family residential structures on West 57th Street, adjacent to the former Marist High School property, and noise impacts predicted at four dual-family residential structures on Sunset Avenue meeting the Authority's second impact criterion (i.e., 10 dBA or greater increase in noise levels under the Proposed Action, relative to existing noise levels). The western extension was also evaluated to mitigate noise impacts predicted at one fourth floor and three fifth floor balconies at the Liberty Bay Club, south of NJ Route 440.

A noise barrier 18 feet in height and approximately 2,990 feet in length along the widened eastbound shoulder of the NB-HCE roadway would provide 116 primary benefits and 46 supplemental benefits, for a total of 139 benefits. At a unit cost of $70/sf, the total cost of the noise barrier would be approximately $3,769,640, equating to $27,120 per benefit ($3,769,640/139 = $27,120). Out of 79 first-row impacts, 77 would benefit, equating to approximately 97 percent ([77/79]*100 = 97%); therefore, the noise barrier meets the Authority's acoustic feasibility requirement of achieving a minimum 5 dBA reduction to at least 50 percent of first row impacted receptors. Further, out of 85 first row receptors (including impacted and non-impacted), the noise barrier achieves a 7 dBA noise level reduction at 62 first row receptors, equating to approximately 73 percent ([62/85]*100 = 73%). The noise barrier would provide noise level reductions ranging from 1 to 16 dBA;

therefore, the noise barrier achieves both design goals established under the Authority's policy. The noise barrier would mitigate traffic noise impacts at 32 single-, 35 dual-, and seven multi-family residential structures, and seven highway-facing classrooms at Woodrow Wilson School #10 (both east and west buildings), equating to 124 total dwelling units mitigated. Remaining impacts would total 29 dual-family structures (58 dwelling units) on JFK Boulevard and one school on West 57th Street (interior noise impact at Woodrow Wilson School #10, east building). Without access to school building floor plans, it was assumed the remaining impacted receptors represent six highway-facing classrooms. The noise barrier worksheet is included within Appendix D: Noise.

While impacted dual-family residences on JFK Boulevard benefit within their backyard outdoor use areas, their front stoop outdoor use areas cannot be effectively mitigated and do not receive benefit from a noise barrier on the NB-HCE roadway due to vehicular traffic on JFK Boulevard. In other words, the noise wall does not achieve a 5 dBA reduction at any front exterior use areas along JFK Boulevard. Placing a noise barrier on JFK Boulevard to reduce noise levels within these front exterior use areas would not be feasible due to engineering constraints, and effectiveness would be substantially degraded because the wall would have several gaps to maintain access to residential driveways and other local connecting roadways. Interior impacts predicted at the Woodrow Wilson School #10 on West 57th Street are within the eastern portion of the school building only. It is recommended that under Final Design, a Building Noise Attenuation study be performed to determine actual building noise reduction factors and availability of central or window air conditioning units that would allow windows to remain closed and thereby mitigate traffic noise impacts. Although not all impacts can be effectively mitigated, this noise barrier is cost-effective, per the Authority's policy, meets all noise barrier design criteria established under the policy, and the Authority is committed to replacing the noise barrier and mitigating noise impacts to adjacent communities south of the NB-HCE corridor that are predicted under the Proposed Action. As such, this noise barrier is recommended for further consideration under Final Design, at which time height and length will be refined based on Final Design horizontal and vertical roadway geometry. The recommended noise barrier and remaining traffic noise impacts are illustrated on Figure D-5 within Appendix D: Noise.

North of the NB-HCE – To mitigate predicted impacts under the Proposed Action to Mercer Park, two dual-family residences on Merritt Street that are part of the Jersey City Housing Authority's Curries Woods neighborhood, and one dual-family residence on Garfield Avenue, a potential three-part noise barrier "system" was evaluated along the westbound shoulder of the widened NB-HCE roadway. Due to the Interchange 14A toll plaza on- and off-ramps (Ramp TW and Ramp ET, respectively) and elevation decreases along those ramps, relative to the NB-HCE, three overlapping noise barriers were investigated on the westbound NB-HCE at the maximum allowable uniform height of 18 feet. The three-part noise barrier "system" was modeled from approximately where the NB-HCE roadway crosses NJ Route 440 to the west to approximately where the NB-HCE roadway crosses the New Jersey Transit Hudson-Bergen Light Rail and Conrail tracks to the east.

The three-part potential noise barrier "system" totals approximately 4,412 feet in length and would provide a noise level reduction ranging from 0 to 5 dBA. Out of 62 total impacts, which includes the 56 equivalent dwelling units calculated for the impacted portion of Mercer Park and three dual-family residential structures (six total dwelling units) on Merritt Street and Garfield Avenue, none would benefit from the noise barrier. In other words, none of the impacted receptors that the noise wall is intended to mitigate would achieve the minimum required noise level reduction of 5 dBA. Noise level reductions within Mercer Park would be barely perceptible, ranging from 2 to 4 dBA. Noise levels on Merritt Street and on Garfield Avenue at the three dual-family residential structures (6 dwelling units) would be reduced by a maximum of 1 dBA or less, which is well below the ability of the human ear to perceive a difference in noise level. A total of three supplemental benefits would result from this potential three-part noise barrier "system" within the western section of the Jersey City Housing Authority's Curries Woods neighborhood on Ruby Brown Place. In other words, non-impacted receptors behind the potential noise wall would achieve 5 dBA noise level reductions. As the three-part noise barrier "system" would not provide benefit to any of the impacted receptors as intended because it would not

yield the minimum required noise level reduction of 5 dBA at impacted receptors, the three-part noise barrier "system" is not a recommended mitigation measure.

3.9.5.3 Information for Local Officials

To prevent future traffic noise impacts on undeveloped land, the Authority, under its traffic noise policy, is required to inform local officials of the distance to the future 66 dBA L_{eq} noise level. As discussed within Section 3.9.2.3, one undeveloped parcel on the east side of JFK Boulevard in Bayonne, south of the NB-HCE roadway, was identified at 1248-1254 JFK Boulevard (Block 17, Lot 1). The City of Bayonne was contacted to confirm that there are no active permits on file for this parcel. Therefore, a receptor grid was modeled on this parcel to determine the distance at which noise levels would be 66 dBA L_{eq} in the future with the Proposed Action. Based on Proposed Action modeling, noise levels would reach 66 dBA L_{eq} up to 87 feet from JFK Boulevard. Beyond this distance, noise levels would be below impact criteria.

3.9.5.4 Construction Noise

Noise-sensitive receivers within project limits will experience an increase in noise levels during construction activities. Typical construction activities, such as roadway deck demolition, bridge repairs and milling/paving are known to produce high noise levels. Equipment such as, but not limited to hoe rams, jackhammers, impact pile drivers, rivet removers, concrete trucks, scarifiers, paving machines, backhoes, and dump trucks, may be utilized. Resultant noise levels can range between approximately 70 to 90 dBA at noise-sensitive sites.

Example construction equipment and resultant noise levels at a reference distance of 50 feet are shown in Table 3.9-5.

Table 3.9-5. Construction-Related Noise Levels at 50 feet

Equipment Type	Noise Level (dBA L_{max})
Mounted Impact Hammer (hoe ram)	90
Jackhammer	85
Rivet Buster/Chipping Gun	85
Impact Pile Driver	95
Pavement Scarafier	85
Concrete Mixer	85
Crane	85
Front Loader	79
Backhoe	80
Dump Truck	84

Source: FHWA Roadway Construction Noise Model User's Guide, Table 1.

For construction activities, standard specifications for inclusion in the proposed construction contract documents may include the following:

- All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
- Air compressors shall meet current EPA noise emission exhaust standards.
- Air powered equipment shall be fitted with pneumatic exhaust silencers.
- Stationary equipment powered by an internal combustion engine shall not be operated within 150 feet of noise-sensitive areas without portable noise barriers placed between the equipment and noise-

sensitive sites. Portable noise barriers shall be constructed of plywood or tongue and groove boards with a noise absorbent treatment on the interior surface (facing the equipment).

- Powered construction equipment shall not be operated before 8:00 a.m. or after 8:00 p.m. within 150 feet of a noise-sensitive site.

3.9.6 Conclusion

Based on the preceding assessment, the Proposed Action will have adverse impacts to noise at several receptors. However, with implementation of a proposed noise wall those impacts will be mitigated to the maximum extent practicable such that they would not be considered significant impacts. To minimize potential impacts from construction-period noise, the Authority has developed an Adaptive Management Plan (see Appendix H) to monitor for activities that result in increased noise levels and to define strategies for mitigating or adjusting that work to reduce potential impacts.

Appendix 3.10

Hazardous Materials and Contaminated Sites

3.10 Hazardous Materials and Contaminated Sites

3.10.1 Study Area Definition and Data Collection

Potential sources of hazardous materials and contaminated sites resulting from previous or existing uses were identified for the NB-HCE corridor between Interchanges 14 and 14A, with a particular focus on areas within 250 feet on either side of preliminary project limits of disturbance, through a Hazardous Waste Survey Technical Environmental Study Report (Dresdner Robin 2022) (Appendix E: Hazardous Materials). The purpose of the hazardous waste survey was to assess whether the soil or shallow groundwater that will be disturbed by project construction activities could contain hazardous waste or other contaminated materials requiring special handling or disposal.

3.10.2 Methodology and Criteria

The hazardous waste survey identified areas of potential environmental concern within and near the study area using a three-step process. The first step included a comprehensive review of relevant environmental information obtained through communications with appropriate local, county, state, and federal regulatory agencies. The starting point involved a review of NJDEP Site Remediation Profile and the NJDEP Site Remediation Program (SRP) GIS data via the NJDEP (2021a) NJ-GeoWeb website. Datasets and databases reviewed included but were not limited to: (1) Known Contaminated Site List, which are sites in the NJDEP SRP with confirmed or suspected contamination; (2) Deed Notice Areas, which are properties with deed notices due to contamination filed with the county where they are located; (3) Classification Exception Areas (CEAs) and Well Restriction Areas, which are sites with groundwater contamination with institutional controls to provide notice that groundwater contamination is present; (4) Chromate Waste Site Boundaries, which are properties in Hudson and Essex counties that currently have or previously had chromate processing waste levels above federal standards; (5) New Jersey Environmental Management System, which is the overarching database identifying sites regulated by NJDEP under one or more regulatory permitting or enforcement programs; (6) Underground Storage Tank Facilities, which are sites with effective, expired, pending, duplicate or terminated underground storage tank (UST) registration; and (7) Historic Fill, which delineates the extent of non-indigenous material deposited to raise the elevation or change the grade of a property. SRP interests intersecting the study area were identified and reviewed further at NJDEP (2016) DEP DataMiner. Additional data provided by DEP DataMiner include the "Case Tracking Tool," which provides the schedule of site regulatory milestones, and "Site Remediation Program Site Detail," which provides details for current and historic activities at a site subject to the NJDEP SRP. A commercially available database search service, Environmental Data Resources, Inc. (EDR), was also consulted to identify contaminated properties or properties with hazardous waste interests. To capture relevant sites within 250 feet of the preliminary project limits, the buffer for the EDR database review was extended an additional 250 feet for a total of 500 feet. The database search compiled information from numerous federal and state environmental databases. Federal databases include but are not limited to the National Priority List, Superfund Enterprise Management System, and Resource Conservation Recovery Act Hazardous Waste Large, Small, and Very Small Quantity Generators databases. State databases include but are not limited to the New Jersey State Hazardous Waste Site (i.e., Known Contaminated Sites in New Jersey) database, New Jersey Leaking Underground Storage Tanks (i.e., UST Active Remediations database), and New Jersey Release (i.e., the Hazardous Material Incident Database).

The second step of the process consisted of a review of sources of historic property information, including aerial photographs extending back to 1930, Sanborn Fire Insurance Maps for the years 1885 to 1979, Hopkins Maps from the late nineteenth and early twentieth centuries, and other historic maps of the study area. The sources of historic information were acquired through a commercial source, EDR, as well as historic map libraries, and online sources. Historic land use information was reviewed to assess whether historic land uses might have contributed to contamination within the study area.

The third step consisted of a "limited" site reconnaissance, including photo documentation, to identify areas of potential environmental concern that may adversely impact the Proposed Action. Field surveyors identified and described: (1) current land uses and operations within the study area; (2) potentially contaminated sites, based on observed conditions; and (3) properties with underground or above-ground storage tanks. Properties were visually inspected from the property boundaries and did not include inspection of the interior of any buildings. The site reconnaissance was conducted by Dresdner Robin on 15 days between May 2021 and July 2022.

In addition, the NJDEP Regional Enforcement Office (Hazardous Waste and Water Resources) and appropriate EPA Region II Office were contacted to determine if any actions or complaints have been filed against businesses within the study area. Information about UST properties undergoing groundwater monitoring was also sought from the NJDEP Division of Waste Enforcement, Pesticides and Release Prevention, Bureau of Underground Storage Tanks, which has information on the presence of groundwater monitoring wells. NJDEP file reviews were performed on Known Contaminated Site properties that potentially intersect or are located directly adjacent to the study area. Information was gathered from appropriate agencies on any recent or pending hazardous waste incidents. Lastly, Open Public Record Access requests were submitted to the NJDEP, Essex Regional Health Commission, Hudson Regional Health Commission, City of Newark, City of Bayonne, and City of Jersey City.

The assessment of potential impacts and measures for addressing contaminated sites and other sources of hazardous materials identified as having the greatest potential to affect construction of the project were identified through analysis of the potential for disturbing or encountering contamination. All sites identified in the Hazardous Waste Survey Technical Environmental Study Report were reviewed, with particular emphasis given to sites identified as potential environmental constraints to construction because of contamination. The proximity of these sites under the Proposed Action alternative was identified by overlaying the site property boundaries on the project preliminary limits of disturbance using GIS software. The degree of potential impact was assessed based on the severity of contamination and the proximity of the site/contamination source to the preliminary project limits; the history of site operations (current/former) and remedial activities; and the existence of engineering/institutional controls or interim remedial measures at the site.

The analysis of potential impacts related to contaminated materials that could result under the Proposed Action alternative considered the potential for encountering contaminated soil and groundwater and other hazardous materials during the construction of the Proposed Action. Contaminated soils, sediments, and groundwater are likely to be disturbed during subsurface construction activities. The type of contaminants encountered, and the impacts of the contaminated materials will largely be dependent on the level of disturbance, or extent of excavation required for specific construction activities. Mitigation measures are also discussed to identify means of avoiding potential impacts to human health and the environment during construction, as well as after the project is completed and operational.

3.10.3 Existing Conditions

Numerous contaminated sites have been previously identified in and near the study area (Figures 3.10-1a and 3.10-1b). The contamination is generally due to extensive past and present industrial and manufacturing activities in the area surrounding the project. Sites include chromate sites, Superfund site-related issues, and presence of contaminated historic fill. There are no identified brownfield redevelopment areas in or near the study area.

From the larger group of contaminated sites, 22 sites in and near the study area identified as areas of potential environmental concern. These sites are identified in Table 3.10-1.

Table 3.10-1. Areas of Potential Environmental Concern

Name	Property Owner	Block	Lot	Address	City	Preferred ID Number
Interchange 14 Toll Plaza	New Jersey Turnpike Authority	Adjacent to 5084.01	24	NB-HCE	Newark	013187
Pierson's Creek NPL	Troy Chemical	5084	82.01 & 102	1 Avenue L	Newark	G000001344
New Jersey Turnpike Authority Maintenance District 7	City of Newark	5084.01	24	NB-HCE	Newark	013186
T & J Landfill	Port Street Redevelopment Corp.	5084	82.01	70 Port St.	Newark	G000000428
NB-HCE Under "NH" Ramp @ Interchange 14 (Mystic Bulk Carriers)	New Jersey Turnpike Authority	5084	102	NB-HCE under ramp at Interchange 14	Newark	G000039090
Colonial Pipeline	Colonial Pipeline	5078.04	84	984 Doremus Ave.	Newark	G000031911
BP Marine Americas	City of Newark	5078.01	15	350 Coastal St.	Newark	012499
Hudson County Chromate Site 148	City of Newark	5078.01	15	350 Coastal St.	Newark	G000008764
Distribution Center at 888 Doremus Ave	Salson Logistics	5078	60 & 60.1	888 Doremus Ave	Newark	000933
Chem – Fleur Inc.	Chem-fleur Urban Renewal Corp	5078	90	150 Firmenich Way	Newark	208649
Newark Bay Study Area	City of Newark	Newark Bay	91	Newark Bay	Newark	332812
Hudson County Chromate Site 144	New Jersey Turnpike Authority	Block 13, Lots 1, 15, 16 and 18; Block 11, Lots 1 and 2; Block 19, Lot 1; Block 22, Lot 1; Block 23, Lot 19; Block 32, Lot 21; Block 37, Lot 1; Block 42, Lots 1 and 30; Block 48, Lot 1; Block 50, Lot 1; Block 74, Lot 1; and Block 8, Lots 3 and 5		W 48th St. & NB-HCE	Bayonne	G000008760

Name	Property Owner	Block	Lot	Address	City	Preferred ID Number
Marist High School	1241 John F. Kennedy Boulevard IPX, LLC	13	1, 15, 16 & 18	1241 Kennedy Blvd.	Bayonne	020638
161 West 57th Street	Private Individuals	13	3	161 West 57th Street	Bayonne	11-09-16-1333-18
1144 Avenue C	Ivory, J & F & J Pellitteri	27	3	1144 Avenue C	Bayonne	019196 & 032771
Bowling Alley Property	One Garfield LLC	28; 30203	4&5; 4	1-17 West 55th Street & 1 Garfield Ave.	Bayonne & Jersey City	NA
PSE&G Greenville Substation	Public Service Electric & Gas Co.	30302	2	41 Garfield Ave.	Jersey City	585211269
IMTT Bayonne Curries Yard		30305	2 to 6	Former Morris Canal	Jersey City	794826 & 002552
Jersey City Municipal Service Center	City of Jersey City	30305	23-36, 29 & 30	13-15 E. Linden Avenue	Jersey City	591925
Rapid Industrial Plastics	City of Jersey City	30305	30	13-15 E. Linden Avenue	Jersey City	010540
Hudson County Chromate Site 21	Consolidated Rail Corp.	30306	4&5	NB-HCE at Pier 20 & 21	Jersey City	G000008649
101 Linden Avenue East	A-B PP Holdings For Jersey City, LLC	27401	29&30	101 Linden Ave. E	Jersey City	835978

Note: Bold font indicates known contaminated sites identified as potential environmental constraints to project construction.
Source: Dresdner Robin (2022)

Figure 3.10-1a. Hazardous Materials and Contaminated Sites – Newark

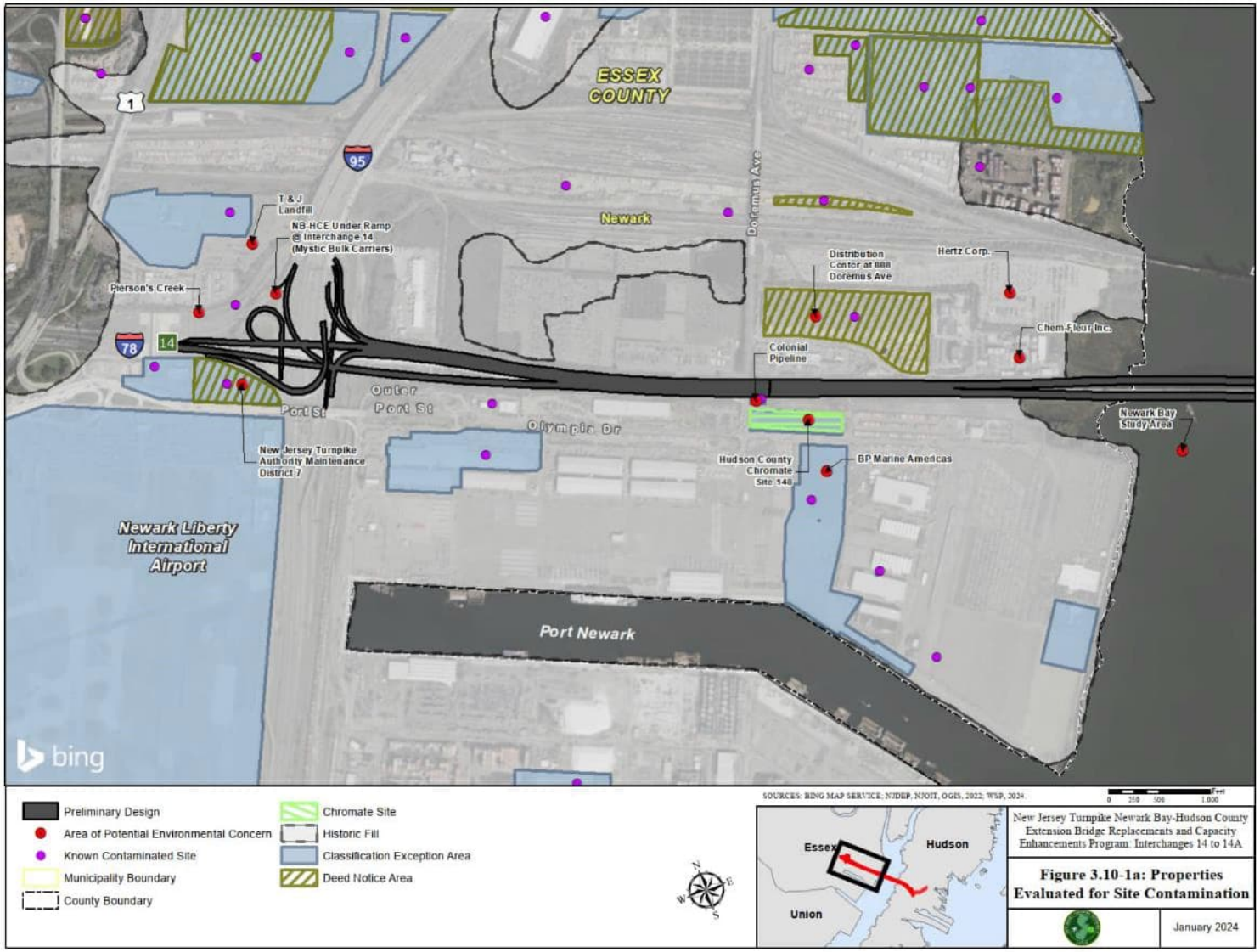


Figure 3.10-1b. Hazardous Materials and Contaminated Sites – Bayonne and Jersey City

Based on evaluation of such factors as the proximity to the project limits of disturbance, 14 of the sites are identified as environmental constraints potentially affecting the project's construction. These sites are indicated in bold in the table and are summarized from west to east in the following paragraphs. More detail regarding each of these sites can be found in the Hazardous Waste Survey Technical Environmental Study Report (Appendix E: Hazardous Materials).

Interchange 14 Toll Plaza – This site has contaminated soil due to a leaking UST that was removed in 1985 and historic fill. Remedial actions for soil contaminated with total petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), metals, and extractable petroleum hydrocarbons have been undertaken. A Notice in Lieu of a Deed Notice with engineering controls for PAHs and metals was issued on April 15, 2019.

New Jersey Turnpike Authority Maintenance District 7 – This site has contamination related to fuel storage; remediation is largely complete. Seven USTs were removed between 1990 and 1993. Investigations of the USTs were conducted from 1990 to 1996 and remedial investigations and product recovery were conducted from 2006 to 2013 as documented in a remedial investigation report dated March 2014. A Notice in Lieu of a Deed Notice was established on September 13, 2017, to address site-wide historic fill and potential for localized petroleum-related contamination (benzene, methyl t-butyl ether, total petroleum hydrocarbons, and light non-aqueous phase liquid [LNAPL]). Groundwater was impacted from the discharge of gasoline and historic fill constituents (PAHs and metals).

Pierson's Creek NPL – Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, Pierson's Creek has been listed on the EPA National Priority List (NPL) since 2014. The Lower Creek Section of Pierson's Creek Operable Unit 1, which comprises the creek itself, intersects a portion of the study area near the northwest portion of Interchange 14. Pierson's Creek is 1.5 miles long and flows from the southern Troy Chemical facility, which is one of several potential sources of contamination in the creek. Troy Chemical Corporation is an active chemical plant in operation since 1956 with a history of manufacturing mercury products and reclaiming mercury. A culverted section of Pierson's Creek Operable Unit 1 passes under the NB-HCE at the western extremities of Interchange 14 before turning east on the north side of the New Jersey Turnpike Authority Maintenance District 7 Maintenance Yard described in the preceding paragraph. Contaminants of concern include mercury, lead, nickel, chromium, arsenic, cadmium, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs) and PAHs, PCBs and dioxin/furans attributed to historical direct industrial process discharges, and wastewater and stormwater discharges from adjacent properties. Cleanup actions to date have not addressed mercury contamination in the creek. EPA is currently working on a remedial investigation/feasibility study for Operable Unit 1, which consists of the creek and upland areas where dredge spoils were side cast.

T & J Landfill – This site is within the Lower Creek Section of the Pierson's Creek Operable Unit 1, a Superfund site described in the preceding paragraph. Based on historical information, the landfill likely received unauthorized material while operating. The site underwent proper landfill closure, which incorporated the installation of an engineered cap and a landfill gas collection system. Contaminants of concern include metals, benzene, alpha-benzenehexachloride, PAHs, bis(2-ethylhexyl) phthalate, and naphthalene. A Deed Notice was recorded on March 26, 2010, memorializing the landfill cap, storm water management system, and landfill gas collection system installed at the site. A Deed Notice was implemented to address remaining soil contamination.

Colonial Pipeline – This site has contaminated soil due to two separate releases of diesel fuel. Previous soil sampling also indicated PAHs, metals, and extractable petroleum hydrocarbons above applicable standards which were attributed to historic fill. A Deed Notice was established on April 18, 2018, for PAHs, extractable petroleum hydrocarbons, arsenic, total chromium, and lead.

BP Marine Americas – This site is co-located with the Hudson County Chromate Site 148. A release of #2 fuel oil from above-grade piping occurred at one of the six former large ASTs on the property. The Remedial Investigation phase delineated exceedances of 2-methylnaphthalene, benzene, EPH, and naphthalene. LNAPL

previously was detected in monitoring wells at the site but has not been detected since 2009. CEA was established on August 21, 2019, for Historic Fill contamination including PAHs, lead and arsenic.

Hudson County Chromate Site 148 – Remediation at this site is complete and the site has been successfully closed. Contaminants of concern include PAHs, metals, and hexavalent and total chromium related to historical fill impacted by chromate production waste. Soil testing has revealed that concentrations of hexavalent and total chromium are not above standards. A CEA was established in August 2019 for historic fill contamination.

Distribution Center at 888 Doremus Ave – Investigations on this site in the 1990s and early 2000s identified historic fill contaminated soil (metals and PAHs). Engineering controls include pavement and buildings and no further action for soils or groundwater was recommended in 1997. A Deed Notice was filed in June 2000 for historic fill contaminated soil. In September 2008, soil adjacent to a diesel fuel above-ground storage tank was identified as impacted by petroleum hydrocarbons; bis(2-ethylhexyl) phthalate was detected above applicable standards. Impacted soil identified was excavated in 2010 and the backfill was capped with concrete, and no further investigation or remediation was required. However, LNAPL was discovered by a groundwater well on property in 2010 and the plume was delineated by groundwater monitoring from 2011 to 2016. Absorbent socks were installed for the removal of LNAPL, which is ongoing. Exceedances have also been identified for several VOCs and semi-volatile organic compounds (SVOCs)/PAHs, including Tentatively Identified Compounds (TICs). A CEA for VOC TICs and SVOC TICs was submitted with a remedial investigation report and established in July 2019 for a portion of the site; a CEA for historic fill related contaminants was submitted in January 2021 for the entire site.

