



TIER 1 FINAL ENVIRONMENTAL IMPACT STATEMENT  
VOLUME 2

## 7.5 Hydrologic/Water Resources



## 7.5 HYDROLOGIC/WATER RESOURCES

### 7.5.1 Introduction

Water resources include surface waters (lakes, rivers, streams, estuaries, seas, reservoirs, etc.) and associated hydrologic systems such as wetlands, coastal zones, and floodplains. Water resources within the Study Area may be used for drinking water, agriculture, industrial processes, transportation, and recreation. Wetlands and floodplains function as natural flood control systems that reduce the speed and volume of runoff, and improve water quality as well as provide habitat essential to a healthy ecosystem. Federal, state, and local governments have developed programs and regulations to protect and manage water resources. Construction activities and development associated with transportation could increase stormwater runoff, thereby degrading water quality and affecting aquatic habitats such as wetlands and estuaries (see Chapter 7.6, Ecological Resources, for an in-depth discussion of potential impacts to ecosystems and water habitats). This section focuses on water resources within the Study Area.

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#### Key Resource: Hydrologic Resources

- Regulated by numerous federal, state, and local laws, regulations and Executive Orders.
  - Adverse impacts may be difficult to permit or unallowable and may influence identification of a Preferred Alternative.
  - Types of effects include dredge or fill of wetlands; encroachment of floodplains; development within designated coastal zones; crossing Navigable Waterways.
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See Chapter 7.7, Geologic Resources (Section 7.7.3), for a discussion and evaluation of sole source aquifers.

#### 7.5.1.1 Definition of Resource

This section includes the definitions, as used in this Tier 1 Draft Environmental Impact Statement (Tier 1 Draft EIS), of surface waters, water quality, floodplains, freshwater and saltwater wetlands, and coastal zones. These resources have been grouped into three main categories:

##### ► **Freshwater Resources**

- **Surface Waters** include freshwater creeks, streams, rivers, lakes, and ponds that are above ground.
- **Water Quality** is the physical, chemical and biological characteristics of a water body. A water body with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria is referred to as “impaired.” Streams identified as “impaired” are required to have established Total Daily Maximum Loads (TMDL). TMDL is a calculation of the maximum amount of a pollutant that the impaired waterbody can receive and still meet water quality standards. A water body that has a good water quality is referred to as “high quality.” Water quality is determined and enforced at the state level, based on standards set by both the state and federal government.
- **Freshwater Wetlands**, as defined by the U.S. Army Corp of Engineers (USACE), means 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 for life in saturated soil conditions. The U.S. Fish and Wildlife Service categorizes wetlands by eight wetland types as part of the National Wetlands Inventory (NWI). The wetland types that were considered *freshwater* wetlands for the purposes of this assessment include Freshwater Forested and Shrub; Freshwater Emergent; Freshwater Pond; Riverine; Lake; and Other Freshwater.

- ▶ **Navigable Waters** refers to large waterways as defined under Section 10 of the Rivers and Harbors Act of 1899 that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce to the head of navigation.
- ▶ **Floodplains** are those areas adjacent to a stream or river that are susceptible to flooding. This study focuses on areas designated by the Federal Emergency Management Agency as special flood hazard areas (SFHA), also known as the area that would be inundated by the 1-percent annual chance flood, also known as the 100-year flood.
- ▶ **Coastal Resources**
  - **Coastal Zones** are defined by Section 304 of the Coastal Zone Management Act (CZMA) as coastal waters (including the lands therein and thereunder) and the adjacent shorelines, strongly influenced by each other and in proximity to the shorelines of the coastal states. Designated coastal zones include islands, transitional and intertidal areas, coastal/salt marshes (saltwater wetlands), and beaches. The zone extends inland from the shorelines only to the extent necessary as determined by each individual state that has a designated coastal zone.
  - **Saltwater Wetlands**, as defined by the USACE, means 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 for life in saturated soil conditions. The U.S. Fish and Wildlife Service categorizes wetlands by eight wetland types as part of the NWI. The wetland types that were considered *saltwater* wetlands for the purposes of this assessment include Estuarine and Marine, and Estuarine and Marine Deepwater.

Appendix E, Section E.05, provides a description of the methodology used for analyzing existing conditions and Environmental Consequences of each of these hydrologic/water resources.