Chem – Fleur Inc. – Community Right to Know surveys list numerous hazardous substances produced, stored and used at this property for the manufacturing of fragrance chemicals for perfumes, soaps, etc. No spills or releases have been reported, except for an air release on June 25, 1996. The potential exists for hazardous substances to impact soil and/or ground water if products did leak and if the floor is in poor condition. The site is located within an area mapped as historic fill, as is the adjoining section of the NB-HCE; historic fill possibly has impacted soil and ground water in the vicinity.

Newark Bay Study Area – Newark Bay has been heavily contaminated by multiple contaminant sources including two NPL Superfund sites under CERCLA: the Diamond Alkali Company and Pierson's Creek. Contaminants of concern include PCBs, polychlorinated dibenzofurans, pesticides, chlorinated herbicides, PAHs, and mercury. Diamond Alkali operated from 1951 to 1969 on the bank of the Passaic River at 80 Lister Avenue in the Ironbound neighborhood of Newark, approximately 4 miles up-river from the NBB. The Diamond Alkali plant operators manufactured numerous chemicals, including 2,4,5-trichlorophenol, which is likely to contain dioxin as an impurity. Cleanup of Newark Bay is in the planning phase. A multi-year remedial investigation/feasibility study is being conducted by Occidental Chemical Corporation's contractors with EPA oversight (EPA 2022b). The Diamond Alkali Superfund Site - Operable Unit 3 (Newark Bay) has entered into an Interim Remedy by the USEPA and supported by NJDEP's Contaminated Site Remediation & Redevelopment Program.

Hudson County Chromate Site 144 – This site includes several impacted blocks and lots within the study area where chromate production waste was used as historical fill, and potential health risk may exist from hexavalent chromium, total chromium, PAHs, and historic fill metals. Remedial actions have included excavation of hexavalent chromium impacted soil, placement of a cap, and institutional controls (Draft Notices in Lieu of Deed Notice and Deed Notices).

Marist High School – This site is co-located with the Hudson County Chromate Site 144. A 20,000-gallon #4 fuel oil UST was abandoned in place in October 1999. An Unrestricted Use AOC NFA was issued on March 14, 2001. A portion of the site is mapped by NJDEP as within Historic Fill.

Bowling Alley Property – The site is currently improved with a building housing a bowling alley. Based on GIS mapping the Morris Canal intersects the rear (southwest side) of this property. The Morris Canal was filled with undocumented material.

Hudson County Chromate Site 21 – Remediation at this site is complete and the site has been successfully closed. Contaminants of concern include hexavalent chromium antimony, beryllium, nickel, and vanadium. Remedial actions for this site consisted of excavations of impacted soil but there is potential for chromate production waste to occur. No Action Alternative.

3.10.4 No Action Alternative

Under the No Action Alternative, no potentially contaminated properties or sites with known contamination would be disturbed by the project. The likelihood of exposure to humans would be as under existing conditions except on those sites where remediation is ongoing or will be undertaken in the future, as is the case with the Pierson's Creek site and Newark Bay, which would have future continue remediation as part of the EPA Superfund program.

3.10.5 Proposed Action Alternative

3.10.5.1 Impacts

The presence of contamination potentially affects the development and construction of the project in multiple ways, including: (1) design of cut areas and other subsurface elements; (2) construction document specifications for managing and handling contaminated soils and groundwater; (3) regulatory oversight by NJDEP; (4) worker and public health and safety during construction; and (5) property acquisition process and costs, as well as liability concerns. In addition to the 10 sites identified in Section 3.10.3 as potential environmental constraints to project construction, historic fill, which typically contains contaminants including metals and PAHs at levels in excess of the NJDEP applicable soil remediation, is found along the NB-HCE based on NJDEP (2021a) mapping. Areas of historic fill mapped by NJDEP (2021b) are indicated on Figures 3.10-1a and 3.10-1b. Also, soil and groundwater contamination from transport and other vehicle spills and leaks along this portion of the NB-HCE is likely.

During project construction, historic fill and otherwise contaminated soil and/or water could be encountered in places along the entirety of the project during clearing, excavation, grading, demolition and the construction of piers and footings of the viaducts and bridges. Soil disturbance will also occur during construction of temporary and permanent access roads, construction staging areas, and stormwater basins. Construction activities within contaminated media (soil, sediment, ground water) have the potential to cause contaminants to migrate both vertically and horizontally. Contaminant release and transport mechanisms during construction include contaminated soil transported as dust and volatilization of contaminants from the soil and groundwater matrices to the soil vapor phase, and existing soil vapor contaminants. The most likely route of exposure will be through breathing volatile/semi-volatile compounds or particulate-laden air released during demolition, excavation, and construction activities.

A Licensed Site Remediation Professional (LSRP) will be retained to oversee the management of contamination encountered during the linear construction project. Coordination with and approvals from NJDEP will occur prior to the disturbance, handling, and disposal of any contaminated waste and materials, and appropriate preventive measures will be undertaken to protect the safety of the public, construction workers, and the greater environment from exposure to contaminated materials.

Pre-Construction Planning During Final Design – Pre-construction sampling of potential contaminated media (soil, sediment, and ground water) will be conducted throughout the project area, including within Newark Bay, to assess the nature and extent of contamination to be encountered during construction, determine remedial measures (if necessary), identify waste disposal or reuse options, and determine the level of health and

safety measures. A pre-construction sampling plan will be developed during final design to identify locations of contaminated material that may need to be managed during construction. The pre-construction sampling plan will be developed based on such design information as earthwork volumes, excavation limits, the exact horizontal and vertical limits of disturbance, and the exact areas of land to be acquired for project right-of-way.

Land to be acquired for the project will be evaluated by a Phase I Environmental Site assessment in conjunction with developing the sampling plan. Based on the presence of surrounding chromate production waste and contaminated sites throughout the study area, the properties to be acquired may be contaminated and environmental due diligence will be performed in accordance with NJDEP's Technical Requirements for Site Remediation. A Preliminary Assessment would be performed, as warranted, at each property to identify potential Areas of Concern and ensure "innocent purchaser" rights for the Authority. Based on the findings of the Preliminary Assessment, a Site Investigation would be conducted, as warranted, to determine if any discharges to the soil, ground water or sediment has occurred at the areas of concern in question. Further remedial investigations would then proceed to delineate the extent of contamination at the property, as warranted. Once contamination has been fully delineated and reported at the property, a Remedial Action Workplan will be prepared to specify the remedial action measures that would take place at the property, as warranted. The appropriate remedial action approaches may range from the implementation of institutional controls, such as a Deed Notice, which would allow soils above soil cleanup criteria to remain in place, to active remediation measures such as excavation and off-site disposal, in-situ treatment of contaminated groundwater and institutional controls such as a CEA. Upon the completion of remediation at the property a Remedial Action Outcome would be prepared and submitted to the NJDEP for site closure in the Site Remediation Program, as necessary.

Of the 14 contaminated sites identified as potential environmental constraints in Section 3.10.3, none are proposed for full or partial acquisition and no ground disturbance associated from the Proposed Action is anticipated on the parcels themselves. Further, the project is not anticipated to impact any properties within a Deed Notice restricted area. However, contaminants can spread via soil, water, and even walking from one place to another, so further investigations in proximity to these properties will be performed, including the collection of soil and groundwater samples, in advance of excavation or construction. Therefore, the sampling plan will focus on areas within the project limits of disturbance that are in proximity to the 14 properties.

Regarding the Newark Bay Study Area (Diamond Alkali) Superfund Site - Operable Unit 3, the Authority and USEPA have coordinated on the potentially coinciding timelines of the NBB Replacement and the Newark Bay remediation and have agreed to continue coordination on the respective projects. It is possible that USEPA's future remedy (not yet selected) for the Newark Bay Study Area will require construction activity proximal to the existing/new bridge alignment, to remediate comparatively elevated areas of contamination in surface sediment. The Authority has reviewed USEPA's current interim remedial plan for Newark Bay and focus areas proximate to the Newark Bay Bridge. The Authority will continue to coordinate with USEPA to share information on remediation and construction schedules to avoid conflicts. Currently, no conflicts between the two projects are anticipated.

Site investigation work plans will be developed to address the impacted areas in coordination with NJDEP and in accordance with all applicable regulations.

Information obtained from the pre-construction sampling activities will be used to determine specifications for contaminated materials management, dewatering means and methods, and health and safety procedures to be implemented during construction.

Construction – The project will require approval by NJDEP as a Linear Construction Project (LCP) since more than 200 cubic yards of contaminated material will be excavated during construction. The Authority will follow the NJDEP (2012b) Linear Construction Technical Guidance to ensure that contamination encountered during construction is handled in a manner that is protective of human health, safety, and the environment.

This technical guidance describes certain practices that should be followed to address contamination, including information on roles and responsibilities, project planning and implementation, best management practices (BMPs) for health and safety and contaminated media management, reporting, fees, and the involvement of LSRPs. As specified in the Linear Construction Technical Guidance, the person conducting an LCP should develop a materials management plan to provide a defined set of procedures to be employed when contaminated soil and ground water are encountered during construction activities.

Construction will be performed in accordance with the Authority's 2016 Standard Specifications and contract-specific specifications develop during final design and included in invitations to bid. The 2016 Standard Specifications, primarily, Sections 213 and 411, provide detailed provisions related to compliance with relevant regulations regarding pollution control during the excavation, handling, storage, and disposal of hazardous waste. The following summarizes the key provisions of the Specifications related to hazardous waste:

Excavation, Handling, and Storage. The Authority will not approve the use of any materials that are contaminated as defined by N.J.A.C. 7:26E-1.8 and NJDEP's most recent version of the Solid and Hazardous Waste Management Program Guidance Document on Contaminated Soil. Undesirable sources of borrow material include former and/or existing commercial and/or industrial sites where hazardous materials were used, handled or stored as part of the business operations, or unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Agricultural areas with former waste processes and/or historical pesticide/herbicide use are also considered an undesirable source. Regulated material excavation consists of the excavation and management of material of whatever nature encountered, that is classified as regulated or hazardous in the NJDEP Solid Waste Regulations, N.J.A.C 7:26-1 et seq. or N.J.A.C 7:26-8. The areas of known regulated material are identified on the Plans. The Contractor will handle regulated material according to applicable Federal, State, and local laws, rules, and regulations; and as specified herein.

Pre-excavation Plans.

a) Site-Specific Health and Safety Program (HASP). The Contractor will perform a hazard assessment of each proposed construction activity, and the Contractor will make independent evaluations regarding the appropriate level of health and safety requirements. The Contractor will employ a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP) to develop and oversee the Site-Specific HASP. The CIH/CSP will prepare the Site-Specific HASP to protect the Contractor's employees, any subcontractor's employees, the Authority's employees and consultants, and the public from contamination present in the areas requiring excavation, as shown on the Plans. The Contractor will ensure that the Site-Specific HASP complies with Federal, State, and local laws, rules, and regulations, including the health and safety requirements of OSHA 29 CFR 1910 and 29 CFR 1926. The Site- Specific HASP will include the requirements for a health and safety coordinator to monitor the working conditions during excavation procedures and during the handling of regulated material to ensure conformance with the approved Site-Specific HASP. The CIH/CSP will evaluate the need for air monitoring during excavation and loading operations of regulated material. If deemed necessary, the CIH/CSP or an assigned coordinator suitably trained and approved by the CIH/CSP for the work required will implement the air monitoring program.

b) Materials Handling Plan. The Materials Handling Plan (MHP) will be prepared for the regulated material (defined above) encountered, moved, and disposed of or recycled during construction. The MHP will include procedures for the following: excavation, stockpiling, receiving facility certification and permits, qualification(s) of licensed hauler(s), transportation routes, waste characterization data, and waste characterization forms.

c) Pollution Prevention and Control Plan. The Contractor will develop a Pollution Prevention and Control (PPC) Plan describing the methods of preventing discharge of regulated stormwater, ground water, sediments, and free product during stormwater control, excavation, and dewatering

operations. The Contractor will prepare the PPC Plan according to Federal, State, and local laws, rules, and regulations relative to regulated discharges. The PPC Plan will specify the measures to prevent stormwater run-on and runoff and measures for dewatering of excavations, dewatering of sediments, decontaminating personnel and equipment, and storing fuels and chemicals. When dewatering in areas of petroleum contamination, the Contractor will provide an oil-water separator with the dewatering basin or sediment control tank.

Sampling and Analysis. The Contractor will collect, transport, and analyze environmental samples required for facility acceptance of the material. The Contractor will perform sampling, testing, and inspections conducted in areas containing regulated material according to the Site-Specific HASP. The Contractor will perform the sampling, testing, and data management procedures according to NJDEP Field Sampling Procedures Manual, NJDEP Technical Requirements for Site Remediation, NJDEP Management of Excavated Soils Guidelines, Appendix 1 of the NJDEP Waste Classification Form, and USEPA requirements.

Transport and Disposal.

Once material leaves the project limits, the Contractor is responsible for ensuring that the handling procedures, placement method, and disposal location are according to applicable Federal, State, and local laws, rules, and requirements, including permits that may be issued for the Contract. The Contractor will dispose of other material or debris in accordance with the Solid Waste Management Act (N.J.S.A. 13:1E-1) and N.J.A.C. 7:26 et seq., and according to the solid waste management plan developed by the solid waste management district of origin. For each truckload of hazardous material will be accompanied by a bill of lading and waste manifest. The following are preliminary materials management procedures and considerations which may be implemented throughout the course of the project with respect to the 10 properties identified as environmental constraints in Section 3.10 and in general.

The following are preliminary materials management procedures and considerations which may be implemented throughout the course of the project with respect to the 10 properties identified as environmental constraints in Section 3.10 and in general.

Dewatering will be required to lower the groundwater table and reach the proposed excavation depths. Groundwater encountered during construction may be considered contaminated based on previous monitoring of several properties in the study area.

Several properties in the study area have been placed under a CEA restricting groundwater use for potable purposes due to pollutant exceedances above the state's primary drinking water standards. The preliminary project limits do not intersect any properties identified within a CEA. Nevertheless, due to the potential for groundwater contamination to be present nearby in these areas, precautions will be taken when performing subsurface activities to avoid contaminant migration and prevent contaminant exposure to workers, the public, and the environment. The property owner and LSRP of record will be contacted to determine if additional requirements are warranted prior to subsurface operations. Also, prolonged pumping should be avoided in these areas to prevent any contaminant plume capture and migration to unaffected properties. While the preliminary project limits do not overlap the New Jersey Turnpike Authority Maintenance District 7, contaminated groundwater may be encountered in the western end of the project due to the proximity of a CEA established for the adjacent parcels, both for PAHs and metals (Figure 3.10-1a). Other CEAs on adjacent properties have been established for chlorinated VOCs; benzene, toluene, ethylbenzene and xylene; and metals.

An open channel section of the NPL site, Pierson's Creek is approximately 250 feet to the north of the project limits. In this location, however, the Pierson's Creek NPL site comprises the creek itself and it then crosses via culvert under the NB-HCE. Pierson's Creek then remains in a culvert for the remainder of its length, crossing south under I-78, turning east north of the New Jersey Turnpike Authority Maintenance District 7 maintenance

yard, turning southeast in the maintenance yard, and passing under the northeast portion of the maintenance garage; it leaves the study area at Port Street and continues southeast beneath the NJ Turnpike Mainline roadway, paralleling the east side of the main roadway before terminating at the Port Newark Channel east of Corbin Street. Project construction is not expected to impact the cleanup activities associated with the Pierson's Creek site because surface excavation in this area is anticipated to be minimal, as it only involves constructing the lowermost portions of two new ramps. The first support piers for these ramps, where drilling shafts will be conducted, is more than 200 feet to the east of the Pierson's Creek culvert. The EPA, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. (CERCLA), as amended, is currently overseeing a remedial investigation/feasibility study of this Site. Pierson's Creek is contaminated with a number of hazardous substances, including but not limited to mercury, polychlorinated biphenyls (PCBs), lead, volatile organic compounds (VOCs) and other metals. While the project construction is not expected to impact Pierson's Creek because surface excavation in this is anticipated to be minimal, the activities could disturb contaminated sediments, so planning for those activities will include safeguards against adverse impacts to Pierson's Creek. Any contaminated conditions of the Pierson's Creek site would not be exacerbated during construction. The Authority will continue to coordinate with EPA related to any construction near Pierson's Creek to ensure that project construction does not interfere with ongoing investigation and remediation efforts at this NPL site.

The Colonial Pipeline property is another site where a CEA encompasses the entire property and where special groundwater management procedures may be necessary. This facility is approximately 25 feet from the edge of the elevated NB-HCE, but it would be protected during construction and no direct impacts are anticipated.

Appropriate groundwater management approaches will be used for the safe disposal of water removed from the ground during construction. Management of contaminated groundwater is considered a remedial action and the construction contractor will be required to keep records of this work for future reporting by the Authority. The construction contractor will develop and implement a dewatering effluent management approach and a Pollution Prevention and Control Plan as specified in Subsection 213.03(c) of the Authority's 2016 Standard Specifications. Typically, groundwater management approaches for the treatment of contaminated groundwater include obtaining a NJDEP Treatment Works Approval for the construction of a temporary groundwater treatment system; and discharge of treated effluent under a New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permit or discharge Publicly Owned Treatment Works through a connection endorsement and various authorizations. Other alternatives to groundwater treatment could include containerization and hauling of groundwater for off-site disposal and Discharge to Groundwater via infiltration basin or well points under Permit by Rule. Securing of dewatering permits will occur during final design and included as part of the construction specifications.

The T & J Landfill site was identified as a potential environmental constraint based on the site's historic landfill operations. While this property is not within the preliminary project limits of disturbance, measures may be considered for any construction activities that may be required near this site to prevent contaminant exposure to workers, the public, and the environment. A perimeter air monitoring plan may also be considered, as appropriate, to monitor landfill gas levels during construction.

The Chem – Fleur Inc site has been identified as a potential environmental constraint based on the site's current operations. Additional measures should be considered while performing construction activities within close proximity to this site to prevent contaminant exposure to workers, the public, and the environment. Based on the air pollutant exceedance observed at this site a perimeter air monitoring plan will be evaluated in further detail when working near this site.

Three areas in the study area are designated as Hudson County Chromate Sites (numbers 21, 144, and 148) due to impacts of chromate production waste. These sites are being remediated under the Hudson County Chromate Project. They typically have Interim Remedial Measures (IRMs) in place to prevent direct exposure to the public while remedial investigations are ongoing. However, any subsurface activity that disturbs an IRM

will require involvement from the responsible party's LSRP. In addition, the IRM must be restored in kind and under the supervision and direction of the responsible party's LSRP. Hexavalent chromium contamination is prone to capillary action. Capillary rise is the mechanism by which water is drawn out of the vadose zone by capillary tension into the overlying soil. Capillary action can contribute to frost heave and carry dissolved salts to the ground surface where the salts precipitate as the water evaporates, forming deposits in the surface soils or structures. For hexavalent chromium, chromium salts precipitate to the ground surface and oxidize, resulting in chrome blooms, which are considered by the NJDEP to be gross visual contamination that must be addressed. When designing structures within these areas, special consideration will be taken to avoid preferential pathways that can foster capillary action within surrounding structures. A perimeter air monitoring plan will also be considered when working in these areas, as the primary route of exposure for hexavalent chromium is inhalation. In accordance with the Linear Construction Technical Guidance dated January 2012, to isolate contaminated material that has been left in place, the Authority must restore and cap the disturbed area with a minimum of six inches of clean material (free of contaminants) or other suitable capping material (asphalt or concrete material) to prevent direct contact exposure from surficial contaminated soils. Capping and restoration follow requirements as outlined in the NJDEP's Chromium Guidance Moratorium dated February 8, 2007.

Constructing bridge foundations in Newark Bay will require sheet piling to construct cofferdams prior to excavation of sediments. BMPs will be considered, as appropriate, when designing structures and implementing construction activities within this area in order to minimize the potential toxicity impact to ecological receptors. Treatment of sediment-laden water may be required prior to discharging to surface water during cofferdam installations. BMPs will also be implemented for in-water work when handling contaminated sediment as specified in the NJDEP (1997) Dredging Technical Manual. The Authority will require the Final Design team to develop a comprehensive resuspension control plan that is consistent with the requirements of the NJDEP Waterfront Development Permit (the Water Quality Certification) to monitor the water column and to establish a procedure for potential corrective action to mitigate sediment resuspension during construction, if required. Measures to minimize impacts to surface waters from dewatering activities will follow NJDEP's Bureau of Water Allocation and Well Permitting (BWAWP) Construction Related Dewatering Guidance. Soil erosion and sediment control plans will be developed by the Authority during final design for certification by the Hudson-Essex-Passaic Soil Conservation District. Coordination by the Authority with the BWAWP will occur during final design on the type(s) for dewatering activities to be obtained by the contractors.

The existing NB-HCE right-of-way will be considered sensitive areas and soil excavated during construction activities may be designated as regulated material. Additional waste classification will be conducted to determine the presence of hazardous soils as defined by the Resource Conservation and Recovery Act. Soil excavated during construction would be classified in accordance with a developed sampling plan. If contaminated soil generated during excavation/trenching activities is classified as non-hazardous (ID-27), it could be reused as backfill, if necessary, at the same location, except when it contains free and/or residual product, gross contamination, or any hazardous waste. Soils excavated for these purposes will not be used to build berms or mounds so as to eliminate the potential for contaminant migration into clean areas. Soils with different lithology will be staged separately and the construction contractor will reconstruct the lithology as it was encountered. Excess regulated material generated that cannot be reused and backfilled will be stockpiled and sampled for off-site disposal. Regulated material excavated during project construction exhibiting possible contamination (e.g., staining and odors) will not be used as clean backfill unless demonstrated as such through analytical testing.

Portions of the project limits are adjacent to or intersect railway properties. Typical pollutants associated with railway infrastructure include PAHs, heavy metals, and to some extent PCBs. Other potential contaminants of concern could likely be widespread pesticide use. As a result, contaminated soil and groundwater (i.e., hazardous substances) may exist within the limits of the project corridor. These areas are an example of where the handling of regulated ID-27 non-hazardous soils for on-site reuse and/or off-site disposal during excavation activities will occur. In these areas, the treatment and discharge of groundwater to either a publicly owned treatment works or surface waterbody during dewatering activities may be warranted. Additional measures should be considered while performing subsurface activities to prevent contaminant exposure to workers, the public, and

the environment. Also, a site-specific health and safety plan (SSHASP) will be prepared in accordance with 29 CFR 1910.120 and Hazardous Waste Operations and Emergency Response regulations to define the requirements necessary to protect nearby residents and workers involved in the remedial activities to be conducted within the project limits. The contractor(s) undertaking the remedial actions and construction activities will prepare a SSHASP for review and approval prior to the commencement of any work. The SSHASP will also conform to the requirements of Subsection 213.03(a) of the Authority's 2016 Standard Specifications.

The NBB and most structures to be demolished as part of construction activities were built prior to the 1970s and likely contain asbestos-containing material and lead-based paint. Also, because lands to be acquired for the project have been used for industrial activities, among other things, further investigation will be performed to confirm the presence and content of asbestos-containing material, lead-based paint, and other contaminants during final design and prior to construction and demolition activities. Asbestos, lead-based paint, PCB-containing oil in electrical equipment, and other hazardous materials will be removed in accordance with regulations by NJDEP, New Jersey Department of Community Affairs, and New Jersey Department of Labor, as well as the Federal Occupational Safety and Health Administration, USEPA. In addition, although not anticipated to be encountered within the project limits, any USTs that would be impacted by construction would be removed in accordance with local and NJDEP regulations.

Pollution Control Specific to Bridge Structures. The existing coating system on previously painted bridges contains red lead and/or basic lead Silico Chromate paints as components. Activities such as bolt removal, torch or mechanical cutting, welding on structural steel and other activities related to the items described herein may cause lead or other hazardous materials to be emitted. The Contractor will include provisions in the Pollution Control Plan, Lead Health and Safety Plan, and Emergency Management Plan to address exposure activities as described above. Existing conduit located within Authority safety walks and other locations may be made from Transite (Asbestos material). The Contractor will include provisions in the Pollution Control Plan and Asbestos Health and Safety Plan to address asbestos exposure activities as described. The containment, storage and collection of debris will be done in strict conformance with all OSHA, Federal Environmental Protection Agency, NJDEP and other regulatory agencies with jurisdiction, rules, regulations, standards, and guidelines in effect at the time of the work. Debris storage of materials removed from all steel structures required in the project will be in accordance with NJDEP Hazardous Waste Management Regulations. The Contractor will account for all coating debris conveyed to the secured storage site and all coating debris transported from the project to the hazardous waste treatment/disposal facility.

Waste designated as hazardous will be picked up, transported and recycled or disposed of in a manner described in the Contractor's pollution control plan and in accordance with all applicable Federal and State regulations, including, but not limited to, New Jersey Department of Environmental Protection (NJDEP) hazardous waste regulations (NJAC 7:26-1, 4, 7-13A, 16, 16A and 17).

3.10.5.2 Conclusion

Based on the preceding assessment, the Proposed Action will have minimal impact on hazardous materials. The systematic approach to identifying site contamination has occurred during project development and the Authority will continue to coordinate with USEPA on NPL sites. As noted in Section 3.10.5.1, further investigations, including sampling of soil and groundwater, will occur during final design to identify measures to be undertaken during construction to protect public and worker health and safety and avoid the spread of contamination. The sampling plan and protective measures will be developed in coordination with USEPA, NJDEP, the counties, and the municipalities, as well as with relevant property owners, as appropriate. By following this approach, no significant impacts will result.

Appendix 3.11

Natural Resources

3.11 Natural Resources

3.11.1 Study Area Definition and Data Collection

The study area for assessing natural resources encompasses all areas within 250 feet of the anticipated limit of disturbance based on preliminary design plans with the following exceptions: (1) the study area was reduced in areas where the study area crossed a rail line, parking lot, or any development that would not be altered by the Proposed Action, and (2) the study area was expanded near Newark Bay to account for changes to the NB-HCE roadway alignment for the NBB replacement.

3.11.1.1 Geology and Soils Resources

The existing conditions of geology and soils in the study area were characterized based on existing data sources, including historic geotechnical borings, surveys conducted by the U.S. Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), U.S. Geological Survey (USGS), USACE, and other secondary sources.

3.11.1.2 Water Resources

Water resources in the study area were identified by reviewing existing maps and databases showing the extent of surface water, hydrology, tributaries, and anthropogenic uses, which included the following:

- USGS 7.5-minute topographic maps
- National Hydrography Dataset (USGS 2022)
- Aerial photography (2020 and historic)
- National Wetlands Inventory (USFWS 2022a)
- Wetlands of New Jersey (from Land Use/Land Cover 2012 Update) (NJDEP 2012a)
- Land Use/Land Cover of New Jersey 2015 (NJDEP 2015)
- Federal Emergency Management Agency (FEMA) FIRMs.
- New Jersey Surface Water Quality Standards (New Jersey Administrative Code [N.J.A.C.] 7:9B, June 2005), as provided by the NJDEP (2021a) NJ-GeoWeb map viewer
- NJDEP (2022) 2018/2020 New Jersey Integrated Water Quality Assessment Report
- Various water and sediment quality characterizations from studies undertaken by the PANYNJ, the USACE, the NJDEP New Jersey Toxics Reduction Workplan for NY-NJ Harbor, and the EPA Regional Environmental Monitoring and Assessment Program.

Water quality standards for water resources are based on the various NJDEP and EPA regulations and guidelines. Groundwater resources are characterized based on field investigations and information from the New Jersey Geological Survey.

3.11.1.3 Wetlands

Prior to performing field investigations, existing maps and databases were reviewed, including the datasets described above, underwater resources, plus the USDA-NRCS (2022) soil mapping. After a desktop review, wetland scientists performed a wetland delineation within the study area between April 29 and May 20, 2021. Wetlands were delineated using guidelines established in the 1989 Interagency Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Wetlands, as defined in this manual, are those areas that are inundated

or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands thus possess three characteristics: 1) hydric soils, 2) wetland hydrology, and 3) hydrophytic vegetation. Wetland scientists used the USACE "National Wetland Plant List: Northcentral Northeast Region" (USACE 2020) as a guide to identify hydrophytic vegetation. Wetlands, open waters, and streams were photographed and categorized as defined in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Delineated wetlands were also classified according to N.J.A.C. 7:7A-3.2 based on resource value (exceptional, intermediate, and ordinary). The width of a transition area varies by resource classification: 150 feet adjacent to an exceptional value resource wetland, 50 feet adjacent to an intermediate resource value wetland, and zero feet adjacent to an ordinary resource value wetland. Anticipated transition areas were assigned to wetlands delineated in the study area.

3.11.1.4 Floodplains

The identification of the potential floodplains was performed through a review of available Flood Insurance Rate Maps (FIRMs) prepared by FEMA under the National Flood Insurance Program. The National Flood Hazard Layer (NFHL) and FIRM panels (34013C0178F, effective date 6/4/2007; and 34017C0103D, effective date 8/16/2022) were accessed from the FEMA NFHL Viewer. In addition, areas of flood risk and associated water-surface elevations for flooding in the study area were reviewed in the Flood Insurance Study for Essex County (FEMA 2020) and the Flood Insurance Study for Hudson County (FEMA 2006). Various other FEMA flood risk mapping products were also reviewed.

3.11.1.5 Coastal Zone and Tidelands

NJDEP administers the State of New Jersey's coastal management program through their Coastal Zone Management Rules defined at N.J.A.C. 7:7. New Jersey's rules provide for a balancing between economic development and coastal resource protection, recognizing that coastal management involves explicit consideration of a broad range of concerns. In New Jersey, the Waterfront Development Law (N.J.S.A. 12:5-3) and related requirements (N.J.A.C. 7:7-2.3) provide the authority for issuance of permits for, among other activities, the placement or construction of structures, pilings, or other obstructions in any tidal waterway. New Jersey's Rules on Coastal Zone Management are employed by the NJDEP's Division of Land Resource Protection in the review of permit applications and coastal decision-making; they address issues of location, use, and resources.

3.11.1.6 Aquatic Biota

To describe aquatic biota within Newark Bay, prior aquatic biological surveys were reviewed to prepare a composite summary of the expected seasonal occurrence of aquatic wildlife in the study area. Previous biological investigations have characterized the seasonal distribution and composition of the fish community in various habitats and areas of New York/New Jersey Harbor, including Newark Bay. Several fish sampling studies have been conducted in the general vicinity of the study area, including:

- The USACE New York District surveyed seasonal use patterns and distribution trends of finfish in New York/New Jersey Harbor from October 1998 through September 1999 (USACE 1999). Sampling was conducted bi-monthly using a 30-foot Wilcox flat bottom trawl and ichthyoplankton tows were made using a 0.5-meter net with 500-micron mesh netting mounted in a benthic sled.
- USACE (2002) provided supplemental data to the 1998 to 1999 surveys to obtain additional information on the distribution patterns of the egg and larval stages of demersal species with emphasis on winter flounder. Sampling was conducted from December 2000 through June 2001. During this program, three stations were located within navigational channels and three were located within shoal areas in Newark Bay.

- USACE (2003, 2004a, 2005, 2006) documents the continuation of the USACE's monthly trawl and ichthyoplankton sampling program from December 2001 through July 2005.
- The National Marine Fisheries Service (NMFS) characterized the seasonal distribution and composition of the fish community in various habitat areas in Newark Bay as part of an evaluation of a flood control project for the Passaic River Basin (NMFS 1994).
- During 1995 to 1996, PANYNJ conducted a fisheries sampling program in support of the Newark Bay Confined Disposal Facility Environmental Impact Statement. Monthly surveys using a 30-foot Wilcox flat bottom trawl were conducted at four shallow water stations in Newark Bay (LMS 1996).
- USACE (2012) prepared a summary report focused on juvenile and adult spawning winter flounder occurrence and utilization within the New York/New Jersey Harbor, incorporating data collected as part of the Aquatic Biological Survey bottom trawl program from 2002 to 2010 by the USACE during the Harbor Deepening Project. Six stations were in channel and non-channel locations within Newark Bay.
- Migratory Finfish Surveys were conducted in 2006 and 2011 to 2013 as part of the New York and New Jersey Harbor Deepening Project, a USACE- and PANYNJ-sponsored project to deepen navigation channels to 50 feet to accommodate larger commercial vessels. Six stations were in channel and non-channel locations within Newark Bay.

3.11.1.7 Terrestrial Vegetation and Wildlife

Terrestrial vegetation and wildlife in the study area were described based on numerous sources, including field surveys. Data were obtained from NJDEP reports and file searches, reports for the Newark Bay Study Area (e.g., Tierra Solutions 2015), and the NJDEP NJ-GeoWeb and Landscape Project GIS databases (NJDEP 2017, 2021a). A qualitative habitat and vegetative community survey was performed to provide a general description of land use, identify the upland habitats present in the study area, and to confirm the information obtained from the reports reviewed and NJDEP's databases.

3.11.1.8 Special-status Species

To determine whether any potential habitat for ESA- or state-listed threatened and endangered species existed in the study area, information about the historic or current species occurrence was obtained and evaluated. The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database identified species that are listed and candidates under the Endangered Species Act (ESA), and Birds of Conservation Concern (USFWS 2024a). The NMFS (2022a) ESA Section 7 Mapper and the NJDEP (2017) Landscape Project mapping were also reviewed. The Landscape Project was developed by the NJDEP Division of Fish and Wildlife (Fish and Wildlife) Endangered and Nongame Species Program (ENSP) as a wildlife-habitat mapping program that is used to identify and map critical habitats for endangered, threatened, and special-concern wildlife. Consultation with the NJDEP Natural Heritage Program was also performed to search the state Natural Heritage Database for locational information of rare species and ecological communities within the study area and its vicinity (see Appendix F: Biological Resources). Consultation was also undertaken with the NMFS Greater Atlantic Fisheries Office.

A habitat assessment for special-status species was performed in the field in tandem with the wetland delineation between April 29 and May 20, 2021. Ecologists evaluated habitats for the likely presence or absence of rare, threatened, or endangered plant and animal species. Ecologists identified any suitable habitats, as well as dominant vegetation, hydrologic regimes, and levels of human disturbance. Structures that could potentially be used for nesting by state-listed raptors were also investigated, such as bridges, utility towers, billboards, rooftops, and bridges. Identified nests were viewed using a spotting scope.

3.11.2 Methodology and Criteria

3.11.2.1 Geology and Soils

The assessment of the effects on geology and soils from the No Action and Proposed Action alternatives were evaluated based on existing data sources, including surveys conducted by the USDA-NRCS, USACE, USGS, and other secondary sources. The Proposed Action, as defined by the limits identified on preliminary design plans, was overlayed on these datasets and the underlying geology and soils was judged with respect to anticipated construction activities.

3.11.2.2 Water Resources

Surface Water Quality

The assessment of effects to surface water quality from the No Action and Proposed Action alternatives were evaluated based on their anticipated effects on baseline water quality of ponds, perennial and intermittent streams, wetlands, tidal channels, and waterbodies. The following documents were reviewed to determine the requirements for addressing impacts to surface waters during the construction and operational phases of the Proposed Action: NJDEP (2011) Stormwater Best Management Practices Guide; NJDEP (2004) Highway Agency Stormwater Guidance Document; NJDEP (2019) Stormwater Discharge Master General Permit Renewal; and NJDEP (1999) Technical Manual for Stormwater Permitting.

Groundwater Quality

To evaluate effects to groundwater quality, the documents listed above were also used. Stormwater that is not introduced into surface water may not infiltrate pervious areas and impact groundwater quality given the poor soil permeability discussed above. However, the depths to groundwater and confined and unconfined layers were determined. Infiltration testing and groundwater monitoring will be performed during final design. Groundwater recharge criteria that are applicable to the Proposed Action, such as the stormwater infiltration criteria in New Jersey's recently updated Stormwater Management Rules (N.J.A.C. 7:8), were identified.

Due to the presence of known and potential contaminated sites in the vicinity of the study area, groundwater quality is a subject of many hazardous waste studies, as detailed in Technical Appendix 3.10.

3.11.2.3 Wetlands

E.O. 11990 Protection of Wetlands, states that no federally approved project will occur in wetlands unless there is no practical alternative to constructing in the wetlands. The impacts to regulated wetlands from the Proposed Action were quantified by overlaying the preliminary design plans onto maps of delineated wetlands and calculating the areas of temporary and permanent impacts for the various types of proposed infrastructure or construction activity.

In New Jersey, the USACE jurisdiction includes coastal waterways/wetlands, waterfront development areas, and other waters within 1,000 feet of the mean high water line (MHWL). Per the Coastal Zone Management Rules (N.J.A.C. 7:7), MHWL is the intersection of the land with the water surface at the elevation of mean high water. The MHWL elevation varies along the oceanfront and the tidal bays and streams in the coastal zone. The MHWL of Newark Bay in the study area is 2.38 feet AMSL (North American Vertical Datum of 1988). Wetlands above MHWL are considered freshwater and wetlands at or below are considered tidal. The NJDEP Division of Land Resource Protection regulates the use and development of coastal resources through the Waterfront Development Law and the Coastal Zone. State regulation over wetlands is determined by obtaining a Letter of Interpretation (LOI) from the NJDEP. An LOI indicates the presence or absence of wetlands, State open waters, or transition areas; verifies or delineates the boundaries of freshwater wetlands, State open waters, and/or transition areas; and assigns a wetland resource value classification. Although NJDEP is the only authority that gives resource value classifications to wetlands, an estimate was provided based upon field review of the wetland and potential special-status habitat occurrence within the wetland.

3.11.2.4 Floodplains

E.O. 11988, Floodplain Management, directed federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. The impacts to regulated floodplains from the Proposed Action were quantified by overlaying the preliminary design plans onto the NFHL (based on and FIRM panels) and calculating the areas within delineated flood zones.

3.11.2.5 Coastal Zone and Tidelands

The Federal Coastal Zone Management Act of 1972 (16 USC 1451 et seq.) was enacted to balance the competing demands of growth and development with the need to protect coastal resources. This is primarily achieved through coastal zone management programs adopted by states to regulate land use activities that could affect coastal waters. To evaluate the Proposed Action's consistency with the New Jersey Coastal Zone Management Rules (N.J.A.C. 7:7), each policy or rule was reviewed to confirm that the Proposed Action Alternative would be carried out in a manner consistent to the maximum extent practicable with those enforceable policies.

Tidelands, formerly known as riparian lands, are all those lands now or formerly flowed by the mean high tide of a natural waterway. These are public lands subject to certain state rights and one must obtain permission from the State to use these lands. For the tidally claimed areas that would be impacted by the Proposed Action, the Authority would confirm whether there is a Tidelands License or Riparian Grant for these areas and if any licenses are still valid. If there is no grant or licenses are no longer valid, then the Authority would apply for a new Tidelands Instrument for work proposed within the claimed areas.

3.11.2.6 Aquatic Biota

The impacts to aquatic communities from the No Action and Proposed Action alternatives were evaluated via a literature and data review. Based on this review, for the Proposed Action, potential impacts to Newark Bay and wetlands were identified by overlaying the preliminary design plans onto maps of delineated wetlands and open waters. Also, the proposed construction methods and sequencing was reviewed and the locations and area of proposed infrastructure within Newark Bay was evaluated. Of value to this assessment are data from various aquatic biology surveys and analysis considered in the Essential Fish Habitat (EFH) Assessment (see Appendix F), surveys as part of the USACE Aquatic Biological Monitoring Program, various species-specific source documents compiled by NMFS, and information collected for the 1997 Final Environmental Impact Statement for the Newark Bay Study Area. In addition, comments and reviews by various state and federal agencies, primarily the NJDEP and NMFS have also been incorporated to provide an accurate assessment of potential impacts to the aquatic resources during the construction and operational phases of the Proposed Action.

3.11.2.7 Terrestrial Vegetation and Wildlife

The impacts to terrestrial vegetation and wildlife from the No Action and Proposed Action alternatives were evaluated via a literature and data review, including reconnaissance-level field surveys conducted concurrently with wetland and waterbody surveys in 2021. Data were obtained from the NJDEP Natural Heritage Program, the NJDEP Landscape Project databases, and various agency studies and reports. Direct impacts on habitat and vegetation were estimated by overlaying the preliminary design plans onto maps of existing ecological communities to identify areas of potential impact. Impacts to migratory birds covered under the Migratory Bird Treaty Act of 1918 were evaluated to ensure that the Proposed Action does not result in the "take" of any migratory bird, or the parts, nests, or eggs of such bird. Also, for compliance with the Bald and Golden Eagle Protection Act (BGEPA), impacts to bald and golden eagles were evaluated. Impacts to special-status species, including ESA- and state-listed species, are covered below in the next section.

3.11.2.8 Special-status Species

The impacts to special-status species from the No Action and Proposed Action alternatives were evaluated based on the habitat preferences for various species known or suspected to be in the study area, as well as the quantity and quality of existing habitat. Impacts were analyzed using recent data on the potential for these species to inhabit the study area, including wetland field surveys and habitat assessment observations, and professional expertise and judgment.

3.11.3 Existing Conditions

3.11.3.1 Water Resources

The study area is located within two sub-watersheds of the Newark Bay watershed (12-digit hydrologic unit code [HUC]: 020301040203) and one sub-watershed of the Upper Bay-The Narrows watershed (12-digit HUC: 020301040205). As depicted in Figure 3.11-1, areas west of the NJ Turnpike Mainline/Interstate 95, including most of Interchange 14 in Newark, are within the Newark Airport Peripheral Ditch sub-watershed (14-digit HUC: 1402030104010010). Also, an open channel of Pierson's Creek occurs approximately 250 feet to the north of the study area, but it flows through the study area via a culvert under the NB-HCE until it discharges into the Port Newark Channel. This stream is discussed further in Section 3.10.3 of Technical Appendix 3.10, as it is an NPL site. Areas east of Interchange 14A and west of Avenue C in Bayonne, including the NBB, are within the Newark Bay/Kill Van Kull (14-digit HUC: 02030104010020). This portion of the study area contains the tidal waters of Newark Bay, including both open waters and wetlands along the shoreline, and several freshwater wetlands. Areas east of Avenue C, including Interchange 14A, drain into Upper New York Bay and are within the Upper New York Bay/Kill Van Kull sub-watershed (14-digit HUC: 02030104010030). Only one feature, Stream DFL-S, was identified in this portion of the study area.

The State of New Jersey's annual rainfall typically ranges between 32 and 48 inches with an average of 45.3 inches from 1895 to present. Newark averages on the high end with a mean of 44.61 inches per year at Newark Liberty International Airport (Rutgers University 2022). Most of the rain falling on the Newark Bay watershed eventually enters Newark Bay in the form of runoff or groundwater influx, the amount of which is highly variable and dependent on the annual climatic conditions.

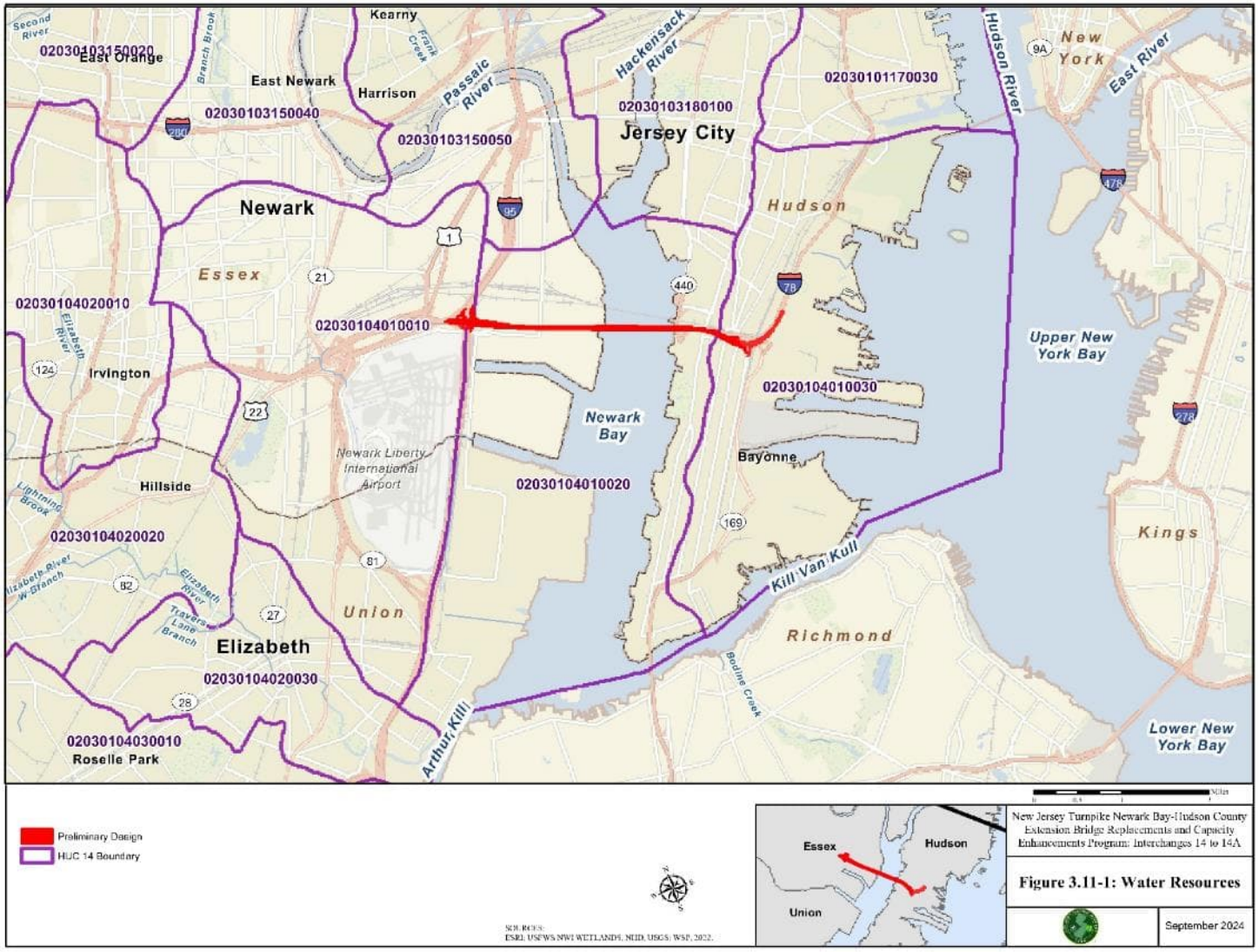
The NBB spans approximately 4,300 linear feet of open water and tidal wetlands (below the MHWL). Newark Bay begins at the confluence of the Passaic and Hackensack Rivers in northeastern New Jersey and is part of the New York-New Jersey Harbor system. The bay is connected to Upper New York Bay by the Kill Van Kull and to Raritan Bay by the Arthur Kill, through which tides originating in the Atlantic Ocean enter. The hydrodynamics of the system is predominantly controlled by three forcing mechanisms: freshwater flows (buoyancy sources), tides, and winds. Tidal currents in Newark Bay and in the Passaic and Hackensack Rivers are found to be moderate, with maximum amplitudes of 0.5 m/second.

Within the navigation channel of Newark Bay, classic estuarine gravitational circulation occurs, with daily averaged currents (the current averaged over several tidal cycles) directed seaward near the surface and landward near the bottom. data also suggests that while the mean depth-averaged flow in the main navigation channel of Newark Bay is landward, the net flow along the channel flanks is seaward. This classic estuarine gravitational circulation pattern can be broken down – that is, the daily averaged currents become uniform throughout depth – during periods of very low freshwater discharge from the Passaic River. During these periods, the daily averaged currents in Newark Bay are directed largely landward (north) at all depths except near the surface. Strong and persistent winds can have a major effect on water circulation in the Newark Bay Complex, and in the estuary. During periods of strong west winds acting synoptically over the New York Bight region (that is, including the coastal ocean area offshore of the harbor estuary), the water level in Raritan Bay is lowered, producing a strong pressure gradient from the Kills to the open ocean. Under this condition, the daily averaged currents are directed seaward (south) out of Newark Bay and through the Kill van Kull. During periods of strong east winds acting synoptically over the New York Bight region, the water level in Raritan Bay is raised,

producing a strong pressure gradient from the open ocean toward the Kills. Under this condition, the daily averaged currents are directed landward in through the Kill van Kull and into Newark Bay. Annual flow calculations by Blumberg et al. (1999) concluded that approximately 60 percent of annual flows into Newark Bay come from the Kill van Kull, and 34 percent from the Hackensack and Passaic Rivers combined, while net discharge to Raritan Bay occurs through Arthur Kill. Additional details about Newark Bay hydrology can be found in the Newark Bay Study Area Remedial Investigation Work Plan (Tierra Solutions 2005).

Water resources in Newark Bay have been impacted for over 150 years by intense urban and industrial development, including extensive dredging, bridge construction, and heavy commercial shipping. The development of the Newark Bay shoreline and nearshore zone with a variety of urban and facilities has modified the area's hydrology, degraded water quality, and altered biotic communities. Over the years, most of the salt marsh wetlands that fringed Newark Bay were lost through filling or degraded as a result of invasive vegetation or mosquito control measures (Tierra Solutions 2005).

Figure 3.11-1. Water Resources



Surface Water Quality

Newark Bay is designated with a surface water quality classification of "SE3" (N.J.A.C. 7:9B), indicating saline waters of estuaries. This includes the open waters associated with an unnamed tidal tributary that flows into the west side of Newark Bay below the north side of the NBB. "SE3" is the general surface water classification applied to saline estuarine waters that have the least protective designated uses (i.e., they are managed for lower water quality than those classified as SE1 and SE2). In SE3 waters, designated uses per N.J.A.C. 7:9B-1.12(f) are: (1) secondary contact recreation; (2) maintenance and migration of fish populations; (3) migration of diadromous fish; (4) maintenance of wildlife; and (5) any other reasonable uses. The 2018/2020 New Jersey Integrated Water Quality Assessment Report indicates that only five of the 19 water monitoring stations in Newark Bay fully supported general aquatic life use criteria. High nutrients, total phosphorus, and impairments associated with nutrient over-enrichment are the common cause of aquatic life impairments.

Newark Bay receives water from the Hackensack and Passaic Rivers. These and other navigable waters in the vicinity have been a center of industrial activity since the Industrial Revolution, receiving direct and indirect discharges from numerous industrial facilities. Newark Bay was once believed to be among the most polluted water courses in the United States, suffering from severe pollution and industrial abandonment in the twentieth century. It is known to contain several chemical constituents, including but not limited to PCBs, PAHs, pesticides, herbicides, VOCs, SVOCs, dioxins, polychlorinated dibenzofurans, and metals (Tierra Solutions 2013). Historical and present-day discharges of dioxins and other chemicals have occurred from several sites in Newark, Kearny, Jersey City, and Bayonne. Also, garbage, sewage, and contaminants have been released into the waters of Newark Bay, its adjoining tributaries, and tidal areas through dumping, storm sewers, and combined sewer overflows. Extensive shipping traffic in Newark Bay, as well as pipeline and facility operations, have resulted in numerous oil and chemical spills, also leading to contamination of Newark Bay Study Area sediments (Tierra Solutions 2013). Impairments from chemical contamination have been documented in Atlantic tomcods, killifish, and many other aquatic species. Tomcods in Newark Bay had polychlorinated dibenzo-p-dioxins levels over 19 times higher than the tomcods sampled in the Hudson River (Yuan et al. 2006). Bugel et al. (2010) studied the health of killifish in Newark Bay and found that these fish suffered from morphological changes indicative of impaired reproductive health and endocrine disruption.

Water quality parameters of temperature, salinity and dissolved oxygen vary considerably within Newark Bay across the seasons. These variations reflect typical meteorological and hydrological conditions in Newark Bay and the waters that flow into it (Arthur Kill, Kill van Kull, Hackensack and Passaic rivers). Annual low water temperatures of around 2 degrees Celsius occur in late December/January, and seasonally high temperatures up to 24 degrees Celsius occur June through August (USACE 1997). Salinity ranges from around 3 parts per thousand (ppt) to 21 ppt over the year, with salinities greater than 12 ppt in spring through fall and lower salinities in winter. Dissolved oxygen values in the summer are relatively low at 4 to 7 milligrams per liter, with highs of 10 to 14 milligrams per liter in the winter months.

As detailed in Section 3.10.3, the Newark Bay Study Area is included as part of a Superfund site due to its contaminated bottom sediments, as well as portions of the Hackensack River, Arthur Kill, and Kill van Kull. Newark Bay is Operable Unit 3 of the Diamond Alkali Superfund site. The historic manufacture of herbicides at a facility along the Lower Passaic River, upstream from Newark Bay, resulted in considerable contamination of area sediments by a variety of toxic substances including DDT and dioxin. The Newark Bay Study Area of the Diamond Alkali Superfund site includes Newark Bay and portions of the Hackensack River, Arthur Kill, and Kill van Kull. As a result of this contamination, the state of New Jersey prohibits consuming blue crab and gizzard shad and recommends very limited consumption of other fish from Newark Bay (NJDEP/NJDOH 2021). Newark Bay has not undergone Superfund remediation as of 2022.

Groundwater Quality

The study area is not in a EPA Sole Source Aquifer region; however, surficial and bedrock aquifers are present in the vicinity of the study area. The western portion of the study area is underlain by the Brunswick aquifer

and the eastern portion is underlain by the Diabase aquifer. Both aquifers are fractured-rock aquifers of the Newark Basin Part of the Piedmont, where groundwater is stored and transmitted in fractures (i.e., confined-flow conditions) (Herman 2001). A surficial, glacial aquifer is present, associated with Newark Bay and adjacent areas, defined as lake bottom sediment (Herman et al. 1998). Because of the study area's proximity to tidal waterways and the Atlantic Ocean, the natural groundwater table is anticipated to be near sea level. Groundwater recharge is likely provided by infiltration from precipitation through the soil and percolation to the water table, although due to the extensive impervious cover (including impacted gravel) in the study area, the potential for recharge is limited. Some recharge may occur along Newark Bay, along with saltwater intrusion. Freshwater wetlands located above the MHWL elevation may have groundwater at or above the soil surface for portions of the growing season, based on surface hydrology observations.

Groundwater monitoring wells were not installed in historic borings for the existing NBB; however, groundwater measurements were recorded in several historic borings during or immediately after the completion of drilling. The depth to groundwater ranged from zero to 14 feet below the surface within the study area and was highly variable due to seasonal variation in rainfall, temperature and variations in soil or rock permeability. No known groundwater monitoring wells were identified within the study area. Further information will be obtained during geotechnical investigations and groundwater data will be used to inform where appropriate controls may be required during construction activities to protect groundwater from exposure to contaminated soil, spills, and dewatering and excavation.

Groundwater contamination exists in the study area and groundwater use restrictions are in place in several locations. Twenty known contaminated sites were identified as part of hazardous waste investigations, further described in Section 3.10.3 of Technical Appendix 3.10. The contamination is generally due to extensive past and present industrial and manufacturing activities in the area surrounding the study area. Groundwater in eastern Newark adjacent to Newark Bay was reported by Hochman (1976) to have high chloride concentrations due to relatively heavy groundwater withdrawals. This pumping lowered the groundwater level in these areas, reversing the natural gradient between the ground and surface waterbodies, and induced a flow of salt water from the river and bay into the underlying water-bearing formations. Hochman (1976) pointed to the dredging of ship canals in Newark Bay and the Passaic River as a probable contributing factor in saltwater intrusion by removing semi-impervious sediments that acted as an imperfect barrier to the infiltration of saltwater.