### 7.5.1.2 Effect-Assessment Methodology

The Federal Railroad Administration (FRA) developed an effects-assessment methodology for each of the three categories of water resources identified in Section 7.5.1.1. The methodologies provide a detailed definition of each resource, data sources, an explanation on how the Affected Environment was defined and established, and how the effects on each resource were evaluated and reported. Table 7.5-1 summarizes key factors associated with the methodologies for each hydrologic/water resource evaluated in this Tier 1 Draft EIS.

**Table 7.5-1: Effect-Assessment Methodology Summary: Hydrologic/Water Resources**

Resource	Affected Environment*	Type of Assessment	Outcome
<b>Freshwater Resources</b>			
Surface Waters	2,000 feet	Quantitative: Acres/ linear feet	Identification of number of surface waters affected by the Representative Route of each Action Alternative and potential associated effects.
Water Quality	2,000 feet	Qualitative	Identification of established water quality for identified surface waters and understanding of how Action Alternatives could influence established water quality.
Freshwater Wetlands	2,000 feet	Quantitative: Acres	Identification of number of acres of freshwater wetlands affected by the Representative Route of each Action Alternative.
<b>Floodplains</b>			
Floodplains	2,000 feet	Quantitative: Acres	Identification of number of special flood hazard areas affected by the Representative Route of each Action Alternative.
		Qualitative	Identification of Action Alternatives located in areas subject to increased flood risk due to climate change and sea level rise.
<b>Coastal Resources</b>			
Coastal Zones	2,000 feet	Quantitative: Route miles	Identification of number of route miles of each Action Alternative that are within an established coastal zone.
Saltwater Wetlands	2,000 feet	Quantitative: Acres	Identification of number of saltwater wetlands affected by the Representative Route of each Action Alternative.

Sources: NEC FUTURE Freshwater Resources, Floodplain, and Coastal Zones and Saltwater Wetlands Effects-Assessment Methodologies, Appendix E, Section E.05, 2014

\* The Affected Environment for Hydrologic/Water Resources is a 2,000-foot-wide swath centered on the Representative Route.

### 7.5.2 Resource Overview

Hydrologic resources are protected and regulated under various federal, state, and local laws such as the Clean Water Act (33 USC 1344). Implementation of the Action Alternatives can result in degradation of water quality, dredge and fill of wetlands, encroachment of floodplains, development in coastal zone management areas, and crossing of navigable waterways. These effects would result from construction and operations associated with modification of existing rail infrastructure, such as expansion of rail rights-of-way, and/or construction of new rail infrastructure, such as railroad tracks or stations. Adverse effects on these resources require mitigation and permitting by regulating agencies such as the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), state environmental agencies, and localities.

Numerous water resources exist within the Study Area, including within the Affected Environment and Representative Route for the existing NEC and each Action Alternative. The FRA collected, catalogued, and analyzed data pertaining to waterbodies and corresponding hydrologic systems such as floodplains and wetlands, and identified potential impacts to water resources of interest. Appendix E, Section E.05, contains a complete list of the hundreds of streams, rivers, lakes, ponds, estuaries, and bays that occur within the Affected Environment of the Action Alternatives.

Understanding the locations of hydrologic resources is important as it can influence decisions on infrastructure needs and design considerations. The analysis presented in this section identifies concentrations of known hydrologic resources that the FRA will consider when identifying the Preferred Alternative and that future project proponents should evaluate further during Tier 2 project planning and development. Key findings of the hydrologic resources analysis are:

▶ **Benefits**

- None of the Action Alternatives cross or intersect any Wild and Scenic River with a special water quality consideration.
- All Action Alternatives incorporate the use of elevated structures and tunnels to minimize effects on hydrologic resources.
- Alternative 3 proposes inland routes north of New York City that occur outside of designated coastal areas.

▶ **Impacts**

- All Action Alternatives affect SFHAs, freshwater wetlands, saltwater wetlands, Navigable Waterways, and coastal zones.
  - Under Alternatives 1 and 2, the majority of the impacts to hydrologic resources occur in Connecticut.
  - Alternative 3 has the greatest combined effects on SFHAs, freshwater and saltwater wetlands and coastal zones of all Action Alternatives. In particular, numerous hydrologic resources are associated with the Long Island Sound.
- Alternative 2 is the only Action Alternative that would bisect the John Heinz Wildlife Refuge in Delaware and Philadelphia, PA. The refuge has associated freshwater wetlands and SFHA, is ecologically sensitive, and is located in a coastal zone.
- New crossings of Navigable Waterways would occur under All Action Alternatives. Alternative 3 proposes the most with 11 new crossings of Navigable Waterways.