3.11.3.2 Geology and Soils

The study area is in the Piedmont physiographic region, which is located between the Atlantic Coastal Province and the Appalachian Province (Tiner 1985). The area west of Newark Bay is underlain by sedimentary rocks (mainly siltstones and shales, and conglomerates) and east of Newark Bay is underlain by igneous rocks (basalt and diabase), and metamorphic rocks (schists and gneiss). These rocks are from the mid-Triassic to early Jurassic periods. Bedrock underlying Newark Bay consists of the Lockatong Formation (light to dark gray silty argillite and laminated mudstone that has been thermally metamorphosed to hornfels where intruded by diabase), Passaic Formation (interbedded red-brown sandstones and shales), and Jurassic diabase (dark gray to black, moderately fractured igneous rock). Almost the entire Bay (including Passaic and Hackensack River Basins) was subjected to glacial erosion and deposition as a result of the last stage of the Wisconsin glaciation. Large quantities of stratified sand, silt, gravel, and clay were deposited in a glacial lake covering the area. These glaciofluvial deposits overlie bedrock and underlie wetlands, fill, and estuarine sediments (NMFS 1994; Drake et al. 1996; Tierra Solutions 2005).

Northeastern New Jersey has a "medium" risk of earthquake hazard (USGS 2014).

According to USACE (1997), sediments outside of the navigation channel within Newark Bay range in thickness from 30 to 45 feet and consist primarily of glacial outwash and till. The pattern of sediment types (sand/gravels versus silt/clays) is indicative of fluvial sediment input at the north end of the Bay, and tidal exchange sedimentation at the south end. Coarser sediments are found at the north end of Newark Bay at the

mouths of the Passaic and Hackensack Rivers. Within the study area, the central part of Newark Bay has primarily silty and clayey bottom sediments. Coarser sediments are also found at the southern end of Newark Bay due to the scouring effect of tidal currents. Based on a total of about 550 historic borings within the limits of the proposed structures, a wide range of subsurface soil and rock conditions are expected. A layer of miscellaneous or man-made fill has been observed within the entirety of the study area. Within the NBB main span and the approaches to the bridge, most of the subsurface conditions from available historical borings show a thin layer of soft to medium organic silt, underlain by a stratum of coarse to fine sand up to about 10 feet thick with varying amount of silt and gravel, and a stratum of clay and silt with varying amounts of sand and gravel and thickness of about 60 feet or greater. The eastern limits of the study area include primarily glacial deposits, silty sand to sandy silt, with coarse to fine gravel, cobbles and boulders. Bedrock over and west of Newark Bay is generally sandstone, sandy mudstone, siltstone, and shale. East of Newark Bay, the bedrock transitions to the diabase formation. Rock core recovery and rock quality designation varies significantly throughout the limits of the study area depending on the parent rock formation.

The Web Soil Surveys of Essex County and Hudson County, New Jersey (USDA-NRCS 2022) indicate that the soils within the study area consist of 16 map units. A mapping unit is a grouping of soils by their natural landscape and soil patterns. Most soil mapping units shown on detailed soil maps are phases of soil series. All soil phases within a soil series that are listed as hydric, or potentially hydric, are not necessarily hydric. By definition, a hydric soil is one that is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, July 13, 1994). Therefore, hydric soils are typically found within wetlands. Only one soil map unit in the study area is considered hydric – Westbrook mucky peat, 0 to 2 percent slopes, very frequently flooded. Westbrook mucky peat is mapped just east of Newark Bay, in wetland areas north and south of the NB-HCE. The soil map units within the study area are listed in Table 3.11-1 and depicted in Figures 3.11-2a and 3.11-2b.

Table 3.11-1. Soil Characteristics in the Study Area

Map Unit Symbol	Map Unit Name	Drainage Class	Depth to Water Table (in.)	Depth to Restrictive Layer (in.) *	Hydric Rating
BhgA	Bigapple loamy sand, 0-3% slopes	Somewhat excessively drained	>80	>80	0
GtbA	Greenbelt loam, 0-3% slopes	Well drained	>80	>80	0
LagA	Laguardia artifactual coarse sandy loam, 0-3% slopes	Well drained	>80	>80	0
LagB	Laguardia artifactual coarse sandy loam, 3-8% slopes	Well drained	>80	>80	0
UdkttB	Udorthents, loamy fill substratum, 0-8% slopes	Not classified	72	>80	5
URBHGB	Urban land, Bigapple substratum, 0-8% slopes	Not classified	>80	>80	0
UREOLB	Urban land, eolian substratum, 0-8% slopes	Not classified	>80	0	0
URKTTB	Urban land, loamy fill substratum, 0-8% slopes	Not classified	72	>80	0
URTILB	Urban land, till substratum, 0-8% slopes	Not classified	>80	0	0
URWETB	Urban land, wet substratum, 0-8% slopes	Not classified	20	0	5
WectA	Westbrook mucky peat, 0-2% slopes, very frequently flooded	Very poorly drained	0	>80	100

* "Restrictive Layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

Figure 3.11-2a. Soils – Newark

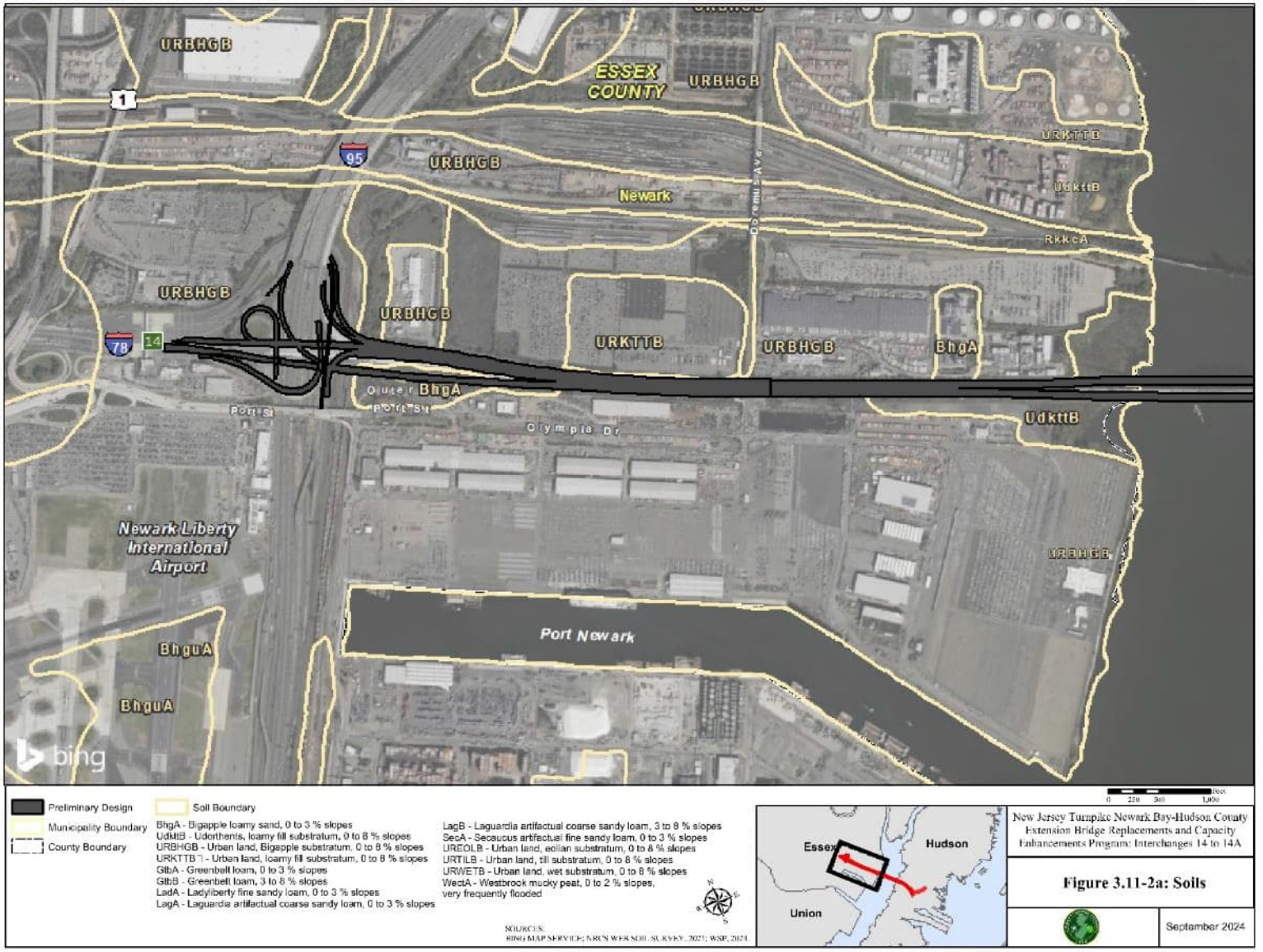


Figure 3.11-2b. Soils – Bayonne and Jersey City

3.11.3.3 Wetlands

Eighteen wetlands, one waterbody, and one stream were delineated within the study area, as shown in Table 3.11-2 and depicted in Figures 3.11-3a and 3.11-3b. Many of the wetland communities are associated with Newark Bay, including two tidal wetlands that directly abut the Bay and several adjacent freshwater wetlands that are within proximity to the Bay or the abutting wetlands. Wetlands in the Newark portion of the study area occur along and underneath the elevated roadway of the NB-HCE and are constricted by adjacent industrial land uses. Wetlands in the Bayonne portion of the study area are located near Newark Bay in the vicinity of Route 440, on both sides of the NB-HCE. An application for LOI verification has been submitted to NJDEP. An application for a request for an approved jurisdictional determination has been submitted to the USACE. There are no coastal wetlands mapped under the jurisdiction of the Wetlands Act of 1970.

Freshwater Wetlands

Freshwater wetlands are discussed further below, grouped according to their Cowardin et al. (1979) classification.

Palustrine emergent, persistent (PEM1) and palustrine emergent, Phragmites australis (PEM5) – Palustrine wetlands include all non-tidal wetlands. The emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes and the vegetation is present for most of the growing season in most years. In the study area, the wetlands in this community type are dominated either by persistent vegetation (PEM1) or *Phragmites australis* (PEM5). Palustrine emergent persistent vegetation observed within the study area includes swamp dock, (*Rumex verticillatus*), saltmarsh rush (*Juncus gerardii*), seaside goldenrod (*Solidago sempervirens*), field horsetail (*Equisetum arvense*), groundsel tree (*Baccharis halimifolia*), curly dock (*Rumex crispus*), and sensitive fern (*Onoclea sensibilis*). Most emergent wetlands observed in the study area were dominated by *Phragmites australis*. These wetlands are located landward of the MHWL, alongside the NB-HCE in Newark, and near Route 440 in Bayonne.

Palustrine forested, broad-leaved deciduous (PFO1) – These palustrine wetlands are forested and characterized by woody vegetation that is approximately 20 feet or taller. The PFO1 wetlands in the study area contain broad-leaved deciduous tree species including slippery elm (*Ulmus rubra*). The herbaceous layer was dominated by poison ivy (*Toxicodendron radicans*), common reed, and curly dock. The only PFO1 wetland identified in the study area was delineated in a portion of Wetland DFJ, located in Bayonne.

Palustrine unconsolidated bottom, cobble-gravel (PUB1) – These palustrine wetlands include ponded areas, with a cobble bottom, which characterizes Wetland DFC. The unconsolidated bottom class includes habitats with at least 25 percent cover of particles smaller than stones and a vegetative cover less than 30 percent. These ponds are shallow (less than six feet deep) and lack significant surface vegetation. Wetland DFC is located underneath the NB-HCE viaduct and is significantly disturbed by ongoing bridge rehabilitation construction.

One open water ditch (Stream DFL-S) was delineated within the cloverleaf of Interchange 14A in Jersey City and is classified as riverine ephemeral, which only flows after precipitation events. The drainage area of Stream DFL-S is approximately 15 acres, and its waters are confined within a lawfully existing, man-made drainage feature and would not be regulated under the Flood Hazard Control Act (N.J.A.C. 7:13-2.3(c)).

Table 3.11-2. Delineated Wetlands and Waterbodies

Delineated Feature Name	Cowardin Classification[1]	Acreage within the Project Limits[2]	Linear Feet within the Study Area	Type of Aquatic Resource	FWW Resource Value Classification
DFA	PEM5	0.636	--	Non-tidal wetland	Intermediate
DFB	PEM5	4.252	--	Non-tidal wetland	Intermediate
DFC	PUB1	0.039	--	Non-tidal wetland	Ordinary
DFD	PEM5	0.063	--	Non-tidal wetland	Intermediate
DFE	PEM5	0.101	--	Non-tidal wetland	Intermediate
DFF	PEM5	0.017	--	Non-tidal wetland	Ordinary
DFG	E2US3/E2EM5/ PEM1	0.809	--	Non-tidal/tidal wetland	Intermediate
DFH	PEM5	0.039	--	Non-tidal wetland	Intermediate
DFI	PEM5	0.052	--	Non-tidal wetland	Intermediate
DFJ	PEM1/PFO1	0.051	--	Non-tidal wetland	Ordinary
DFK	PEM5	0.345	--	Non-tidal wetland	Intermediate
DFL-S (Ditch)	R6	0.012	127	Ephemeral stream	Ordinary
DFP	PEM5	0.205	--	Non-tidal wetland	Ordinary
DFQ	PEM5	0.212	--	Non-tidal wetland	Intermediate
TSA	PEM5	2.024	--	Non-tidal wetland	Intermediate
TSB	PEM5	0.010	--	Non-tidal wetland	Ordinary
TSC	PEM5	0.467	--	Non-tidal wetland	Intermediate
TSD (Wetlands of Newark Bay)	E2EM1/PEM5	6.340	--	Non-tidal/tidal wetland	Exceptional/ Intermediate
TSD (Open Water of Newark Bay)	E1UB3	24.600	376	Tidal wetland	n/a
TSE	PEM1	0.672		Non-tidal wetland	Ordinary
TOTAL		40.895	503		

[1] Cowardin Classification Key:

E2EM1: Estuarine intertidal, emergent, persistent
E2EM5: Estuarine intertidal, emergent, *Phragmites australis*
E1UB3: Estuarine subtidal, unconsolidated bottom, mud
E2US3: Estuarine intertidal, unconsolidated shore, mud
PEM1: Palustrine emergent, persistent
PEM5: Palustrine emergent, *Phragmites australis*
PFO1: Palustrine forested, broad-leaved deciduous
PUB1: Palustrine unconsolidated bottom, cobble-gravel
R6: Riverine ephemeral

[2] Most delineated features extend beyond the study area boundary and the acreage presented are clipped to the limits identified on preliminary design plans

Tidal Wetlands

Newark Bay is a broad, navigable tidal waterbody classified as estuarine subtidal, unconsolidated bottom, mud (E1UB3) and was discussed previously under "Water Resources." Tidal wetlands occur on both sides of the bay and are discussed further below, grouped according to their Cowardin et al. (1979) classification.

Estuarine intertidal, emergent, persistent and common reed (Phragmites australis) (E2EM1/E2EM5) – In the intertidal subsystem, the substrate is exposed and flooded by tides. The E2EM wetlands in the study area are associated with tidal influence from Newark Bay and include shoreline areas of Wetland TSD on the west side of Newark Bay and Wetland DFG on the eastern side. This emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes and the vegetation is present for most of the growing season in most years. Portions of Wetland TSD in this community type are dominated by saltmarsh cordgrass (*Spartina alterniflora*) (E2EM1), and portions of Wetland DFG in this community type are dominated by *Phragmites australis* (E2EM5). Wetland TSD is bisected by Warehouse Place, where a portion of the wetland flows underneath the roadway through a culvert and is thus tidal westward to Doremus Avenue. The tidal portion of Wetland TSD receives tidal flow from Newark Bay and the remaining portion of the wetland is considered freshwater emergent (PEM5).

Estuarine intertidal, unconsolidated shore, mud (E2US3) – These estuarine wetlands are like those described above but have unconsolidated shores characterized by substrates lacking vegetation except for pioneering plants. The only E2US3 wetland found in the study area is associated with the tidal portion of Wetland DFG, which occurs infield of Route 440 in Bayonne. This wetland is connected to Newark Bay via a culvert under Route 440 in Bayonne.

Figure 3.11-3a. Wetlands – Newark

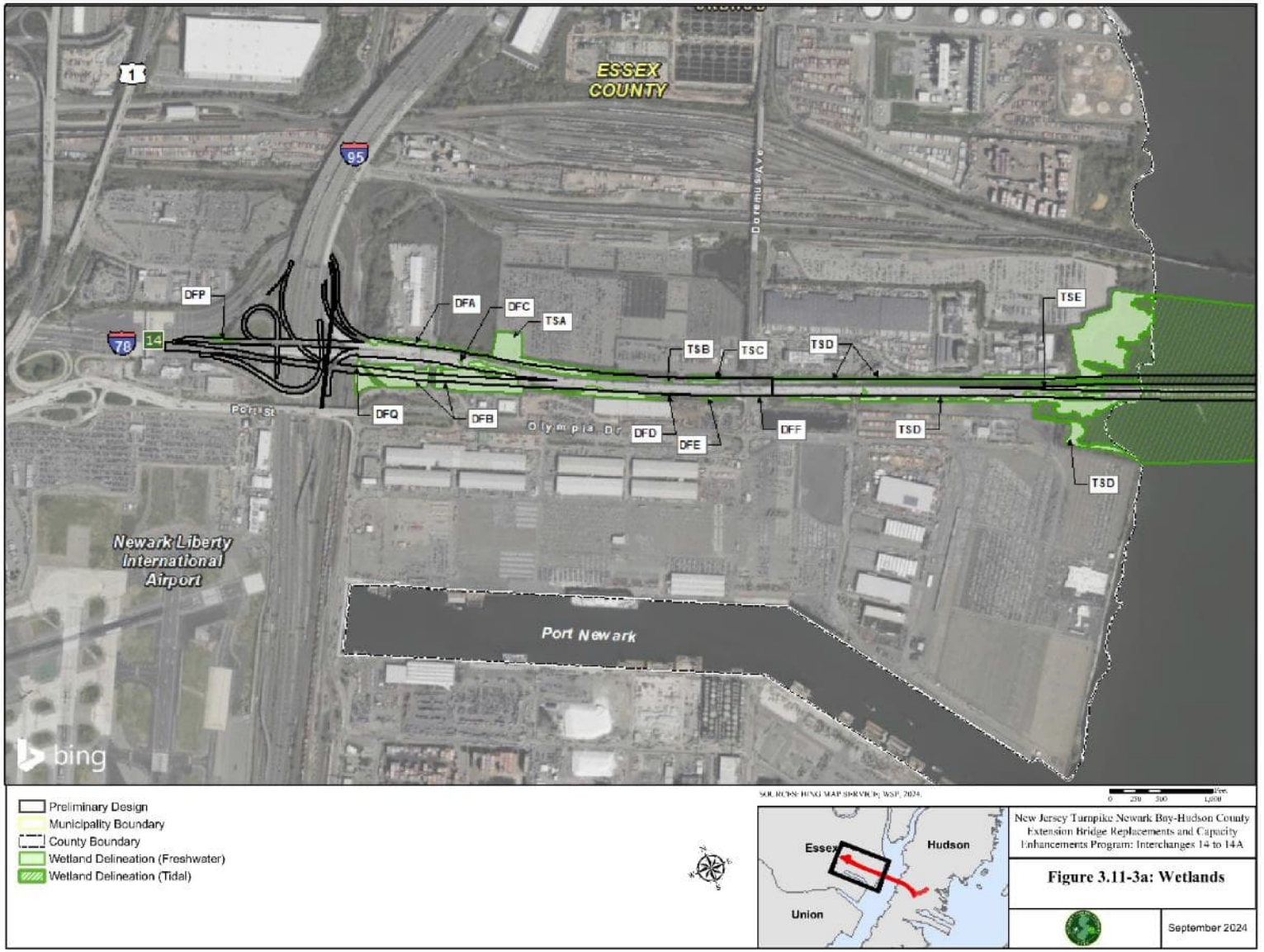


Figure 3.11-3b. Wetlands – Bayonne and Jersey City

3.11.3.4 Floodplains

Flooding is a common occurrence in coastal wetlands in the study area as tidal fluctuations cause flooding of wetland areas adjacent to Newark Bay. Less frequent flood events which, on average, are expected to be equaled or exceeded during any 100- or 500-year period are mapped by the FEMA in the study area. The 100-year flood zone and 500-year flood zone within the study area vicinity are shown on Figures 3.11-4a and 3.11-4b. For the most part, the existing NB-HCE is not within the floodplain. In places where it intersects a regulated floodplain, the NB-HCE structure is elevated above the floodplain on bridge/viaduct structures except for the piers and abutments that are located within the floodplain.

The effective FIRM panels show that Newark Bay and other low-lying areas in the study area are within the regulatory flood zone VE, which is subject to inundation by the 1-percent-annual-chance flood event and has additional hazards associated with storm waves. This flood zone has a base flood elevation of 8 to 15 feet within the study area (FEMA 2022). Additionally, the FEMA (2016) Flood Risk Map for the Essex County Coastal Project Area shows the area adjacent to Newark Bay is subject to coastal storm surges.

Major flooding events have occurred in the region resulting from the combination of significant storm events, as well as the tidal dynamics. USACE reports a history of significant events that caused "major" flood conditions in the Passaic River, some as recently as 2012, although NOAA indicates that many of the flooding events along the Passaic River are associated with channelization and regulation/diversion conditions in the river (USACE 2006a; NOAA 2011). This implies that not all major floods along the Passaic River resulted in flooding conditions in Newark Bay. Most recently, Hurricane Sandy's 12-foot storm surge submerged the Newark Bay shoreline in 2012, temporarily shutting down the nation's busiest container port. The inundation of flooding into Newark Bay during Hurricane Sandy was measured at 4 to 6 feet across Newark Bay in Elizabeth and the area around Newark Liberty International Airport (NJDEP 2014). With around 95 percent of Newark neighborhoods covered by buildings, roads, and other impervious surfaces, runoff from rainfall is a frequent source of flooding during sustained heavy rain events.

Figure 3.11-4a. Flood Zones – Newark

Figure 3.11-4b. Flood Zones – Bayonne and Jersey City

3.11.3.5 Coastal Zone and Tidelands

The study area is within a regulated waterfront development area of New Jersey. The New Jersey Waterfront Development Law regulates not only activities in tidal waters, but also the area adjacent to the water, extending from the MHWL to the first paved public road, railroad, or surveyable property line (minimum of 100 feet, to a maximum of 500 feet). As such, consistency with applicable Coastal Zone Management Rules (N.J.A.C. 7:7) must be determined. The Waterfront Development permit application would need to include a report and plans demonstrating compliance with the Flood Hazard Area Control Act rules as part of the coastal permit application.

New Jersey tidelands (formerly known as riparian lands) include all lands that are currently and formerly flowed by the mean high tide of a natural waterway. Tideland areas in the study area were identified in review of Land Use/Land Cover of New Jersey 2015 (NJDEP 2015). The areas under the NBB and extending back on the east bank 1,300 feet and on the west bank 3,200 feet, have been identified as containing tidelands claim area.

3.11.3.6 Aquatic Biota

In addition to freshwater wetland habitats, discussed above, the study area includes brackish and saltwater aquatic communities within Newark Bay. Newark Bay has a width ranging from about 0.6 to 1.2 miles. Within the study area, depths are generally less than 8 feet, except for the Newark Bay Main Navigational Channel North Reach, which passes under the Bridge and has an authorized width of 500 feet and a depth of 35 feet. The shoreline type along Newark Bay varies, consisting largely of riprap and bulkheads, with little natural shoreline remaining. The shorelines support algae, crabs, clams, and other invertebrates that serve as prey for fish like striped bass and bluefish. The western shore of Newark Bay below the existing bridge is riprap with tidal wetlands immediately north and south; the eastern shore of Newark Bay under the bridge is composed of riprap. Benthic habitats in Newark Bay in the study area tend to be dominated by silty-clay substrates and are degraded by contaminants. As such, the infaunal communities are relatively impacted in terms of species diversity and abundance (Iocco et al. 2000). Despite these impacts, the existing data as presented in Volume I of the Newark Bay Study Area Remedial Investigation Work Plan (Tierra Solutions 2005) indicate that Newark Bay supports a variety of vegetation, and fish and wildlife species (USACE 1997, 1999; NOAA 1994). The predominant categories of organisms include plankton/algae, aquatic and wetland plants, infaunal (benthic) invertebrates, bivalves (i.e., clams), crustaceans (i.e., shrimp and crabs), and various fish species occupying several trophic levels.

The NMFS EFH Mapper indicates that the NB-HCE corridor intersects EFH within Newark Bay for 11 fish species/management units (NMFS 2022b). In addition, the NB-HCE intersects one Habitat Area of Particular Concern (HAPC), the Mid-Atlantic HAPC for summer flounder (*Paralichthys dentatus*). NMFS identifies HAPC for juvenile and adult summer flounder across its entire range as "all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH" (MAFMC 2016). The surveys described in Section 3.11.1.6 were used to prepare a composite summary of the expected seasonal occurrence of EFH-designated species in the Newark Bay area (Table 3.11-3). Of the 11 species for which EFH has been designated in the Newark Bay area, early life stages (eggs, larvae and juveniles) of five species (winter flounder, Atlantic herring, windowpane flounder, Atlantic butterfish and summer flounder) have been collected there (LMS 1996; USACE 1999, 2002, 2003, 2004a, 2004b, 2005, 2006b). Newark Bay is designated as EFH for egg, larval, juvenile and adult stages of winter flounder, windowpane flounder, and red hake. The presence of winter flounder and windowpane flounder eggs suggests possible spawning near the study area. Juveniles and/or adults of 10 EFH-designated species (winter flounder, little skate, Atlantic herring, red hake, windowpane flounder, clearnose skate, bluefish, Atlantic butterfish, and summer flounder) have been caught in the study area during the various fish community studies performed in Newark Bay and the USACE's winter flounder and migratory finfish surveys conducted for the New York/New Jersey Harbor Deepening Program (USACE 1999, 2002, 2003, 2004a, 2004b, 2005, 2006b, 2012, 2015).

Table 3.11-3. EFH-Designated Species

Common Name	Eggs	Larvae	Juveniles	Adults
winter flounder (*Pleuronectes americanus*)	X	X	X	X
little skate (*Raja erinacea*)	--	--	X	X
Atlantic herring (*Clupea harengus*)	--	X	X	X
red hake (*Urophycis tenuis*)	X	X	X	X
windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
winter skate (*Raja ocellata*)	--	--	X	X
clearnose skate (*Raja eglanteria*)	--	--	X	X
longfin inshore squid (*Doryteuthis pealeii*)	X	--	--	--
bluefish (*Pomatomus saltatrix*)	--	--	X	X
Atlantic butterfish (*Peprilus triacanthus*)	--	X	--	--
summer flounder (*Paralicthys dentatus*)	--	X	X	X

Many of the fish species in Newark Bay are transient or migratory, passing through Newark Bay to upstream spawning grounds or entering the area seasonally from nearby ocean waters. These include migratory species, such as striped bass, American shad, and river herring, which depend on the estuary as a nursery and a forage area for juveniles and adults. Shad and river herring are currently "depleted" and experiencing low population abundances coastwide (ASMFC 2022a). Striped bass are overfished, as determined by a 2018 Benchmark Stock Assessment, but no longer experiencing overfishing relative to the updated biological reference points (ASMFC 2022b). Other species that frequent Newark Bay during similar life history stages include both marine and estuarine fish like winter flounder, bluefish (*Pomatomus saltatrix*), and summer flounder. Other fish species are year-round residents in Newark Bay; these generally begin spawning in late spring and continue throughout most of the summer following general onshore and offshore seasonal movement patterns (onshore in spring and summer, offshore to deeper waters in fall and winter). Most life stages of these species may be found in the estuary throughout the year. These species, such as the mummichog (*Fundulus heteroclitus*), bay anchovy, striped killifish (*Fundulus majalis*), provide an important forage base for larger predatory species.

The dominant fish species in the nearshore areas, or subtidal flats community, consist of small schooling fish like bay anchovy and Atlantic herring, with fewer larger fish like white perch and striped bass. Striped bass and Atlantic tomcod are more common in deeper waters of transitional zone and navigational channel (Tierra Solutions 2013). From seven shoal stations sampled by USACE (2004b) on the east side of Newark Bay, 28 species of fish were collected with a bottom trawl. Six species (striped bass, winter flounder, bay anchovy, Atlantic herring, Atlantic tomcod, and Atlantic silverside) dominated the catch from all shoal stations combined.

3.11.3.7 Terrestrial Vegetation and Wildlife

The expansion of industry and population surrounding Newark Bay has resulted in a severe reduction in the availability of natural habitats for indigenous and migratory wildlife (Tierra Solutions 2005). Due to the high human population density and extensive land development, terrestrial vegetation and wildlife habitat are extremely limited within the study area. The habitats that exist are remnants of the original ecosystem that contained a substantial diversity of plants and animals. The NJDEP (2015) Land Use/Land Cover of New Jersey 2015 indicates that the study area comprises approximately 54 percent urban land, 18 percent water, 19 percent wetland, 3 percent forest, and 6 percent upland grass/shrub.

Dominant vegetation in the upland communities in the study area include tree of heaven (*Ailanthus altissima*), slippery elm (*Ulmus rubra*), mugwort (*Artemisia vulgaris*), Japanese knotweed (*Reynoutria japonica*), red fescue (*Festuca rubra*), and Kentucky bluegrass (*Poa pratensis*). Most of the upland area in the study area consists of unvegetated gravel access area underneath the NB-HCE structure.

Due to this extensive development, terrestrial wildlife communities in the study area are thus largely composed of disturbance-tolerant species that are associated with fragmented habitats and forest edges, and those species that can habituate and co-exist with anthropogenic activities in disturbed settings. The following wildlife species were observed by ecologists during various site visits to the study area: snapping turtle (*Chelydra serpentina*), white-tailed deer (*Odocoileus virginianus*), northern diamondback terrapin (*Malaclemys terrapin*), ring-billed gull (*Larus delawarensis*), herring gull (*Larus argentatus*), red-throated loon (*Gavia stellata*), bufflehead (*Bucephala albeola*), American black duck (*Anas rubripes*), double-crested cormorant (*Phalacrocorax auritus*), fish crow (*Corvus ossifragus*), red-tailed hawk (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), black-crowned night-heron (*Nycticorax nycticorax*), yellow-crowned night-heron (*Nyctanassa violacea*), brant (*Branta bernicla*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), European starling (*Sturnus vulgaris*), peregrine falcon (*Falco peregrinus*), rock pigeon (*Columbia livia*). Nearly all wildlife observations were associated with Newark Bay or the adjacent marsh to the west.

Newark Bay and its associated tidal wetlands provide migratory stopover habitat for various bird species, including waterfowl, wading birds, and fish-eating species. Water-dependent migratory bird species were observed foraging in Newark Bay during the spring months. While the Newark Bay shoreline is generally rip-rapped with limited foraging habitat, intertidal areas with submerged vegetation and mudflats exposed during low tide are located along the western side of the Bay in the study area. Breeding was not directly observed in these marshes, but on structures within and in the vicinity of the survey area. A fish crow nest was observed on the Conrail bridge to the north of the study area, in Newark Bay, and a red-tailed hawk nest was observed on a billboard located east of the Bay, adjacent to the Conrail line and Route 440 in Bayonne. Nesting by state-listed species, including osprey and peregrine falcon, are discussed below under *Special-status Species*.

The USFWS (2024) IPaC provides a summary of migratory bird records as part of the IPaC Resources List report (Appendix F), which indicates eight migratory birds of conservation concern could be affected by activities within or near the study area: bald eagle (*Haliaeetus leucocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), chimney swift (*Chaetura pelagica*), eastern whip-poor-will (*Antrostomus vociferus*), king rail (*Rallus elegans*), red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), and wood thrush (*Hylocichla mustelina*). Of these, the bald eagle is the only species documented during field surveys, which is also protected by the BGEPA and listed by the State of New Jersey as an endangered species. Due to these protections, bald eagles are discussed further in the following section.

3.11.3.8 Special-Status Species

Certain rare and imperiled plants and animals are protected under the ESA and the New Jersey Endangered Species Conservation Act of 1973. The USFWS (2024) reported that one proposed endangered species, tricolored bat (*Perimyotis subflavus*) and one candidate species, the monarch butterfly (*Danaus plexippus*), are potentially affected by activities in this location. Potential roost trees may be present for tricolored bat. The host plant of monarch, common milkweed (*Asclepias syriacea*), was documented within an upland sample point adjacent to wetland DFE but no other patches of milkweed were observed within the project limits and there is very limited suitable foraging habitat within the surrounding developed lands. Important nectar-producing plants like goldenrods were not a dominant plant, as plant communities in the study area are dominated by invasive plants. USFWS also recommended that the project consider saltmarsh sparrow (*Ammodramus caudacuta*), as the species is currently under review for Federal listing per the ESA and likely to be listed in Fiscal Year 2024 (USFWS 2024b). Suitable high marsh habitat is present on the west side of Newark Bay but is limited within the project limits. There is a small area of low marsh south and adjacent to the Bridge (~1 acre), but the

low/high marsh matrix located north of the Bridge provides the most suitable saltmarsh sparrow habitat (~6 acres) located outside of the project limits.

The NMFS (2022a) ESA Section 7 Mapper reported that the study area intersects habitat potentially used by the federally endangered Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*). This includes migrating and foraging habitats within Newark Bay for adult and subadult Atlantic sturgeon and for adult shortnose sturgeon. Based on studies in Newark Bay, the potential occurrence of sea turtles in Newark Bay is highly unlikely and they are dismissed from further analysis. This finding is supported by the USACE Biological Assessment for the New York and New Jersey Harbor Deepening Channel Improvements Feasibility (USACE 2022d). There are no critical habitats found in the vicinity of the Proposed Action (USFWS 2024a, NMFS 2022c).

The NJDEP Natural Heritage Program reports that the survey area includes habitat patches that are potentially suitable for the following 13 state-endangered, threatened, or special-concern wildlife species, including three birds of prey, six wading birds, one shorebird, one butterfly, and two fish. These species are listed in Table 3.11-4 and suitable habitat for them, as mapped by the NJDEP Lands and Landscape Project, is shown in Figures 3.11-5a and 3.11-5b. Additionally, NJDEP indicates that the northern diamondback terrapin, a species of special concern, may occur in the study area. Two additional species, osprey (*Pandion haliaetus*) and yellow-crowned night-heron (*Nyctanassa violacea*), are also listed in Table 3.11-4, as they were observed in the vicinity of the survey area during field investigations.

Appropriate nesting habitat for the state-listed colonial waterbirds is not present in the study area. However, black-crowned night-herons, an extreme habitat generalist relative to other species, is known to occur in the study area and was observed on one occasion during field investigations in the tidal marsh west of Newark Bay. Yellow-crowned night-heron was also observed at the same time as the black-crowned night-heron, both foraging. The tidal marsh located west of Newark Bay, north of the NB-HCE is dominated by *Spartina alterniflora* and provides foraging habitat for wading bird species. All other tidal and freshwater marshes in the study area are mostly dominated by the invasive plant *Phragmites australis*.

Atlantic sturgeon and shortnose sturgeon could be present in the waters of Newark Bay and adjacent bays and tributaries. The New York Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments (DPS) of Atlantic sturgeon are endangered; the Gulf of Maine DPS is threatened. Adult and subadult Atlantic sturgeon originating from any of these DPSs could occur in the study area. Shortnose sturgeon are listed as endangered throughout their range. Because the young of both species remain in their natal river/estuary until about age two, and early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile Atlantic or shortnose sturgeon would occur within Newark Bay and adjacent bays and tributaries (see Appendix F).

In 2021, a state-endangered peregrine falcon nest was documented on the NBB located inside the arch of the bridge in bottom lateral (L7), approximately 500 feet from the west shore of Newark Bay. As part of the proposed replacement of the NBB, wildlife biologists began monitoring an active peregrine falcon nest just west of the bridge's main span in 2021. Fledglings were observed in both 2021 and 2022. In 2023 and 2024, the falcons were observed using a nest box that was installed on a NBHCE Pier W4 just west of Newark Bay, over land.

A bald eagle nest has been active for the past several years at Kearny Point near the confluence of the Hackensack and Passaic Rivers. It is a tree nest and is located approximately 1.5 mile north of the NBB (Smith and Clark 2015, 2020, 2021). The nest was first documented in 2015, and monitoring data suggests that its eggs hatch in late March and chicks fledge the nest in mid to late June. Per NJDEP monitoring, the nest has fledged young by early August during the past several years. Bald eagle reproduction in New Jersey officially begins on December 1, when nest building may commence, and ends on August 31, when fledging young has ended (USFWS 2007). The bald eagles from the Kearny Point nest potentially forage in the study area, although

infrequently during nesting due to the distance from the nest area. Bald eagles may also roost and forage in the study area outside of the nesting season, including during winter.

An osprey nest was observed during peregrine falcon monitoring in 2020, 2022, and 2024, and is located on the Conrail bridge to the north of the NBB. Although not confirmed, it is presumed that the nest has successfully fledged chicks due to the nest site fidelity of the osprey pair.

Table 3.11-4. Special-status Species

Common Name	Scientific Name	Federal Status	State Status	Suitable Habitat Present? (Type)
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Endangered	Endangered	Yes (Migration & Foraging)
bald eagle[1]	*Haliaeetus leucocephalus*	Protected	Endangered	Yes (Foraging)
black-crowned night-heron	*Nycticorax nycticorax*	Not Listed	Threatened	Yes (Foraging)
cattle egret	*Bubulcus ibis*	Not Listed	Threatened	Yes (Foraging)
checkered white	*Pontia protodice*	Not Listed	Threatened	No
eastern small-footed myotis	*Myotis leibii*	Not Listed	Endangered[2]	Yes
glossy ibis	*Plegadis falcinellus*	Not Listed	Special Concern	Yes (Foraging)
least tern	*Sternula antillarum*	Not Listed	Endangered	Yes (Foraging)
little brown bat	*Myotis lucifugus*	Under Review	Endangered[2]	Yes
little blue heron	*Egretta caerulea*	None	Special Concern	Yes (Foraging)
monarch butterfly	*Danaus plexippus*	Candidate	Special Concern	Yes
northern long-eared bat	*Myotis septentrionalis*	Endangered	Endangered[2,3]	Yes
osprey	*Pandion haliaetus*	Not Listed	Threatened[4]	Yes (Nesting & Foraging)
peregrine falcon	*Falco peregrinus*	Not Listed	Endangered	Yes (Urban nesting)
saltmarsh sparrow	*Ammodramus caudacuta*	Under Review	Special Concern	Yes
shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	Yes (Migrating & Foraging)
snowy egret	*Egretta thula*	Not Listed	Special Concern	Yes (Foraging)
tricolored bat	*Perimyotis subflavus*	Proposed Endangered	Endangered[2]	Yes
tricolored heron	*Egretta tricolor*	Not Listed	Special Concern	Yes (Foraging)
yellow-crowned night-heron	*Nyctanassa violacea*	Not Listed	Threatened[5]	Yes (Foraging)

1 The Bald and Golden Eagle Protection Act provides for the protection of bald eagles by prohibiting the taking, possession, and commerce of such birds, except under certain specified conditions.

2 Northern long-eared bat, little brown bat, eastern small-footed myotis, and tri-colored bat, all of which are found state-wide, have been reviewed by Endangered and Non-game Species Program Biologists and the NJ Endangered and Nongame Advisory Committee and are given a "Consensus Status" of "Endangered," but are not formally listed.

3 Northern long-eared bat was not identified by the USFWS (2024) IPaC as potentially occurring in the Proposed Action area or being potentially affected by the Proposed Action, but NJDEP (2021c) indicated that the species is found state-wide and is presumed to be present.

4 Osprey was not identified by the NJDEP Natural Heritage Program nor the Landscape Project habitat mapping, as potentially occurring on in the study area, but osprey nesting was directly observed during field investigations.

5 Yellow-crowned night-heron was not identified by the NJDEP Natural Heritage Program nor the Landscape Project habitat mapping, as potentially occurring on in the study area, but yellow-crowned night-heron were directly observed during field investigations.

Figure 3.11-5a. Special Status Species – Newark

Figure 3.11-5b. Special Status Species – Bayonne and Jersey City

In addition, according to NJDEP, the northern long-eared bat, little brown bat, eastern small-footed myotis, and tricolored bat, all of which are found statewide and have a "Consensus Status" of "Endangered" in New Jersey, must be considered if tree clearing is required. USFWS did not identify any occurrence of the northern long-eared bat, but the species may be present in the vicinity. The potential presence of other special-status bats is also assumed due to the lack of surveys.

All marine mammals are protected under the Marine Mammal Protection Act of 1972, which prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters. "Take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." There is very limited available aquatic habitat for marine mammals, such as dolphins, in the vicinity of Newark Bay. However, the bottlenose dolphin (*Tursiops truncatus*), harbor porpoise (*Phocoena phocoena*), harbor seal (*Phoca vitulina*), and harp seal (*Pagophilus groenlandicus*) have all been sighted in waters adjoining Newark Bay in recent years (Frazier 2011, The Associated Press 2010, New Jersey Meadowlands Commission 2011). Although they are not common in Newark Bay, they are an infrequent potential visitor. The noise and traffic of cargo ships entering and leaving Newark Bay likely deter marine mammals from intentionally entering Newark Bay.

3.11.4 No Action Alternative

3.11.4.1 Geology and Soils

Under the No Action Alternative, current geologic processes such as erosion and sedimentation would continue at a rate comparable to that which currently exists because no new ground disturbance would result from the Proposed Action. No impacts to soils or geology are anticipated under the No Action Alternative.

3.11.4.2 Water Resources

Surface Water Quality

The primary impact associated with the No Action Alternative would be that the stormwater runoff from the existing NB-HCE, including the NBB and approach roads, would continue to be discharged directly into Newark Bay and other surface waters. Existing stormwater drainage for elevated roadway surfaces consists of open scuppers discharging into the open air and falling below the roadway surface. Runoff from the scuppers dissipates as it drops to the ground, like normal rainfall, and discharges into existing wetlands and open waters. Existing hard paved surface areas associated with the NB-HCE within the study area totals approximately 50 acres. The current direct stormwater drainage into Newark Bay does not provide a reduction of the pollutant loading caused by the steadily increasing number of vehicles that travel on the bridge.

Groundwater Quality

The No Action Alternative would continue to allow untreated runoff from the NB-HCE to drain into pervious areas and, therefore, infiltrate into the groundwater, carrying pollutants with it. There are no Sole Source Aquifers located in the study area. Under the No Action Alternative, no potentially contaminated groundwater would be disturbed.

3.11.4.3 Wetlands

No impacts to wetlands are anticipated under the No Action Alternative. Rehabilitation activities as well as routine repair and maintenance on the existing bridge are expected to occur on and from the existing decking and superstructure above ground level. It is anticipated that any required construction staging areas could be located on upland areas, rather than in wetlands. Under the No Action Alternative, shading impacts to wetlands would be identical to those impacts existing under current conditions. Therefore, no changes in shading impacts would occur to wetlands beneath the bridge. However, minor impacts to wetland functions and values could potentially occur due to accidental fills or spills resulting from rehabilitation activities and bridge repair and maintenance.

3.11.4.4 Floodplains

The No Action Alternative would have zero increase in fill and impervious surfaces within the floodplain of Newark Bay. The Proposed Action would not be undertaken and the existing NBB would remain in its current location and configuration. As a result, nothing would occur to change flood risk and flood levels in the study area.

3.11.4.5 Coastal Zone and Tidelands

A Coastal Zone Consistency Assessment would not be needed to address impacts of the No Action Alternative. Also, no tideland conveyances would be necessary if the Proposed Action were to not be implemented.

3.11.4.6 Aquatic Biota

The No Action Alternative would require continued and increasing repair and maintenance needs of the NBB and existing viaducts and surface of the NB-HCE, from Interchange 14 to Interchange 14A. Routine repair and maintenance work is anticipated to include the replacement of the existing deck as well as various superstructure and substructure maintenance repairs. It is anticipated that the rehabilitation, repair, and maintenance work would be conducted on and from the existing decking and superstructure above ground level. As a result, no impacts to aquatic ecosystems are expected under the No Action Alternative. Also, no impacts are expected for marine mammals protected under the Marine Mammal Protection Act under the No Action Alternative.

3.11.4.7 Terrestrial Vegetation and Wildlife

Under the No Action Alternative, the small patches of natural vegetation within the study area would continue to provide low-quality habitat that supports species habituated to human activities. Wetlands would not be impacted and would remain as potential wildlife habitat. However, the existing roadway and NBB would require periodic rehabilitation activities and routine repairs and maintenance that could potentially cause visual and noise impacts that could affect wildlife foraging, breeding, and nesting.

3.11.4.8 Special-status Species

Under the No Action Alternative, wetland habitat within the study area would not be filled and would remain as potential foraging habitat for wading birds, including protected species. There would be no impacts to special-status species, including those listed under the ESA such as the Atlantic sturgeon and shortnose sturgeon. The existing NBB would require periodic rehabilitation activities and routine repairs and maintenance that could potentially cause visual and noise impacts that could deter the peregrine falcon from successfully nesting on the bridge. However, these falcons are likely habituated to a high level of disturbance and have not yet been known to experience any adverse impacts of existing bridge maintenance activities. Likewise, any bald eagles that potentially forage in the study area could be disturbed by bridge repairs and maintenance, but no take would be expected to occur.

3.11.5 Proposed Action Alternative

3.11.5.1 Impacts

<u>Geology and Soils</u>

Under the Proposed Action, construction and associated excavation and drilling activities would reconfigure surface topography but are not expected to adversely affect the underlying geology of the area. Vibration due to pile driving would be largely avoided by using drilled shaft foundations for the bridge piers. There are no voids, fissures or unusual geologic conditions evidenced which would affect the construction of the Proposed Action Alternative. Geotechnical subsurface information will be used to inform the final designs of foundations to support all bridges, piers, and at-grade roadway widening locations, and will consider the Authority's design

criteria for seismic design requirements in the latest edition of the American Association of State Highway Officials Guide Specifications for LRFD Seismic Bridge Design, Second Edition, 2011.

Construction and demolition activities would involve the excavation of soils for installing cofferdams around pier structures, building stormwater basins, and establishing permanent access roads for construction, maintenance and security access. These activities would require only slight topographic modifications for ground leveling for staging and maneuvering construction equipment. Due to the flat topography of the site, the potential for soil erosion would generally be low. Construction and demolition would also require the laying of metal or wooden mat platforms on wet soils in areas where temporary wetland impacts are proposed. Low-ground-pressure construction equipment would be used whenever possible to perform construction in wetlands. Skid rigs would only be used when wooden planks or snow fencing is laid down to minimize disturbance of the ground surface. The need for construction mats and associated temporary impacts would be reduced where possible by installing temporary trestles for constructing the approach spans, although this would require temporary piles to be installed in places. All approach span piers located within open waters and wetlands would be constructed within sheetpile cofferdams in order to keep earth and water from entering the excavation site so that construction work can be performed in dry conditions. Soil mapping by USDA-NRCS (2022) indicates that over 30 percent of soils in the study area is "urban land" and most of the study area's surface area is covered by asphalt, concrete, buildings, and other impervious surfaces. In total, there would be permanent disturbance to approximately 28 acres of soil, including both wetlands (10.5 acres) and uplands (17.5 acres); and temporary disturbance to approximately 26 acres of soil, including both wetlands (7.5 acres) and uplands (18.4 acres). The Westbrook mucky peat soils are very poorly drained soils inundated by salt water at high tide. While soil erosion and sediment control measures would be in place, some amount of soils exposed due to construction and demolition activities would be naturally transported to the surrounding wetlands and waterways via erosion activities. To avoid and minimize potential increases in soil erosion during construction, erosion and sediment control measures would be implemented to mitigate adverse impacts to erodible soils, which may include a combination of turbidity barriers, silt fences, hay bales, diversion ditches, temporary grading, and vegetative or other protective coverings for exposed soils. Many of these methods are extremely effective at reducing sediment loss from construction sites. For example, siltation fencing can reduce off-site loss of sediment by 75 percent. All excavations in wetlands and open water would be conducted from within cofferdams, where water within these cofferdams would be pumped out to settling tanks before being discharged. In accordance with the Soil Erosion and Sediment Control Act of 1975, as amended (N.J.S.A. 4:24-39 et. seq.), a soil erosion and sediment control (SESC) plan will be prepared and implemented. The plan would meet the Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90 (New Jersey SSCC 2017) and be certified by the Hudson Essex Passaic Soil Conservation District *Urban Erosion and Sediment Control*. Upon completion of demolition of the existing NBB, all staging areas and temporary access roads would be removed, and the soils would be restored to their original grade and revegetated.

During construction, historic fill and other contaminated soil could be encountered during the Proposed Action and cause contaminants to be transferred to water, air, or other natural media. As discussed in Technical Appendix 3.10, coordination with and approvals from NJDEP will occur prior to the disturbance, handling, and disposal of any contaminated soil and appropriate preventive measures will be undertaken to protect the safety of the public, construction workers, as well as the greater environment from exposure to contaminated soil.

Water Resources

Surface Water

During the construction phase of the Proposed Action, soil erosion and resuspension of bottom sediments would be expected to cause the greatest impacts to surface waters. Construction activities such as clearing and grubbing, excavations, and the creation of equipment staging areas would expose and disturb the soil in the study area, potentially leading to soil erosion. The construction of additional impervious surfaces would also lead to increased stormwater runoff volumes and impact surface water quality through the potential increase of

contaminants and sediments entering Newark Bay. Dissolved chemicals, such as hydrocarbons, nutrients, and road salt can enter the surface waters as stormwater runoff. In-water construction would impact water quality via increases in suspended sediments.

The construction of the new NBB piers will involve installation and removal of over a thousand 42-inch steel pipe piles and approximately 10,000 linear feet of temporary sheetpile cofferdam. The new bridge piers will be constructed by the drilled shaft method. These piers will be accessed via a temporary construction trestle extending out from each shore to the new main span pier locations just outside of the navigation channel. The temporary access trestle for the new westbound bridge would be supported by 42-inch diameter steel pipe piles and is expected to be in place for a period of up to 5 years. Once the new westbound bridge is completed, another temporary trestle would be constructed out from each shore alongside the eastbound bridge and used for both demolishing the existing NBB and constructing the new bridge within its existing footprint. Bridge demolition would include removing all of the piers within Newark Bay to 2 feet below the mudline in accordance with Authority practice, except for the two main span piers which would remain to support the fendering system for the new bridges. This trestle would also be in place for a period of up to 6 years. New trestle piles located below the MHWL would be installed initially by vibratory driving and finally by impact driving. During the timing restriction, trestle pile installation will be conducted within bubble curtains. Bubble curtains will be used either with or without a larger 60-inch diameter casing set to the mudline and equipped with air compressor lines to reduce sediment resuspension and underwater noise transmission during pile driving. The drilled shafts for the bridge piers would likely be advanced in-water with turbidity barriers used to minimize sediment resuspension and reduce impacts to the aquatic community. During timing restrictions, cofferdams or bubble curtains may be used for drilled shaft construction depending on the concrete cap footings. Concrete cap footings may be constructed within cofferdams or using precast or preformed forms supported by the drilled shafts (no traditional cofferdams). Bridge pier construction would then take place within dewatered steel sheetpile cofferdams, and other sediment control structures. Demolition of the existing bridge piers would also occur within turbidity barriers or sheetpile cofferdams. All in-water pier work would take place outside of the January 1 through June 30 time of year restriction. Following completion of bridge construction and demolition, cofferdams and trestle piles would be removed by vibratory extraction. All of this in-water construction activity requires considerable use of spud barges, tugboats and other support vessel types over a period of up to 10 years. The installation and removal of steel pipe piles and steel sheetpiles and associated spud barge mooring and tugboat propeller wash in the relatively shallow waters of Newark Bay will disturb bottom sediments and cause temporary increases in suspended sediment in the construction area.

The introduction of suspended sediment in the water column of Newark Bay could result in increased total suspended solids (TSS) and turbidity, decreased dissolved oxygen levels (due to increases in Biochemical Oxygen Demand), and decreased photosynthesis due to increased turbidity. Surface water quality in Newark Bay could also be affected by additional metal or chemical (organic or inorganic) loadings associated with sediments. Metals, nutrients, and other chemicals may be released into the surrounding waterways during the dredging, dewatering of cofferdams, and movement of construction material, fuels, and lubricants. Because sediments within Newark Bay are known to be heavily impacted with PCBs, dioxins, and metals, best management practices would be implemented to minimize the potential for, and magnitude of, adverse environmental impacts that could result.

Per NJDEP Bureau of Water Allocation and Well Permitting (BWAWP) Construction Related Dewatering Guidance, since the Proposed Action will be covering multiple municipalities and counties, the Proposed Action will need to obtain one authorization per municipality where dewatering will occur and that, depending on the quantity of water to be diverted and the duration of the activity within each municipality, either a Temporary Dewatering Permit or a Short-Term Water use Permit-by-Rule may be required. The BWAWP will be contacted prior to Project construction to discuss this matter further since the application requirements and review time varies significantly for each authorization type.

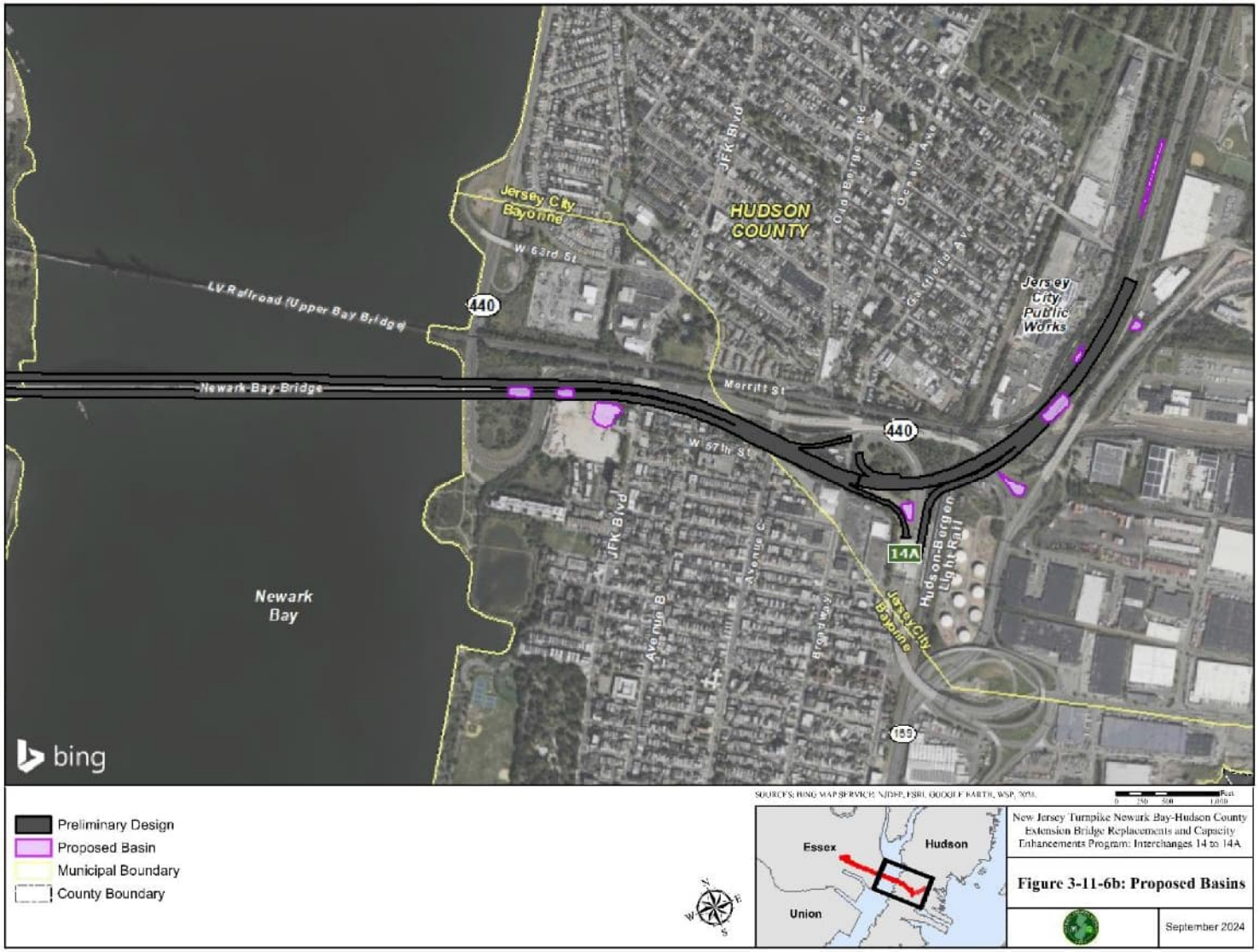
Various permits and approvals may be required for the Proposed Action construction related dewatering activities from the Well Permitting and Water Allocation Permitting sections in the Bureau of Water Allocation and Well Permitting. There will be coordination with the BWAWP prior to construction, as necessary.

The Proposed Action would increase the area of existing paved roadway by almost 45 percent, from approximately 60 to 86 acres, including both pavement at ground level and elevated bridge/viaduct surfaces. The paved surface area of the existing NBB over top of open water in Newark Bay totals around 7 acres and the paved surface area of the new bridge spans over top of open water, accounting for the demolition of the existing bridge, would be approximately double and total over 15 acres. Stormwater runoff from these paved surfaces would flow either directly into Newark Bay or into wetland and water quality detention basins that ultimately drain into the Bay. To demonstrate compliance with the NJDEP's Stormwater Management Rules (N.J.A.C. 7:8), stormwater management analysis for the Proposed Action has been developed based on analytical procedures and hydrological computations within each HUC-14 watershed to estimate the number, sizes, and locations of stormwater management basins that may be required. It is expected that, overall, the Proposed Action would improve the water quality of stormwater runoff over existing conditions due to the presence of the new detention facilities. Also, hydrodynamic separator-type Manufactured Treatment Devices would be used to remove floatable debris (e.g., leaves, trash, oil) and to remove suspended solids from storm water runoff. There would not be an increase in peak flows to any of the local storm sewer systems receiving runoff from the NB-HCE. The proposed stormwater basins will achieve that goal.

Long-term impacts to water quality related to the increase in impervious surfaces and associated pollutant loading of stormwater will include the construction of approximately 19 stormwater basins to intercept and treat stormwater runoff from the roadway (Figures 3.11-6a and 3.11-6b). At Interchange 14, seven basins are proposed within infield areas of the right-of-way. East of Interchange 14 and west of Newark Bay, four basins are proposed beneath viaduct structures. East of Newark Bay and west of Interchange 14A, two basins are proposed beneath the viaduct structures near Route 440, and one basin is proposed at the former Marist High School site. One basin is proposed in the infield of Interchange 14A, and four basins are proposed between Interchange 14A and Linden Avenue. Stormwater runoff would also be reduced via the use of extended detention basins. These best management practices can also be used for nutrient removal. In addition, the Proposed Action would comply with the storm drain inlet design standard provided in the NJDEP Highway Agency Stormwater Guidance to control passage of solid and floatable materials through storm drain inlets (NJDEP 2004).

Figure 3.11-6a. Proposed Stormwater Management Basins – Newark

Figure 3.11-6b. Proposed Stormwater Management Basins – Bayonne and Jersey City



It should be noted that, because an Initially Preferred Alternative for the NB-HCE Program was established prior to March 1, 2021, the Proposed Action is not required to comply with the NJDEP's Green Infrastructure rules that went into effect on that date. However, the Proposed Action includes infiltration testing and groundwater monitoring to determine whether infiltration-type best management practices will be feasible, since installing such measures can minimize construction cost and reduce the stormwater runoff burden on combined sewer overflow systems, which currently drain the study area. At the time of this writing, the infiltration testing, and groundwater monitoring are underway. Relevant data gathered from that program will be considered and presented prior to the conclusion of the preliminary design effort.

Impacts associated with construction would be minimized by restricting in-water work to dry conditions within cofferdams and implementing an SESC plan. During construction, impacts due to the increase of TSS and turbidity, and release of metals and chemicals from the sediment into the water column would be mitigated through controlling soil movement and minimizing the resuspension of sediments in the water column. The methods that will be used to achieve this will be specified in the SESC plan that would be developed prior to the initiation of field activities. This plan will specify the best management practices that will be used to minimize the impact of construction. Control measures that may be used to meet the conditions of the permit include turbidity barriers, hay bales, silt fences, dikes, swales, and cofferdams. Implementation of this plan will be carefully monitored during construction to facilitate utilization of the best sediment management options during construction activities. Work for the bridge abutments and piers will be performed with the use of cofferdams and sealing off sediments which will then be appropriately disposed of off site. Measures will be employed during demolition to prevent deposition of debris into Newark Bay. Measures will be taken during construction of the piers (i.e., cofferdams, turbidity barriers, etc.) to minimize disturbance of bottom sediments and reduce such sediment resuspension, thereby not affecting turbidity. Trestle piles would be driven within casings; steel sheetpiles will be installed with vibratory hammers; drilled shafts will be advanced with turbidity barriers or bubble curtains; and bridge pier construction and demolition will be performed in dry conditions within cofferdams.

The discharge of excavated material and/or placement fill material into navigable waters, as required for construction under the Proposed Action, would be performed in compliance with the Clean Water Act Section 404 (b) (1), Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Construction impacts will be mitigated in accordance with an SESC plan that will be developed in compliance with stormwater discharge permit requirements, including erosion and sediment control measures in accordance with the Soil Erosion and Sediment Control Act of 1975, as amended (N.J.S.A. 4:24-39 et. seq.). The concepts proposed in the Preliminary Stormwater Management Design Report have been discussed with NJDEP and the final design will be developed after the issuance of the Finding of No Significant Impact and during the NJDEP Waterfront Development permitting process. The Authority would further evaluate water quality impacts associated with filling and excavating activities in navigable waters, and would obtain a permit from the USACE in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The Authority would comply with all the terms and conditions of a Section 404 Permit and provide compensatory mitigation for permanent impacts, inclusive of temporary impacts greater than 6 months in duration, by restoring 0.817 acres of tidal open water through the removal of the existing bridge piers following construction of the new bridge. Compensation for unavoidable impacts would include purchasing mitigation credits from existing mitigation banks within Watershed Management Area (WMA) 5 (Hackensack River, Hudson River and Pascack Brook Watersheds) and WMA 7 (Arthur Kill Watershed), as detailed further in Section 3.11.5.2 below.

To address water quality impacts associated with potential pollutant discharges during construction, a New Jersey Pollutant Discharge Elimination System permit would be obtained. Because the Proposed Action would result in the disturbance of greater than one acre, it is required by NJDEP that coverage under the General Stormwater Permit (5G3) be obtained. For this permit, certification of an SESC plan would first need to be obtained from the Hudson Essex Passaic Soil Conservation District. Operational impacts due to the increase of runoff, and thus the increase in pollutant loading will be minimized through the development and implementation of an SESC plan. Pursuant to the stormwater quality requirements of the Stormwater

Management Rules at N.J.A.C. 7:8, the best management practices would provide the required reduction of average annual TSS load and will reduce the average annual nutrient load by the maximum extent feasible. The SESC plan and stormwater management design would:

- Comply with applicable design and performance standards;
- Ensure long-term operation and maintenance of best management practices;
- Comply with standards to control passage of solids and floatable materials through storm drain inlets; and
- Reduce the discharge of pollutants to the maximum extent possible.

Groundwater

Groundwater encountered during construction may be considered contaminated based on previous monitoring of several properties in the study area. Dewatering will be required within excavation areas where the groundwater table is encountered in order to reach the proposed excavation depths. Appropriate groundwater management approaches will be used for the safe disposal of water removed from the ground during construction. Management of contaminated groundwater is considered a remedial action and the construction contractor will be required to keep records of this work for future reporting by the Authority. The Contractor would also apply for and obtain the appropriate Surface Water General Permit(s) required under N.J.A.C. 7:14A from the NJDEP Division of Water Quality. Potentially applicable General Permits include the following:

- Short-term De Minimis Discharge Permit (B7; previously the Construction Dewatering Permit). The Short-term De Minimis Discharge Permit authorizes short term, uncontaminated discharges of groundwater generated during construction activities for the purpose of lowering the groundwater table. A de minimis discharge for the purposes of this general permit is defined as a discharge containing a relatively insignificant amount of pollutants that complies with all of the conditions specified in this permit.

- General Petroleum Product Cleanup (B4B). This general permit authorizes the discharge of treated groundwater from remediations, dewatering, and pump test activities that may be necessary due to contamination by petroleum products to eligible surface waters of the State.

- General Groundwater Remediation Clean-up (BGR). This general permit authorizes the discharge of treated groundwater resulting from groundwater remediations, dewaterings, and pump test activities as associated with non-petroleum products into eligible surface waters of the State or storm sewers.

During construction, contaminated groundwater could be encountered in places along the entirety of the study area during excavation for the demolition and construction of piers and footings of the viaducts and bridges. Construction activities within contaminated groundwater have the potential to cause contaminants to migrate both vertically and horizontally. As discussed under *Construction* in Section 3.10.5.1, the Proposed Action would follow the NJDEP (2012b) Linear Construction Technical Guidance to address any contaminated groundwater that is encountered during excavation and prevent the excavation from serving as a conduit for the spread of contaminated water. A pre-construction sampling plan will be developed during final design to identify locations of contaminated groundwater that may need to be managed during construction. Appropriate remedial actions, such as engineering controls, would be developed and implemented to avoid the potential for adverse impacts to construction workers, surrounding communities and the environment. Remedial actions or measures may include off-site disposal or treatment of contaminated groundwater. Institutional and engineering controls would be used to avoid the potential for post-construction impacts.

Constructing bridge foundations in Newark Bay will require sheet piling to construct cofferdams prior to excavation of sediments. Best management practices will be considered when designing structures and

implementing construction activities within this area in order to minimize the potential toxicity impact to ecological receptors. Treatment of sediment-laden water may be required prior to discharging to surface water during dredging and cofferdam installations. Best management practices will also be implemented for in-water work when handling contaminated sediment as specified in the NJDEP (1997) Dredging Technical Manual.

Coordination with and approvals from NJDEP will occur prior to the disturbance, handling, and disposal of any contaminated groundwater and appropriate preventive measures will be undertaken to protect the safety of the public, construction workers, as well as the greater environment from exposure to contaminated groundwater. This is further detailed in Section 3.10.5.1 of Technical Appendix 3.10.

Wetlands

Impacted wetlands are depicted in Figures 3.11-7a and 3.11-7b. As shown in Table 3.11-5, the Proposed Action will result in approximately 3.808 acres of permanent impacts and 10.374 acres of temporary impacts to tidal waters within Newark Bay. In addition, the Proposed Action will result in approximately 2.045 acres of permanent impacts and 5.449 acres of temporary impacts on intertidal and sub-tidal shallow areas of Newark Bay. Impacts to tidal waters are also discussed further below under "Aquatic Biota."

Several delineated freshwater wetlands would also be disturbed by the implementation of the Proposed Action. Most are freshwater wetlands, and nearly all are palustrine (non-tidal) features that are dominated by the invasive *Phragmites australis*. A summary of anticipated freshwater wetland impacts is depicted in Figures 3.11-7a and 3.11-7b and is provided in Table 3.11-6. Permanent freshwater wetland impacts total 8.957 acres and permanent freshwater (New Jersey-regulated) transition area impacts total 3.910 acres. Permanent freshwater wetland impacts can be divided into three categories: (1) wetlands impacted by the footprint of the elevated NB-HCE roadway and the placement of fill to provide "permanent access" underneath the structure for maintenance, inspections, and security, including impacts from viaduct support structures and stormwater basins, (2) wetlands impacted by proposed pier footings that would extend beyond the edge of the permanent access; and (3) wetlands impacted by roadway embankment. A total of 10.413 acres of temporary freshwater wetland impacts and 4.062 acres of temporary freshwater transition area impacts are anticipated to result from the proposed project. All activities considered temporary (to be removed) will be in place for greater than 6 months. Temporary activities include construction access, cofferdams for new piers, cofferdams for existing pier removal, cofferdams for the fender system, and the construction trestle (both pilings and shading of wetlands). Temporary impacts can be divided into four categories: (1) wetlands impacted by construction staging and access areas, (2) wetlands impacted by the installation and removal of cofferdam sheetpiles around bridge pier footings, and (3) wetlands impacted by NBB construction trestle piles. To prevent soil compaction and minimize impacts within freshwater wetlands and transition areas during temporary disturbance, construction pats, timber matting, and/or geotextile fabric would be used, in addition to standard BMPs like using oversized, low-pressure tires.

Permanent access and maintenance accounts for gravel fill to provide access underneath the structure for inspections, maintenance activities, and ultimately limit public access with a security fence. Permanent access and maintenance accounts for approximately 8.76 acres of impacts in freshwater wetlands and 0.97 acres of impacts in tidal marsh. The permanent access and maintenance area is aligned with the footprint of the NB-HCE roadway from eastbound bridge fascia to westbound bridge fascia. Per NJDEP's request to overestimate impacts, the preliminary design of this area covered the entirety of the road footprint and will ultimately be reduced during final design. NJDEP recommended that the project permit for the worst-case scenario of disturbance and further detail impact reduction subsequently (i.e. for mitigation purposes).

The 26.231 acres of temporary impacts is comprised of the following components:

- New road = 0.071 acres
- Cofferdams (piers/fenders) = 4.45 acres

- Construction access = 8.24 acres
- Construction trestle = 13.47 acres, of which 12.91 acres results from trestle shading (nearly half of the 26.28 acres of total temporary impacts). Installation of trestle piles will amount to approximately 0.56 acres of temporary fill in wetlands and tidal waters.

Temporary disturbances in-water would be restored upon removal, as tidal waters will refill trestle and cofferdam sheet pile areas. Trestle and cofferdam sheet pile areas, and construction access routes located in estuarine or freshwater marshes will be regraded to original elevations and re-planted or seeded, as detailed on the approved NJDEP Freshwater Wetland/Waterfront Development Restoration Plans.

Low marsh areas will be replanted with *Spartina alterniflora* plugs on 3-foot centers. High marsh areas will be replanted with *Spartina cynosuroides*, *Distichulus spicata*, and *Juncus gerardii*. Freshwater wetlands will be re-seeded with an emergent wetland mix containing *Andropogon gerardii*, *Panicum virgatum*, *Panicum amarum*, *Leersia oryzoides*, *Echinocloa walterii*, and a mixture of native forbs and rushes. Along the lower elevations of freshwater wetland, shrubs will be planted, including *Baccharis halimifolia*, *Myrica pensylvanica*, *Clethra alnifolia*, and *Amorpha fruticosa.* Many of these wetland areas are dominated by *Phragmites australis* currently and may require herbicidal treatment post-construction to ensure native species establishment. Wetland transition areas and upland locations will be re-seeded with a coastal successional field mix consisting of various warm-season grasses and perennial wildflowers.

Monitoring of temporarily disturbed and restored areas is not a requirement of the NJDEP permit, but restored grades will be reflected in as-built drawings and re-vegetated wetland areas will be revisited during the first growing season following construction to determine the success of the replanting and seeding. Adaptive management may include herbicide treatment of invasive species and/or spot re-seeding and replanting as needed to ensure the restored areas return to their intended condition.

The Proposed Action would result in more than double the area of existing impervious surface and there would be corresponding increases in stormwater runoff, ultimately discharged to Newark Bay and adjacent wetlands. However, surface runoff from paved surfaces would be collected on bridge and viaduct sections and conveyed to detention basins that will treat the water for TSS, contaminants, and nutrients, and the Proposed Action would result in a decrease in pollutant loading. Stormwater treatment structures will not be placed in wetlands. As noted previously, a final design of the stormwater treatment structures and methods will be developed during the subsequent permitting process described in Section 4.12 of the NEPA EA.

Figure 3.11-7a. Wetland Impacts – Newark

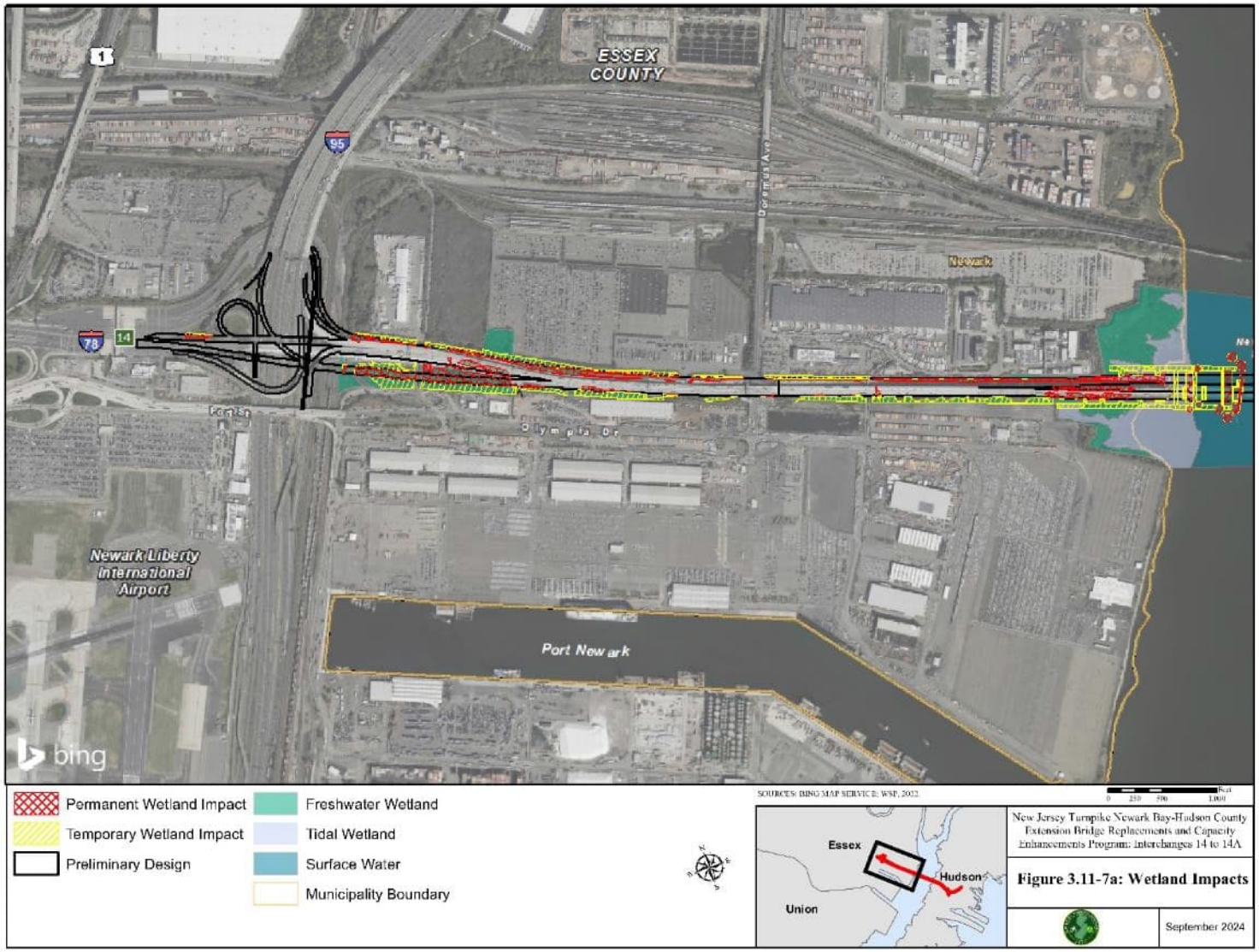


Figure 3.11-7b. Wetland Impacts – Bayonne and Jersey City

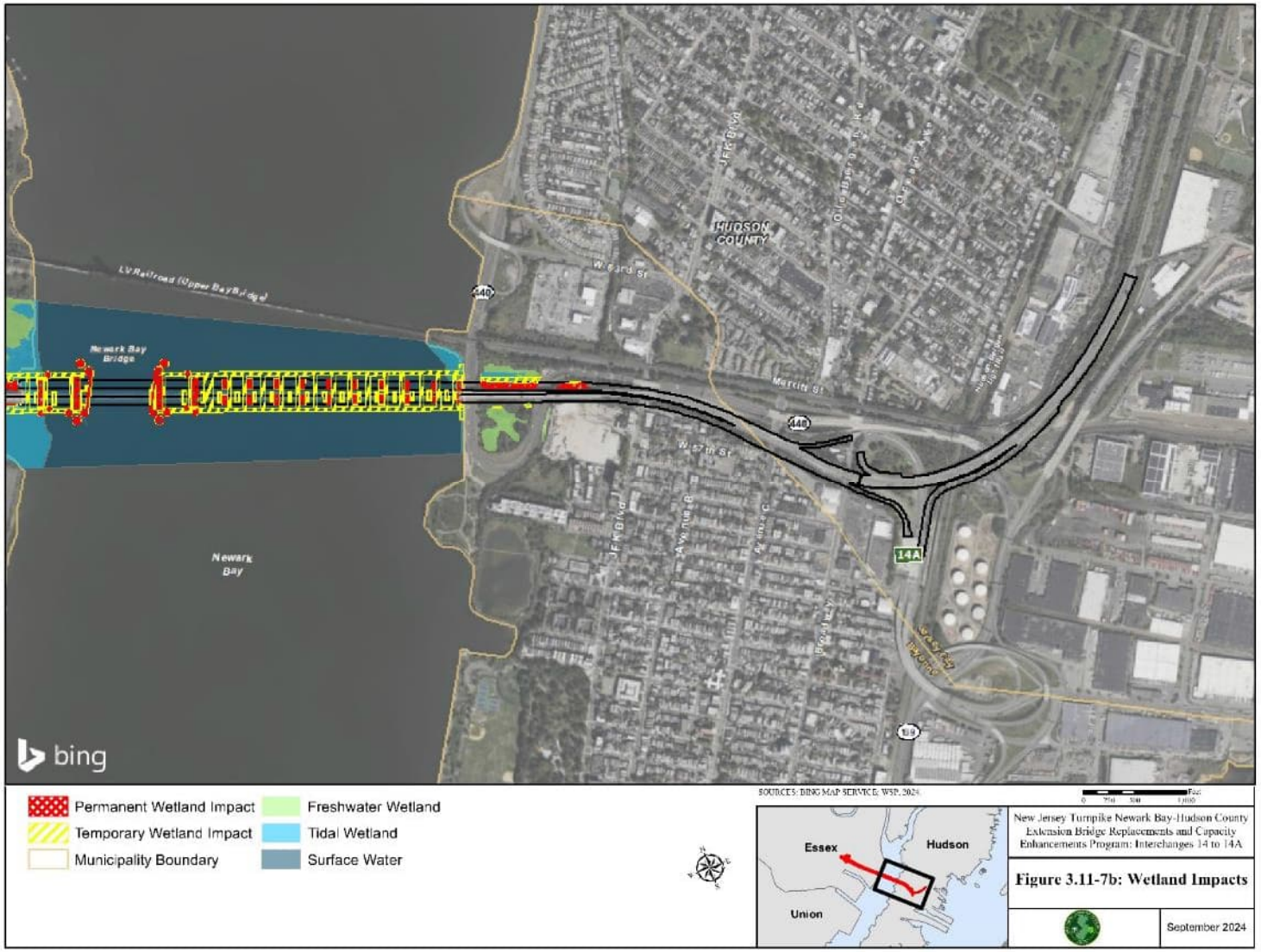


Table 3.11-5. Tidal Waters and Intertidal and Subtidal Shallows Impacts

Regulated Area	Project Activity	Permanent Impacts (acres)
Intertidal and Subtidal Shallows (E2US)	New pier footings	0.817
	New fender system	0.261
	Permanent access & maintenance	0.967
Tidal Waters (E1UB)	New pier footings	2.525
	New fender system	1.283
	Total	5.853
Regulated Area	Project Activity	Temporary Impacts (acres)
Intertidal and Subtidal Shallows (E2US)	Cofferdam - existing pier footings	0.265
	Cofferdam - proposed pier footings	0.287
	Trestle piles	0.174
	Trestle deck (shading only)	4.001
	Construction access	0.621
	Cofferdam - fender system	0.101
Tidal Waters (E1UB)	Cofferdam - existing pier footings	0.834
	Cofferdam - proposed pier footings	0.677
	Trestle piles	0.349
	Trestle deck (shading only)	8.005
	Cofferdam - fender system	0.467
	Cofferdam - existing fender removal	0.042
	Total	15.823

Table 3.11-6. Freshwater Wetland and Transition Area Impacts

Regulated Area	Project Activity	Permanent Impacts (acres)
Freshwater Wetlands (PEM, E2EM)	Permanent access & maintenance	8.758
	New pier footings	0.079
	New road	0.120
Wetland Transition Areas	Permanent access & maintenance	3.897
	New pier footings	0.013
	Total	12.867
Regulated Area	Project Activity	Temporary Impacts (acres)
Freshwater Wetlands (PEM, E2EM)	Cofferdam - existing pier footings	0.094
	Cofferdam - proposed pier	1.677
	Trestle piles	0.037
	Trestle deck (shading only)	0.840
	Construction access	7.694
	New road	0.071
Wetland Transition Areas	Cofferdam - existing pier footings	0.079
	Cofferdam - proposed pier	0.042

Regulated Area	Project Activity	Permanent Impacts (acres)
	Trestle piles	0.004
	Trestle decking (shading only)	0.050
	Construction access	3.887
	Total	14.475

Floodplains

Newark Bay is tidally influenced throughout the study area and is a primary cause of potential flooding, and its floodplains would be regulated as a tidal flood hazard area under the New Jersey Flood Hazard Area Control Act Rules (N.J.A.C. 7:13). The Proposed Action would require construction within the 100- and 500-year floodplains of Newark Bay. Bridge piers and towers would be constructed in the floodplains and the placement of these structures would displace some floodplain volume. However, the existing and proposed NB-HCE structure is above the floodplain except for the piers and abutments that are located within the floodplain. The proposed structure will require the addition of 28 new pier footings to be installed entirely within the 100-year floodplain but within Newark Bay. Because the fill from these structures is entirely within tidal waterbodies, no impacts to the flood heights are anticipated. Very localized changes in water circulation around bridge piers would occur, but that would not impact flooding or floodplain storage, as flooding is influenced by tidal surge emanating from the Atlantic Ocean through Newark Bay. All bridge components, including the superstructure and mechanical and electrical equipment, would be resilient to both normal tidal fluctuation and storm-related ocean surges and to saltwater. These design features decrease future risk of damage and loss of life associated with the Proposed Action and would not result in a substantial impact to floodplain values.

The footprint area of permanent structures within the floodplain would increase in comparison to the existing structures because of the need for larger bridge piers to support the wider bridge decks carrying more traffic lanes than at present. The need for a permanent access road to the bridge piers and towers would also increase the footprint area. The total area of new fill within the 100-year floodplains is anticipated to be 0.55 acres due to portions of 20 new pier footings. Most of these impacts, or 0.34 acres would result from 16 new pier footings within the 100-year floodplain on the north side of the NB-HCE in Newark between Interchange 14 and Newark Bay. The remaining impacts, or 0.21 acres of four new pier footings within the 100-year floodplain, would occur in Bayonne to the north of the former Marist High School property. Generally, these types of impacts within regulated flood hazard areas require separate Flood Hazard Area permits for authorization. However, portions of the study area would be subject to regulation under the NJDEP Waterfront Development Law (N.J.A.C. 7:7) and by rule, compliance with the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13) can take place within the context of a Waterfront Development Permit and a separate Flood Hazard Act Permit would not be required. Given, the minor modifications to the floodplain that would result from the Proposed Action, and its location within a tidal waterbody, adverse impacts to the floodplain or flooding of areas adjacent to the study area are not expected. The final design of the proposed structures will ensure that all elements adhere to the Flood Hazard Area requirements.

The Proposed Action would permanently impact approximately 5.5 acres of New Jersey-regulated riparian zones. There would be approximately 3.0 acres of temporary impacts on riparian zones.

In conjunction with the roadway improvements the Proposed Action would build a new stormwater drainage system that would include provisions for water quality treatment for the stormwater runoff generated by the proposed roadway surfaces. As required by New Jersey stormwater runoff quantity standards at N.J.A.C. 7:8-5.6, the stormwater management design would ensure that the post-construction peak runoff rates from the proposed surfaces for the 2-, 10-, and 100-year storm events would be reduced to 50, 75, and 80 percent, respectively, of the pre-construction peak runoff rates. The existing drainage system would be replaced with a new closed pipe system with roadway runoff being conveyed to approximately 20 stormwater detention basins (see "Surface Water Impacts" above). The Authority's preferred method for achieving those reductions is via

above-ground basins due to the excessive life-cycle costs and access limitations associated with below-ground stormwater storage facilities. The basins will be designed according to NJDEP specifications to treat areas of new and reconstructed pavement. The basins are located to avoid impacting existing wetlands, utilities, and hazardous material "hot-spots," with locations coordinated with the proposed structures and embankments. Basins proposed beneath the viaduct structures would be designed to include maintenance/inspection access roads within the 100-year storm storage volumes of the basins. There are also basins proposed along embankment-supported segments of the NB-HCE, including those located outside of the existing NB-HCE right-of-way, as well as on a portion of the former Marist High School.

The Proposed Action would not increase peak flows to any of the local storm sewer systems receiving runoff from the NB-HCE. Based on the concepts proposed in a Preliminary Stormwater Management Design Report, the proposed stormwater basins would achieve that goal, but specific analyses may be required for submission to local sewer authorities.

Temporary soil stockpiling may occur within the 100-year floodplain, which would be conducted in accordance with NJDEP Flood Hazard Area Control Act Rules and the NJDEP Flood Hazard Area Permit and plans approved for the Proposed Action. As outlined in N.J.A.C. 7:13-12.17(b), in order to minimize the potential that hazardous substances would be transported off site by floodwaters during the conduct of subsurface activities in sensitive areas, all material necessary to facilitate the excavation and/or removal of hazardous substances would be stored and stockpiled as follows: (1) outside any floodway; (2) as far as practicable from any regulated water; and (3) where practicable, within flood-resistant containment areas; and (4) where such material does not meet the Residential Direct Contact Soil Remediation Standards at N.J.A.C. 7:26D, above the 10-year flood elevation.

The Proposed Action would comply with the provisions of E.O. 11988 by following the Interagency Water Resources Council implementation guidelines (Interagency Water Resources Council 2015).

Coastal Zone and Tidelands

As the study area is within the coastal zone boundaries of New Jersey, the Proposed Action will be required to address New Jersey state policies to certify compliance with New Jersey's Coastal Management Program, as approved under the National Coastal Zone Management Program. As part of this environmental assessment, a Coastal Zone Consistency Assessment for the Proposed Action has been developed that evaluates how it is consistent with the state's coastal policies. Based on its evaluation pursuant to the Coastal Zone Management Act (CZMA), the NJDEP determined on April 3, 2024, that the Proposed Action will be conducted in a manner fully consistent or consistent to the maximum extent practicable with the federally approved enforceable policies of the New Jersey coastal management program.

The construction of new in-water structures would require an application to the Bureau of Tidelands for a new Instrument. For the tidally claimed areas impacted by the Proposed Action, the Authority would determine whether there is a Tidelands License or Riparian Grant for these areas and if any licenses are still valid. If there is no grant or licenses are no longer valid, then the Authority would apply for a new Tidelands Instrument for work proposed within the claimed areas.

Aquatic Biota

Construction of the bridge support structures would directly impact aquatic ecosystems, including freshwater and tidal wetlands, and open water in Newark Bay. Bridge construction methods may include a combination of drilling shafts and pile driving for the bridge support structures, which would introduce sound into the water and would disturb fish habitat in Newark Bay. This could disturb important fish habitat and disrupt migration of fish during spring spawning runs of striped bass, as well as shad and river herring, through the Newark Bay area. Other temporary impacts such as suspension of sediments and increased turbidity would occur during construction. The water quality impacts of the Proposed Action are discussed above under "Water Resources."

Short-term effects on aquatic biota resulting from the Proposed Action include the following: displacement of fish from available water column habitat in Newark Bay due to avoidance of areas of hydrological disturbance; noise and vibrations caused by construction; increased turbidity and levels of resuspended solids and contaminants; and temporary sediment disturbance and associated loss of the benthic community within cofferdams. Most impacts would be temporary and include 15.823 acres of temporary losses of the water column and subtidal shallows (Table 3.11-5). Sources of temporary impacts to surface waters of Newark Bay include the placement of cofferdams around the new and existing bridge pier footings and fenders, and for trestle piles to construct the westbound bridge (approximately 550 piles) and demolish the existing bridge and construct the eastbound bridge (approximately 600 piles). Temporary impacts to Newark Bay would last for the for the duration of construction, or around two years, but would not be simultaneous because of construction sequencing.

Additional temporary impacts would result from spud barge movements and associated vessel propeller wash in the shallow waters of Newark Bay. Small turbidity increases are expected to occur during construction from these activities which in turn may impact some fish species that are sensitive to water quality fluctuations. Flounder species are particularly susceptible to bay bottom disturbance because of their demersal habitat preference and dependence on benthic forage species. Winter flounder eggs, which are demersal, adhesive, and stick together in cluster are particularly susceptible to burial from sediment resuspension and deposition. However, turbidity in Newark Bay is naturally highly variable, depending on freshwater inflow, strong tidal currents, storms, and other factors. Other fish such as little skate, Atlantic herring, red hake, clearnose skate, bluefish, and Atlantic butterfish are less demersal or fully pelagic and are only seasonally present in the Newark Bay area. Following bridge construction and demolition, fish and other aquatic habits are expected to resume use of temporarily lost portions of the water column; any temporary impacts from the Proposed Action are expected to be negligible. Other EFH-designated species (little skate, Atlantic herring, red hake, clearnose skate, bluefish, and Atlantic butterfish) are less demersal or fully pelagic and are only seasonally present in the Newark Bay area. Pelagic species, including forage species of EFH-designated species are expected to resume use of temporarily lost portions of the water column following bridge construction and demolition. Any temporary impacts to pelagic species from the Proposed Action are expected to be negligible. Further detail about impacts on EFH-designated species can be found in the EFH Assessment (Appendix F). At this point, it is anticipated that the Authority will perform its formal consultation with NMFS during its regulatory review of the Bridge Permit Application, pursuant to the Magnuson-Stevens Act Provisions for Federal Agency Consultation with the Secretary (50 CFR Part 600.920).

Upon completion of bridge construction, areas of water column and benthic habitat occupied by cofferdams and trestle piles will be available to all fish species. Areas of benthic habitat temporarily lost due to cofferdam placement and trestle piles would be devoid of benthic forage species after cofferdam and trestle removal. Substrates around the new bridge piers and in areas where the existing NBB piers were removed would be recolonized by mobile organisms from adjacent unaffected areas and by natural recruitment. Recovery of the natural benthic assemblage to baseline conditions of abundance, biomass, and community composition should occur within one to five years in most cofferdam areas where sediment type and hydrodynamics remain unchanged (Newell et al. 1998). The presence of the new bridge piers will alter hydrodynamics in the immediate area around each bridge pier, so sediments may be coarser adjacent to piers due to lack of settlement of silt particles and a different benthic community composition may result in these areas. Areas of pier removal would be backfilled to adjacent grades with sand and would become naturally recolonized over time. Areas of salt marsh temporarily impacted by construction trestles and cofferdams would be regraded to original elevations and replanted with native salt marsh species. Monitoring required by NJDEP permits would ensure that restored salt marsh areas meet performance standards.

Long-term effects on aquatic biota include effects resulting from construction activities in Newark Bay, including the alteration of substrate types and benthic habitats; changes in depth, hydrodynamics, and sedimentation rates; and permanent loss of water column and benthic habitats resulting from new bridge piers. The new bridge pier footings and fenders would result in the permanent fill in Newark Bay totaling

approximately 5.853 acres, including 3.808 acres of tidal open waters and 2.045 acres of tidal wetlands (Table 3.11-5). The removal of the existing NBB piers, except for the main span piers that would remain, would result in the gain of 0.817 acres of tidal open waters, and 0.034 acres of tidal wetlands, for a net permanent habitat loss of 5.002 acres. The permanent loss of natural sand-silt benthic habitat of Newark Bay would impact flounder species, which are the EFH-designated species most affected by the loss of bay bottom because they are largely demersal and require this habitat for shelter and foraging. Winter flounder also require fine-grained bottom habitat for spawning. However, the area of loss is relatively small compared to the overall area of intertidal and subtidal shallows available in Newark Bay. Wetland mitigation would be required to offset ecological impacts to tidal wetlands, as detailed in Section 3.11.5.2. The loss of bay bottom would be somewhat offset by the habitat functions provided by the new bridge piers. The intertidal and subtidal surfaces of the new bridge piers will provide hard substrate for the epibenthic fouling estuarine community, such as mussels, barnacles, and tunicates, and will likely support algae, and will function as fish habitat for pelagic and structure-oriented fish species.

Salt marsh adjacent to the NBB, are designated as HAPC for summer flounder. Direct impacts within tidal portions of Wetland TSD are expected to be minor because juvenile and adults are mobile and would likely move from the study area due to disruptions from construction. Impacts to larvae could include loss of individuals during construction (direct impact), and increased turbidity and reduced water quality (indirect impacts) that would affect habitat condition and feeding. These impacts would be located along the western shoreline of Newark Bay where approximately 1.240 acres of impacts to tidal marsh HAPC would occur, including 1.055 acres of permanent impacts due to new pier footings, fenders, and construction access, and 0.185 acres of temporary impacts due to cofferdam sheeting around pier footings, existing pier footing removal, and trestle pile installation. There is no region-wide mapping of summer flounder EFH and GARFO (2021) indicates that local sources and on-site surveys may be needed to identify submerged aquatic vegetation beds. Due to its connection to Newark Bay via culvert, Wetland DFG would not likely provide this habitat. Future surveys would be performed to delineate the extent of vegetated shallows within the limits of the Proposed Action. Following construction, these tidal wetlands would be graded to appropriate elevations, replanted with native salt marsh species and would be subjected to permit-mandated monitoring to ensure restoration success.

To avoid interference with spring spawning runs of striped bass and other migratory fish, as well as Atlantic sturgeon (see below under "Special-status Species"), NJDEP recommended that the Proposed Action follow the "NY/NJ Harbor Agreement: February 1 – May 31" (NJDEP 2021c). Additionally, best management practices would be implemented to reduce impacts of construction on migrating fish by monitoring and controlling turbidity, noise, and overall habitat disturbance. These practices are expected to include the following: constructing and demolishing bridge piers within cofferdams to reduce sediment and contaminant resuspension; vibratory pile-driving of sheetpile cofferdams and use of turbidity barriers and/or air bubble curtains to minimize noise generation and sediment resuspension and escapement; and installation of trestle piers within casings using compressed air to reduce noise transmission to surrounding waters. These measures are outlined in the Protection Plan for Anadramous Fish Species and Winter Flounder, which was prepared to meet NJDEP Fish and Wildlife Special Conditions 1 through 3 of the NJDEP Waterfront Development, Flood Hazard Area, and Freshwater Wetland Individual Permit, File Number 0000-23-0012.2. Potential soil stockpile erosion into Newark Bay would also be minimized using standard best management practices like silt fences or hay bales. NMFS and NJDEP will likely place restrictions on the scheduling of in-river activities to protect fisheries. Coordination between these agencies will take place during the permitting phase. NMFS and FHWA have developed best management practices for in-water work (GARFO 2018). These best management practices include time of year (TOY) restrictions for each state in the greater Atlantic region so that in-water work (i.e., turbidity producing activities) may be avoided during sensitive life stages of managed species. These standard TOY restrictions consider the breeding, nursery, and migration stages of species which are especially vulnerable to in-water silt-producing activities, noise impacts, or activities which may encroach greater than 25 percent into a waterway interfering with migration. Bridge construction and demolition activities would adhere to the New Jersey in-water TOY restrictions from January 1 to June 30 which minimize turbidity-related impacts to winter flounder spawning and river herring migration and would be protective of aquatic resources

for half of the year. Work could proceed within cofferdams installed outside of this restriction period. Bridge construction and demolition would not substantially block Newark Bay in the fall, so the diadromous fish restriction from September to November 30 may not be warranted. Submerged aquatic vegetation is not present in Newark Bay. The overwintering blue crab and striped bass restriction period from November 15 to April 15 would be substantially protected by observing the winter flounder and diadromous fish restriction periods from January 1 to June 30.

Terrestrial Vegetation and Wildlife

The Proposed Action would result in the permanent loss of approximately 11.330 acres of wetland communities, which provide most of the limited wildlife habitat within the study area, split between 8.957 acres of freshwater wetland impacts and 2.045 acres of tidal wetland impacts; and cause temporary impacts to 12.753 acres of wetlands, split between 10.413 acres of freshwater wetland impacts and 5.449 acres of tidal wetland impacts. Most impacted wetlands are dominated by *Phragmites australis*, except for the *Spartina* marsh located on the western shore of Newark Bay, north of the NB-HCE. The habitat value of the *Phragmites*-dominated communities is generally low due to low species diversity and high levels of anthropogenic activities and disturbance; thus, impacts to wildlife and vegetative species are anticipated to be negligible. The loss of tidal marsh may cause adverse impacts to foraging habitat used by many species, including mammals like mink, muskrat, and raccoon; reptiles like the northern diamondback terrapin; special-status wading birds (see below under "Special-status Species"); other water birds like mallard, double-crested cormorant, and ring-billed gulls; diurnal raptors like osprey, peregrine falcon, and red-tailed hawk; and many passerines including killdeer, red-winged blackbird, song sparrow, swamp sparrow, and marsh wren. Migratory species that utilize the marsh for foraging are prone to impacts and the portion of the marsh to be impacted has the potential to provide nesting habitat for passerine and waterfowl species. The removal of vegetation and filling of wetlands during construction could cause displacement of individuals to nearby suitable habitat and may increase competition for reproductive, foraging, nesting, and migratory habitat. Wildlife mortality could increase if no suitable habitat exists nearby, but the loss of vegetation communities would result in minor adverse impacts to wildlife resources of the region. All upland, freshwater wetland, and tidal marsh vegetation would be removed outside of the breeding window for these species in New Jersey (March 15 through September 15) to eliminate the potential for nesting during the active season if work cannot abide by breeding season timing restrictions for migratory bird species. Additionally, a Migratory Bird Monitoring Plan will be developed prior to construction and implemented by a qualified biologist between March 1 and September 15 during construction. Based on this analysis, pursuant to the Migratory Bird Treaty Act, the Proposed Action will not result in a take of migratory birds or the parts, nests, or eggs of such bird. While habitat used by migratory birds may result in destruction or modification, construction activities would be performed outside of the nesting season when there is no potential for take of any birds or eggs. Other raptor and corvid species observed nesting in the vicinity of the study area (osprey, red-tailed hawk, and fish crow) are unlikely to be impacted by the Proposed Action because their nests are located on structures outside of the study area and in areas with existing elevated levels of traffic, noise, and human disturbance (active trains, billboard lighting). There is no potential nesting habitat for diamondback terrapin in the study area and the Proposed Action would only disturb potential foraging habitat.

In total, the Proposed Action would intersect approximately 47 acres of unpaved, vegetated uplands as identified on preliminary design plans. In addition to the wetland impacts discussed above, the Proposed Action would cause approximately 17.5 acres of permanent impacts and 18.4 acres of temporary impacts to these uplands, of which the vast majority are mowed grass and bare ground that provides little to no wildlife habitat. Upland vegetative communities within the survey area are also very limited in size and dominated by invasive plant species such as mugwort, tree of heaven, Japanese knotweed, and various turf grass species. Due to the limited size and quality of the upland vegetated communities in the study area, impacts from the Proposed Action would be negligible for terrestrial wildlife species. Following construction, disturbed areas not occupied by permanent structures would be revegetated with a native seed mix of species indigenous to this region of New Jersey to the greatest extent practicable in accordance with a revegetation plan that would follow E.O.13112, Invasive Species.

Given the existing levels of noise and other human activity to which birds and other wildlife are accustomed and the low disturbance sensitivity of most species, the Proposed Action is not expected to elevate noise levels to the point that there would be significant disturbance to birds. The birds occurring closer to the NB-HCE, including the special-status species in Table 3.11-4, are expected to be habituated to elevated noise and anthropogenic activity from ongoing traffic and maintenance work. However, construction and demolition activities may affect species that are habituated to only lower levels of baseline disturbance and some species could potentially be temporarily displaced or otherwise adversely affected. The birds with the most potential to be affected are those that would occur in closest proximity to the areas of construction, such as peregrine falcons that nest on the bridge, and waterbirds that forage in Newark Bay. A more detailed analysis of the impacts to the peregrine falcon is discussed below under "Special-status Species." Waterbirds that forage in Newark Bay would in most cases be expected to temporarily avoid the areas of construction activity and instead utilize other sections of the river slightly up or down stream. Temporary displacement is not considered to have the potential to significantly affect these species given the small size of the bridge area relative to the extensive areas of water that would remain unaffected and accessible. Additionally, nearby expanses of open river would remain accessible and free of disturbances throughout the duration of construction.

The closest Audubon Society Important Bird Areas are Meadowlands District, about 3.5 miles north of the study area in in Bergen and Hudson Counties; Harbor Herons Complex, which includes Shooters Island, about 4 miles south of the study area at the southern end of Newark Bay; and Arthur Kill Complex, about 5.5 miles south of the study area along the entire length of the Arthur Kill. At this distance, construction and operation activities of the Proposed Action would not affect birds inhabiting any Audubon Society Important Bird Area in the region.

Special-status Species

ESA-listed Species Under USFWS Jurisdiction

The Proposed Action would have no effect on federally threatened and endangered species under the jurisdiction of the USFWS because USFWS (2024) indicates that no ESA-listed species may occur within the boundary of the Proposed Action and/or may be affected by the Proposed Action; they identify one proposed endangered species (tricolored bat), one candidate species (monarch butterfly), and one species currently under review for listing (saltmarsh sparrow). Also, the Proposed Action would have no potential to affect the designated or proposed critical habitat of any ESA-listed species under USFWS jurisdiction. Per coordination with the USFWS New Jersey Field Office, the following measures will be taken to minimize impacts to the proposed, candidate, or species under review in the event they become formally listed prior to or during the project implementation.

Potential impacts on the tricolored bat, as well as the endangered northern long-eared bat, are discussed below under *Bats*.

Where milkweed (*Asclepias* spp.) is present and proposed for removal, it will be removed between October 1 and April 30 outside of the active season for monarchs in New Jersey. Temporarily disturbed areas will be revegetated post-construction. Wetland transition areas will be reseeded with a coastal successional field mix comprised of warm season grasses and perennial wildflowers, a mix which includes five (5) species of milkweed (*Asclepias* spp.) and includes but is not limited to various nectar species such as asters *(Symphyotrichum* spp.*)* and goldenrods *(Solidago* spp.*).* Palustrine emergent wetlands will be re-seeded with a native emergent wetland mix which also includes native forbs such as beggarticks *(Bidens* spp.), seaside goldenrod *(Solidago sempervirens*) and perennial saltmarsh aster *(Symphyotrichum tenuifolium*).

Proposed permanent impacts to tidal wetland areas comprise approximately 0.624 acres on the west side of Newark Bay and consist of *Phragmites*-dominated marsh and tidal creek – areas not considered suitable for saltmarsh sparrows. Regardless, marsh vegetation in the areas to be permanently disturbed will be removed between September 15 and March 15, inclusive of other migratory birds.

Temporary impacts are proposed in approximately 0.825 acres of tidal marsh from the temporary trestle and include approximately 0.653 acres of *Spartina alterniflora* low marsh habitat. 0.653 acres represents marsh areas shaded from the trestle deck and is not indicative of displaced marsh area. There is approximately 0.034 acres (~68 piles) of proposed temporary fill from trestle piles in low marsh habitat. Activity on the trestle may deter bird use of nearby marsh due to noise and the presence of moving equipment and human activity, but it will not physically impact individuals once installed due to the raised position of the trestle deck. Temporarily disturbed areas will be restored post-construction and replanted with *Spartina alterniflora*, *Spartina cynosuroides*, *Disticulus spicata*, and *Juncus gerardii* plugs. Additionally, if permittee-responsible mitigation is proposed for the project, high marsh and low marsh communities will be considered to potentially provide additional habitat for saltmarsh sparrows.

ESA-listed Species Under NMFS Jurisdiction

Direct impacts to Newark Bay, which comprises potential habitat for the ESA-listed endangered Atlantic sturgeon and shortnose sturgeon, would occur during construction of bridge support structures. While Newark Bay is not within a migration path to spawning grounds for Atlantic sturgeon and shortnose sturgeon, adult Atlantic sturgeon could occur near the NBB. No eggs, larvae, or juvenile Atlantic or shortnose sturgeon are anticipated to occur within Newark Bay and its adjacent bays and tributaries. Per the NMFS Harbor Deepening Biological Opinion, shortnose sturgeon are not expected to occur in the study area; they have only been observed as far south as the Statue of Liberty, which is more than 10 miles away via the most direct water route (NMFS 2012).

Bridge construction may include a combination of drilling shafts and pile driving for the bridge support structures and could temporarily disturb aquatic habitat used by sturgeon in Newark Bay via suspension of sediments and increased turbidity during construction. Since sediments in Newark Bay are composed of sand and silt, sheetpile cofferdams would be installed using vibratory hammers instead of impact hammers, and removed via vibratory extraction, thereby reducing potentially harmful noise generation. Any increases in turbidity caused by construction are expected to be short-lived, minor, and local to the immediate area, and would be quickly dissipated by the swift currents within the bay. Turbidity levels are not expected to reach levels that are toxic to sturgeon or benthic communities that support them. Further information about the bridge construction methods and construction impacts on water quality is found above under "Surface Water Impacts." It should also be noted that urban estuaries such as Newark Bay frequently experience elevated turbidity from heavy rain events, shipping, and other factors. The water quality impacts of the Proposed Action would have only insignificant and discountable effects to sturgeon.

The Proposed Action would introduce sound into the water and potentially impact adult Atlantic sturgeon. Historic boring data indicate that trestle pipe piles would need to be driven down about 40 feet into the sediment with a vibratory hammer and then driven an additional 20 to 40 feet with an impact hammer. Approximately 80 days would be required to construct the northern trestle assuming that two pile hammers are used at once during 8-hour workdays. The southern trestle will take the same amount of time with the same assumptions. For in-water installation of the trestle piles, a larger 60-inch diameter casing may be set to the mudline and equipped with air compressor lines at the bottom of the casing, which will create air bubbles in the annular space between the pipe pile and the casing to reduce sediment resuspension and underwater noise transmission during pile driving. Pile installation would begin with a reduced blow energy soft start to minimize initial effects and give any potentially affected species time to vacate the area before the higher energies are used and sound levels rise, reducing potential noise exposure risk. The sound levels in Table 3.11-7 are an estimate and will likely vary depending on the geometry and boundaries of the surrounding underwater environment (i.e., shallow/deep water, obstacles in the waterway). As the distance from the source increases, underwater sound levels produced by pile driving dissipate rapidly. Underwater noise levels will attenuate approximately 5 decibels (dB) every 32.8 feet (10 meters) for steel pipe and sheet piles. Additionally, bubble curtains can reduce noise from impact driving by about 10 dB (CALTRANS 2015).

Table 3.11-7. Transmission Loss Calculations and NMFS Disturbance and Injury Thresholds

Pile Type	Hammer Type	Estimated Sound Pressure Level (dB Peak)	Estimated Pressure Level (dBRMS)	Estimated Single Strike Sound Exposure Level (dBsSEL)	Distance (ft) to 206 dB Peak (Injury)	Distance (ft) to 187 dB SEL (Injury)	Distance (ft) to Behavioral Disturbance Threshold (150 dBRMS)
		Unattenuated/Attenuated	Unattenuated/Attenuated	Unattenuated/Attenuated			
48-inch steel pipe pile[1]	Impact hammer	213/208	192/187	179/174	44.6	142.2	9,608.40
72-inch steel pipe pile[2]	Vibratory hammer	N/A	170/165	N/A	N/A	N/A	328.1
Sheet pile	Vibratory hammer	N/A	154/149	N/A	N/A	N/A	28.1

[1]42-inch pile size not available in NMFS Multi-species Pile Driving Calculator for impact driving. Numbers listed are conservative for 42-inch pipe pile.
[2]42-inch pile size not available in NMFS Multi-species Pile Driving Calculator for vibratory driving. Numbers listed are conservative for 72-inch pipe pile.

Vibratory driving is estimated to be 10 to 20 dB quieter than pile driving with an impact hammer (CALTRANS 2015). Therefore, for the purpose of this analysis, since impact pile driving of the 42-inch steel pipe piles will generate the greatest noise levels and effects on sturgeon, the noise levels produced by starting with a vibratory pile driver were not considered. Impact driving 48-inch steel pipe piles (42-inch is not available in the NMFS Multi-species Pile Driving Calculator) would generate underwater noise levels as follows: unattenuated peak noise level of 213 dB; pressure level of 192 dB; and single strike sound exposure level of 179 dB. Per the NMFS Multi-species Pile Driving Calculator (NMFS 2022d), for a sturgeon to be exposed to potentially injurious levels of noise during pile driving, it would need to be within a maximum of 45 feet of a single strike or within 142 feet of the pile being driven over a 24-hour period (when driving 48-inch steel pipe piles with an impact hammer). This is extremely unlikely to occur as it is expected that sturgeon would modify their behavior at 9,608 feet from impact pile driving and quickly move away from the ensonified area before cumulative injury levels are reached. The installation of the pipe piles within an air bubble-equipped casing will reduce noise transmission to surrounding waters compared to open-water pile driving by around 10 dB, but the NOAA Fisheries acoustics tool does not have a proxy project for this type of pile installation. Therefore, the threshold distances to sturgeon disturbance and injury from impact driving of steel pipe piles presented in Table 3.11-7 are conservative. Use of a soft start would give any sturgeon in the immediate area an opportunity to vacate the area before sound levels rise further, reducing potential noise exposure risk.

Per the NMFS Multi-species Pile Driving Calculator (NMFS 2022d), vibratory driving steel sheet piles would produce peak noise levels that do not exceed the 206 dB Peak threshold for sturgeon injury. Vibratory sheet pile-driving would generate a pressure level and single strike sound exposure level of 154 dB, with associated threshold distances for sturgeon injury and disturbance extending out 60.6 feet from the sheetpile. The use of air bubble curtains to reduce the escapement of resuspended sediment will also function to reduce noise transmission to adjacent waters compared to open-water pile driving, and would reduce noise levels by 5 dB, with associated threshold distances for sturgeon behavioral disturbance extending out 28.1 feet from the sheet pile. Therefore, the threshold distances to sturgeon disturbance and injury from vibratory driving of steel sheet pile presented in Table 3.11-7 are conservative.

Injurious levels of underwater noise for sturgeon would only occur very near the source, within 45 feet. Underwater noise levels that may affect sturgeon behavior would also only occur near the source, within 9,608 feet. Use of a soft start would give sturgeon the opportunity to vacate the area, minimizing the likelihood for potential injury. Should sturgeon enter areas within the threshold distances for injury or behavior, it is likely that they would move away from the noise source. This possible modification of normal movement patterns of some individuals is expected to be insignificant because underwater noise would be limited in duration, affect only a small area within Newark Bay, and would not pose a barrier to migration or the availability of other more suitable habitat. Thus, interference with feeding, reproduction, migration or other activities necessary for survival is not expected. Adherence to New Jersey in-water TOY restrictions from February 1 to June 30 is expected to occur to protect sturgeon for half of the year. Work could proceed within cofferdams installed outside of this restriction period. The use of cased trestle piles and vibratory driving of steel sheetpiles would be protective of sturgeon habitat by minimizing noise and turbidity.

Vessel traffic associated with bridge construction and demolition could increase the risk of vessel strikes with Atlantic and shortnose sturgeon. Tugboats, spud barges, crew boats, and other vessel types would be operating daily over a 7-day work week for the four-year duration of construction and demolition. Vessel traffic associated with bridge construction and demolition would constitute most vessel traffic in the area, however most construction and demolition would be performed via the temporary access trestle, thereby minimizing vessel use. However, work vessels would be slow moving with drafts well above the portion of the water column used by sturgeon, and therefore have very low likelihood of striking a sturgeon. Lastly, the potential aquatic habitat modification and loss, as detailed above under "Aquatic Biota," could displace Atlantic sturgeon from water column and benthic habitat occupied by cofferdams and trestle piles for the duration of construction, or approximately two years for any given temporary in-water structure. As sturgeon forage in the sediment, they would be potentially affected by the loss of bay bottom foraging habitat. However, the area of loss is relatively

small compared to the overall area of intertidal and subtidal shallows available in Newark Bay. Based on the impacts described above and the fact that adults of both species are highly mobile and could easily avoid the area during active construction, no adverse effects are anticipated. NMFS completed their ESA Section 7 consultation and concurred that the Proposed Action is not likely to adversely affect either the Atlantic or shortnose sturgeon, as noted in their October 17, 2024, concurrence letter to the USCG (see Appendix F).

Birds

Several Birds of Conservation Concern and state-listed endangered, threatened, and special-concern species could occur in the study area, including the bald eagle, black-crowned night-heron, cattle egret, glossy ibis, least tern, little blue heron, osprey, peregrine falcon, snowy egret, tricolored heron, and yellow-crowned night-heron (Table 3.11-4). The Proposed Action would involve construction in areas adjacent to special-status species habitat. Impacts would depend on the species' population size and type of activity. This is primarily a concern for construction activities within the vicinity of waters and wetlands, where the vast majority of habitat suitable for special-status species is found in the study area. One exception is the checkered white (*Pontia protodice*), a butterfly that is found in a wide variety of sites including dry weedy areas, vacant lots, fields, pastures, sandy areas, railroad beds and roads. In the past, checkered white butterflies have been observed at EWR, along the Peripheral Ditch near the NB-HCE. Portions of the airfield and Port Newark have been classified as suitable habitat for the butterflies (NJDEP 2017). However, ecologists performing surveys of the study area did not find suitable habitat for the checkered white, which typically occurs in open areas such as savannas, old fields, vacant lots, power line rights-of-way, and along forest edges. Also, construction would be performed outside of the checkered white butterfly habitat. Therefore, the Proposed Action would not be expected to have any effect on the checkered white butterfly.

The shorelines of Newark Bay and wetlands located on either side of Newark Bay provide suitable foraging habitat for listed wading bird species, including black-crowned night-heron and yellow-crowned night-heron (State threatened) which were observed during field investigations. Other species that may forage in or around the study area include the state-endangered bald eagle and peregrine falcon; the State-threatened cattle egret (*Bubulcus ibis*), and other state species of concern. As these birds are highly mobile and capable of avoiding construction activities, disturbance from construction activities would be minor, short-term and localized, as discussed above under "Terrestrial Fish and Wildlife."

Peregrine falcon—Peregrine falcons have been documented nesting on the NBB during the past two years and presumably remain in the area year-round. The Proposed Action would displace the existing nest, but an alternative nest site could be constructed to minimize potential impacts. Further details on mitigation are detailed below and in Section 3.11.5.2. The degree of impact to these falcons from constructing new bridges and demolishing the existing bridge would depend on the level of tolerance by the nesting pair, the visibility of disturbing activities from the nest, and the timing of construction and mitigation measures with respect to nesting chronology (see Slankard et al. 2020). Although urban peregrine falcons are generally more habituated to, and less disturbed by human activities, the behavioral response of individuals to disturbances varies and they are susceptible to nest failure or abandonment if disturbed by construction activities at critical times (NYSDEC 2014). Nesting encompasses the critical time and the timing of the annual cycle for the peregrine falcon in New Jersey (Table 3.11-8). During the non-breeding season from September to February, the peregrine falcon pair may continue to occupy the NBB and regard it as their territory and hunting grounds.

To prevent disturbance to nesting peregrine falcons, recommendations for avoidance buffers have varied between around 2,600 to over 5,000 feet (Richardson and Miller 1997); however, Slankard et al. (2020) found that a 150-to-300-foot buffer was sufficient to avoid disturbance to nesting peregrine falcons during a bridge replacement over the Ohio River. Direct observations of the peregrine falcons and their nest site during monitoring in 2022 indicated that the birds are relatively unresponsive to disturbances associated with bridge maintenance activities and high traffic volumes during normal bridge operation; they have successfully nested amidst construction and maintenance work on the bridge. Based on these observations, the peregrine falcons

occupying the NBB are expected to habituate to and tolerate the increased levels of noise and human activity that would occur during bridge construction and demolition.

Table 3.11-8. Annual Cycle for the Peregrine Falcon in New Jersey

Annual Cycle	Timing*
Nesting season (includes courtship and nest site selection/nest-building)	Mid-February to early March
Egg laying	March to mid-April
Incubation (approximately 33-35 days)	Early April to mid-May
Nestling period (approximately 6 weeks)	Mid-May to mid-June
Fledgling period (initially dependent on parental feeding, approximately 9-12 weeks)	Mid-June to early September
Immature stage (dispersal from nest area)	Mid-August to early September
No breeding activity (pair remains at the bridge/territory)	September to February

Sources: Herbert and Herbert 1965, NJDEP 2015

* Dates provided are for a normal nesting season, as courtship and subsequent periods can be pushed back until late June in an unsuccessful nesting season.

The nesting activity and associated behavior of peregrine falcons would continue to be monitored on a weekly basis during the breeding season (February 15 to July 31), or until fledging occurs, prior to bridge replacement, during construction activities, and for two years following completion of bridge construction and demolition activities. This would promote adaptive management of the mitigation proposed for the falcon nest over the course of the Proposed Action. A proactive approach will be taken to coordinate protective measures for peregrine falcon in consultation with the NJDEP Fish and Wildlife ENSP. Construction activities, especially those that may disturb the birds, will be scheduled outside of the peregrine falcon nesting season (March 1 to June 30). Alternatively, a 300-foot work restriction zone may be implemented during the breeding season. The following activities would be prohibited within the work restriction zone: demolition of existing structures, construction/demolition of temporary trestle bridges, installation of temporary cofferdams, installation of new structures (i.e., piers, bridge deck, fenders). The distance and intensity of such activities will need to be determined in consultation with ENSP and evaluated as construction progresses because it is anticipated that the falcon pair will demonstrate resilience. It should be noted that the pair has been successful on the existing NBB during the past two years while road crews have been performing bridge maintenance activities and Slankard et al. (2020) observed that falcons tolerated personnel access as close as the adjacent pier of the bridge staff, which was 250 feet away from a replacement nest box on a new bridge. If an activity has the potential to adversely impact nesting peregrine falcons and cannot be avoided during the nesting season, ENSP staff would be consulted prior to conducting work (or as soon as possible for emergency works) to determine additional management/mitigation (e.g., monitoring) recommendations. Monitoring by an avian biologist, as determined in consultation with the ENSP staff, would also be performed during an activity that has the potential to disturb the birds and cannot avoid the nesting season.

Bald Eagles—Construction activities within or alongside Newark Bay could impact bald eagles. Tree clearing or disturbances to mature trees or dead snags, which would be required in limited areas along the eastern shoreline of Newark Bay, may affect eagles roosting or foraging in the area. The NJDEP Landscape Project mapping shows foraging habitat for the bald eagle within the study area and a nest is located about 1.5 miles to the north, at Kearny Point. Reproduction is the period when bald eagles are most sensitive to disturbance, but the Proposed Action would occur far enough away that no disturbance to nesting would occur. Based on USFWS guidelines for minimizing disturbances to bald eagles, which recommend a maximum buffer distance of 0.5 miles between bald eagles and extremely loud noises, it can be conservatively estimated that bald eagles would avoid a maximum of 0.5 miles of river in each direction from the bridge during construction (USFWS 2007). Displacement of eagles from this area would represent an insignificant temporary reduction in the

amount of foraging habitat available on Newark Bay and the lower Passaic and Hackensack River. Bald eagles would also have the potential to occur within the study area during the winter, during which time individuals would usually be found sitting on ice flows within areas of open water. Per USFWS recommendations, all construction activities would be completed in accordance with the National Bald Eagle Management Guidelines (USFWS 2007). Additionally, a Northeast Bald Eagle Project Screening Form was completed for the project and is included in Appendix F. Therefore, in compliance with the BGEPA, the Proposed Action Alternative would not be expected to "take" any bald eagle and there would thus be no meaningful impact to them at either the individual or population level. Similarly, ospreys have nested at the same location on the Conrail bridge in 2021 and 2022, but the nest is located outside of the study area. Red-tailed hawks have nested on a billboard on the east side of Newark Bay, which is outside of the study area also. However, while there could be temporary disturbance to foraging adults, there is no potential for adverse impacts to breeding individuals.

Wading Birds—The NJDEP Landscape Project Mapping (Figures 3.11-5a and 3.11-5b) indicate that emergent wetlands within the vicinity of the Program provide suitable foraging habitat for state-listed wading birds. The black-crowned night-heron and yellow-crowned night-heron were observed during field investigations. However, heron nesting habitat is absent in the study area due to a lack of suitable wetland tree and shrub cover, dominance of *Phragmites australis*, and high levels of human disturbance. Because there is no documented nesting habitat for special-status wading birds, it is unlikely that agencies would require mitigation (preservation, enhancement, or creation of new habitat) for impacts to foraging habitat because it is not the limiting factor for these species.

Bats

There is potential for the Proposed Action to affect bats via tree clearing and bridge demolition, which could reduce roosting habitat or potentially cause direct mortality if an occupied roost tree or bridge is disturbed when bats are present. Construction activities may also disturb bat foraging and cause indirect impacts via changes in insect prey. Potentially impacted species include the federally endangered northern long-eared bat and proposed endangered tricolored bat, and other bat species given a "Consensus Status" of "Endangered" by NJDEP (little brown bat and eastern small-footed myotis) (Table 3.11-4). Because potential bat habitats cannot be avoided, the Authority would coordinate with USFWS and NJDEP Fish and Wildlife to identify appropriate avoidance and minimization measures. This includes conducting the removal or trimming of any tree that provides suitable roosting substrate within the project limits between October 1 and March 31. Impacts to bats would be temporary and minor after implementing such measures.

Marine Mammals

Impacts to marine mammals are not anticipated based on their unlikely occurrence within the study area. Only temporary, insignificant disturbances to marine mammals would be anticipated to occur from disturbance related impacts. No harassment to marine mammals would be anticipated at either Level A (injury) or Level B (disturbance).

3.11.5.2 Conclusion

Based on the preceding assessment, the Proposed Action will have impacts to natural resources; however, the measures outlined below will reduce any impacts to the maximum extent practicable. The Proposed Action will have measurable impacts on water quality, but measures would be implemented to ensure that pollutant concentrations would be below applicable standards, regulations, and guidelines, and within existing conditions or designated uses. Pursuant to the CZMA, the Proposed Action will have no reasonably foreseeable effects on coastal uses and resources. Pursuant to the Marine Mammal Protection Act, the Proposed Action is not likely to or will not result in takes of marine mammals. Pursuant to the Magnuson-Stevens Act, the Proposed Action may adversely affect EFH or Habitat Areas of Concern. Pursuant to the Migratory Bird Treaty Act, the Proposed Action will not result in a take of migratory birds or the parts, nests, or eggs of such bird. Pursuant to the BGEPA, the Proposed Action will not result in a take of Bald or Golden Eagles or the parts, nests, or eggs of such bird.

Geology and Soils

To minimize the potential for soil loss during storm events, soil erosion and sediment control measures will be implemented. These measures would be specified in an SESC plan that complies with the Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90 (New Jersey State Soil Conservation Committee 2017). Soil stockpiled on site would be situated so as not to obstruct natural drainage or cause off-site environmental damage. In addition, the construction specifications will require that all soil erosion and sediment control structures are installed prior to any construction and that they must be maintained for the duration of the Proposed Action. Additional best management practices that would be followed include:

- Low-ground-pressure construction vehicles will be used whenever possible to perform construction in wetlands. Skid rigs will only be used when wooden planks or snow fencing is laid down to minimize disturbance of the ground surface.

- The area used for access to the construction location will be minimized to the maximum extent practicable. Matting or track equipment will be used when the ground is soft to avoid soil compaction. All access roads will be maintained within the limit of disturbance, which will receive permanent revegetation upon project completion.

- Disturbance/removal of trees for access to the construction site will be minimized to the maximum extent practicable. Whenever trees must be removed, selective removal of trees less than four inches in diameter is preferred in lieu of removal of larger trees.

- Temporarily disturbed areas will be restored to pre-existing conditions. Planting of disturbed areas will occur as soon as possible to minimize the possibility of erosion.

- Excavation and filling activities will be conducted in a manner to minimize turbidity and sedimentation into wetlands and open waters. Placement of embankments (filling) will be conducted in such a manner as to contain sediment at the fill areas. All construction activities will be performed in accordance with an approved Soil Erosion and Sediment Control Plan.

- The limits of disturbance, as indicated on the permit plans for a Section 404 Nationwide General Permit #15, are the maximum necessary for the construction. The limit of encroachment will also be posted with signage to prevent intrusion by construction vehicles.

- Staging and temporary roads or soil stockpiles will not be permitted in wetland areas that are not needed for actual construction, except as indicated on Permit Plans.

- Proper soil erosion and sediment control measures will be utilized in the vicinity of any construction activities.

With the implementation of these measures, no further mitigation is necessary.

Although drilling into bedrock will occur, blasting of bedrock is not anticipated for the Proposed Action. Final engineering of the new bridges would consider seismic potential and assess foundation needs to satisfy seismic demands. Additionally, techniques to mitigate liquefaction effects, including stone columns, compaction grouting, jet grouting, and deep cement mixing, will be considered during the final design of the bridge.

Water Resources

Surface Water

Impacts to surface waters have been minimized through elements of the project design and construction methods. For example, the lengths of bridge spans have been maximized to reduce the total number of piers. As described under *Surface Water Impacts* in Section 3.11.5.1, best management practices would be implemented to treat stormwater runoff during construction and afterward from the widened roadway. The Proposed Action would comply with the New Jersey Stormwater Management rules at N.J.A.C. 7:8 and strict adherence to an SESC Plan would avoid adverse water quality impacts from erosion and sediment loading during construction. SESC Plan implementation will be monitored on site. The Proposed Action would comply with all conditions imposed by a Stormwater Management Permit issued by NJDEP. Adverse water quality impacts in Newark Bay would be minimized by restricting in-water work to dry conditions within cofferdams and using turbidity barriers or bubble curtains around drilled shafts, eliminating the release of suspended solids to surrounding water from this activity. The installation of stormwater basins will aid in providing better water quality and lower erosive peak discharges than the existing conditions without stormwater basins. Under N.J.A.C. 7:7A-11, wetland mitigation is required for all wetland and open water impacts identified in an Individual Freshwater Wetlands and Open Water Fill Permit. Because impacts are expected to exceed 1 acre; the permit would require mitigation for permanent impacts as detailed under "Wetlands" below.

NJDEP's permitting of the Newark Bay Bridge Replacement on April 3, 2024 includes approval of a Water Quality Certificate pursuant to Section 401 of the Clean Water Act. With implementation of the best management practices and conditions noted in the NJDEP permit, expected water quality impacts will be below significant levels.

No further mitigation is necessary.

Groundwater

Groundwater would be encountered during excavation for the construction and demolition of pier footings for the viaducts and bridges. Based on previous monitoring of several properties in the study area, groundwater encountered may be considered contaminated. A pre-construction sampling plan will be developed during final design to identify locations of contaminated groundwater that may need to be managed during construction. The Proposed Action would follow the NJDEP Linear Construction Technical Guidance to address any contaminated groundwater that is encountered during excavation and prevent the excavation from serving as a conduit for the spread of contaminated water. Coordination with and approvals obtaining required permits from NJDEP will occur prior to the disturbance, handling, and disposal of any contaminated groundwater.

Wetlands

Wetlands temporarily disturbed during construction will be restored to their original grade and planted with indigenous wetland vegetation.

Overall, a total of approximately 14.810 acres of permanent impact to wetlands and open water is unavoidable and will require compensation. After accounting for the compensation of unavoidable long-term temporary impacts (i.e., greater than six-month duration as discussed in Section 3.11.5.1 above) at 26.236 acres and the restoration of habitats following the removal of the existing bridge piers, the overall acreage requiring off-site compensation is approximately 41.046 acres, as summarized in Table 3.11-9 below.

Table 3.11-9. Mitigation for Permanent Impacts

	Total Permanent Impacts (acres)	Total Temporary (>6 months) (acres)	Required Net Off-Site Mitigation* (acres)
Tidal Water	3.808	10.374	14.182
Tidal Marsh	2.045	5.449	7.494
Nontidal Freshwater Marsh	8.957	10.413	19.370
Total Wetlands/Waters	14.810	26.236	41.046

* The net off-site mitigation requirement subtracts the on-site restoration acreages from the permanent impacts to calculate the net mitigation need.

The Authority will acquire available wetland mitigation credits from existing mitigation banks with Service Areas that overlap WMA 5 (Hackensack River, Hudson River, and Pascack Brook Watersheds) and WMA 7 (Arthur Kill Watershed). Appendix F contains a copy of a Mitigation Conditions Correction Letter from NJDEP dated June 7, 2024, adding an additional mitigation bank to the permit conditions of File No. 0000-23-0012.2. Appendix F also includes three letters of credit availability from potential mitigation banks to provide compensatory tidal and freshwater credits. If necessary, the Authority will also pursue permittee-responsible mitigation to provide for the balance of the compensatory requirements not covered by available mitigation credits. The form and type of the additional mitigation activity will be coordinated with the regulatory agencies and may include third-party turnkey mitigation projects as well as publicly funded tidal wetland mitigation opportunities.

By permit dated April 3, 2024, NJDEP has authorized the Newark Bay Bridge Replacement under and in conditional compliance with the applicable Coastal Zone Management Rules (N.J.A.C. 7:7-1.1 et seq.) as amended through October 5, 2021, the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-1.1 et seq) as amended through November 7, 2022, and the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13-1.1 et seq.) as amended through July 17, 2023. The following are among the conditions of the permit:

- Wetlands temporarily disturbed during construction will be restored to their original grade and planted with indigenous wetland vegetation.

- Mitigation of impacts to wetlands, subtidal, intertidal, and tidal waters will likely include the purchase credits from approved mitigation banks but could also include permittee- (Authority-) provided restoration, creation, and/or preservation of wetland habitats. The use of a mitigation bank would be accomplished through the purchase of credits in a bank that has established similar or higher wetland values and functions as the area disturbed by the Proposed Action, including similar wildlife habitat, similar vegetative species coverage, and density, equivalent flood water storage capacity, and equivalency of other relevant values or functions. Finally, mitigation could be provided via in lieu payment into the NJDEP Wetlands Mitigation Fund.

Specifically, for the portion of the Proposed Action involving the replacement of the Newark Bay Bridge, the Authority will develop plans to accomplish the following:

- Mitigate for the disturbance of 9.156 acres of herbaceous wetlands through an on- site or off-site creation, restoration, or enhancement project or with the purchase of credits from a mitigation bank

serving the appropriate watershed management area in accordance with the mitigation hierarchy (N.J.A.C. 7:7A-11 et seq).

- Mitigate for the loss of 2.045 acres of intertidal and subtidal shallows and 3.808 acres of tidal water (N.J.A.C. 7:7-17.13).

- Mitigate the disturbance of 4.358 acres of herbaceous riparian zone vegetation in accordance with the standards at N.J.A.C. 7:13-13.

Application by the Authority for approval of activities under the Freshwater Protection Act Rules for the other portions of the Proposed Action (those outside of the Newark Bay Bridge replacement limits) will occur during final design of those portions (portions of the Proposed Action outside the Newark Bay Bridge replacement limits are outside the coastal zone and waters of the U.S.). Mitigative conditions of other NJDEP permits are expected to be similar to those listed above for the Newark Bay Bridge replacement activities of the Proposed Action.

No further mitigation is necessary.

Floodplains

The Proposed Action would include various mitigation measures to maintain the function and quality of floodplains during construction. The proposed design minimizes floodplain impacts by designing the majority of the NB-HCE roadway on structure rather than on fill. The Proposed Action would be conducted in accordance with NJDEP Flood Hazard Area Control Act Rules (N.J.A.C. 7:13) and NJDEP permit conditions. This includes providing compensatory mitigation for riparian zone impacts.

The Federal Emergency Management Agency requires communities to review and permit all proposed construction or other development within their SFHA to participate in the NFIP. The local Floodplain Administrators have responsibility to ensure all development occurring within their community's Special Flood Hazard Area (SFHA) is compliant with the local Flood Damage Prevention Ordinance, and minimum National Flood Insurance Program (NFIP) standards, regardless of any state-issued permits. The Authority will coordinate with local Floodplain Administrators during the final design to ensure that all elements adhere to the NFIP and Flood Hazard Area requirements. Measures to mitigate any identified floodplain impacts will be included by the Authority in bid documents.

No further mitigation is necessary.

Coastal Zone and Tidelands

A federal consistency determination was issued in conjunction with an individual permit from NJDEP on April 3, 2024. The Proposed Action will comply with all applicable conditions of the permit. No further mitigation is necessary.

Aquatic Biota

Permanent losses of tidal marsh, designated as HAPC for summer flounder, would be mitigated at a 3:1 ratio through the restoration of these habitat types within the watershed (for permittee-responsible mitigation) or a 1:1 ratio (for mitigation purchased through mitigation bank credits). As noted above, the acreage would be identified through additional surveys prior to EFH consultation with NOAA Fisheries Greater Atlantic Regional Fisheries Office. NMFS and NJDEP Fish and Wildlife will likely place restrictions on the scheduling of in-water activities to protect fisheries, which will be determined through coordination with both agencies during permitting of the Proposed Action. Additionally, the Proposed Action would not create a physical barrier to fish movement and will not adversely affect migrating fish. In order to ensure that migrating fish are not impacted, no construction operations in open water would take place from January 1 to June 30. Trestle pile

installation is permitted to occur between January 1 and June 1 with bubble curtains and additional mitigation measures in place as described under Special-status Species below. No further mitigation is necessary.

Terrestrial Vegetation and Wildlife

To avoid impacts from visual, noise, and vibration disturbance, construction activities would be timed to avoid vulnerable bird nesting/fledging periods and reproduction periods for mammals, amphibians, and reptiles. Specific measures would be finalized as the design progresses and would be specified in the permit requirements. A Migratory Bird Monitoring Plan will be developed prior to construction and implemented by a qualified biologist between March 1 and September 15 during construction. Impacts to wetland-dependent plants and animals would be offset by the required wetland mitigation discussed above. No further mitigation is necessary.

Special-status Species

No further mitigation is necessary for special-status species beyond the avoidance and minimization measures discussed in Section 3.11.5.1, except for peregrine falcon.

Measures will be undertaken to protect peregrine falcon nesting habitat during construction. These measures, which are included in an impact avoidance proposal that was submitted to NJDEP which includes installation of an alternative nest structure on Block 5708, Lot 91 and the City of Newark near the Newark Bay Bridge in accordance with specifications detailed by NJDEP in its permit for the Newark Bay Bridge replacement.

The proposal includes a detailed work schedule regarding measures to exclude peregrine falcon from nesting on the Newark Bay Bridge and construction of the alternate nest structure.

The Authority will engage a qualified wildlife biologist, with sufficient knowledge of and experience with avian species, and particularly peregrine falcon behavior, to monitor the project area from March 1 through July 31 of the given calendar year. The wildlife biologist will document peregrine falcon usage of the newly installed nest structure and continued use of the bridge proposed for demolition.

The conditions of the individual permit issued by NJDEP on April 3, 2024, further ensure that aquatic special-status species are also protected by appropriate measures. Specifically, to protect anadromous species spawning runs within the Newark Bay and associated tributaries, a timing restriction from March 1 through June 30 will be employed for any in-water disturbance, sediment generating activities and pile driving activities. A separate timing restriction of January 1 through May 31 will be observed to protect winter flounder species during migration and spawning in the area. This winter flounder species timing restriction period will be applied to tidal waters ranging from near-shore (sub-tidal) to 20-foot depths, in low to moderate tidal velocity areas, and in waters averaging between 10 - 32 parts per thousand salinities. Measures will also be used during construction for activities outside Newark Bay to prevent the introduction of sediment into the Bay and/or increase its turbidity.

In its permitting of the Newark Bay Bridge Replacement, NJDEP has authorized the Authority to conduct pile driving installation for trestle construction during the above referenced timing restriction period, by allowing for the use of bubble curtains, both with and without external confinement casings, provided that the contractor uses best management practices, as applicable, including use of noise attenuation and minimization measures during piles driving, such as:

- Driving piles in the dry or during low water conditions for intertidal areas.
- Use of vibratory hammers and construction phasing to minimize acoustic impacts.
- Driving piles as deep as possible with a vibratory hammer prior to using an impact hammer.

- Minimizing the number and size of temporary and permanent piles.
- Limiting pile driving activities to no more than 12 hours per day.
- Providing a 12-hour quiet (recovery) period between pile driving days.
- Use of "soft start" or "ramping up" pile driving (e.g., driving does not begin at 100% energy).
- Use of cushion blocks when using an impact hammer.
- Using drilled shafts instead of hammered piles where appropriate.

Implementation of these and other measures will serve to minimize potential impacts on the endangered fish species and Essential Fish Habitat.

The Authority has been coordinating with USCG on Section 7 ESA consultation with NMFS prior to construction regarding the assessment of potential effects on the Federally endangered fish species and any additional measures to protect the species during construction. NMFS completed their ESA Section 7 consultation and is in concurrence with the "may affect, but not likely to adversely affect" determination for Atlantic and shortnose sturgeon, as noted in their October 17, 2024, letter to the USCG. No further mitigation is necessary.