### **7.5.3 Affected Environment**

Similar to the Study Area, numerous water resources were identified within the Affected Environment. Table 7.5-2 through Table 7.5-7 summarize the quantities, where applicable, and types of resources identified for the existing NEC and the Action Alternatives; these tables list only the largest water resources, but Appendix E, Section E.05, provides a full listing of resources.

**Table 7.5-2: Summary of Water Resources within the Affected Environment by Action Alternative**

Resource	Existing NEC	Alt. 1	Alt. 2	Alternative 3				
				D.C. to NYC	New York City to Hartford		Hartford to Boston	
					via Central Connecticut	via Long Island	via Providence	via Worcester
SFHA (acres)	21,270	22,125	25,965	13,015	7,050	6,450	8,510	9,290
Freshwater Wetlands (acres)	8,535	9,375	11,430	5,155	2,225	1,580	5,705	5,820
Saltwater Wetlands (acres)	6,430	6,695	7,190	2,535	1,985	6,470	2,875	2,795
Total Wetlands (acres)	14,965	16,070	18,620	7,690	4,210	8,050	8,580	8,615
Coastal Zone (route miles)	180	225	235	115	110	135	50	15

Source: NEC FUTURE team, 2015

The FRA identified water resources associated with freshwater wetlands within the Affected Environment for each of the Action Alternatives. Given the numerous resources present, Table 7.5-3 lists only those resources within counties in which the Affected Environment of an Action Alternative contains a higher than average number of freshwater wetlands; the average acreage of freshwater wetlands present within each Action Alternative’s Affected Environment is 250 acres per county. Note that an Action Alternative may cross a resource and not be listed in Table 7.5-3 if that resource has less than 250 acres of freshwater wetlands associated with it for that county.

Table 7.5-3 also notes those resources with special water quality designations. See Appendix E, Section E.05, for a complete list of all surface waters and corresponding water quality designations.

Table 7.5-4 lists Navigable Waterways crossed by either the existing NEC or Action Alternatives. While numerous Navigable Waterways exist within the Affected Environments of the Action Alternatives, only those that are crossed by the Representative Route are noted. Also noted are Navigable Waterways that are not currently crossed by the existing NEC but would be crossed by one or more of the Action Alternatives.

Resources associated with floodplains have been identified within the Affected Environment for each of the Action Alternatives. Given the numerous resources present within the Affected Environments for each Action Alternative, Table 7.5-5 lists only those resources within counties in which the Affected Environment of an Action Alternative encompasses a higher than average number of associated SFHA; the average acreage of SFHA present within each Action Alternative’s Affected Environment is 700 acres per county.

**Table 7.5-3: Affected Environment: Water Resources Associated with Freshwater Wetlands by Action Alternative**

State	County	Resource of interest	Existing NEC	Alt. 1	Alt. 2	Alt. 3
MD	Anne Arundel	Patuxent River ( <b>WQ</b> )	X	X	X	X
	Baltimore	Gunpowder River and Gunpowder Falls ( <i>both WQ</i> )	—	—	—	X
	Harford	Gunpowder and Bush Rivers ( <i>both WQ</i> )	—	—	—	X
	Cecil	Susquehanna River	—	X	X	X
DE	New Castle	Christina River ( <b>WQ</b> )	X	X	X	X
PA	Delaware	Delaware River	—	—	—	X
	Philadelphia	Schuylkill River ( <b>WQ</b> )	—	—	X	X
	Bucks	Van Skiver Lake	X	X	X	X
NJ	Mercer	Assunpink Creek ( <b>WQ</b> )	X	X	X	X
	Middlesex	Lower Hudson River	X	X	X	X
NY	Westchester	Mamaroneck ( <b>WQ</b> ) and Cross Rivers	—	—	—	X
CT	Fairfield	Major Tributaries of Long Island Sound ( <b>WQ</b> )	—	—	—	X
	New Haven	Major Tributaries of Long Island Sound ( <b>WQ</b> )	X	X	X	X
	New London	Major Tributaries of Long Island Sound ( <b>WQ</b> )	X	X	X	X
	Hartford	Major Tributaries of the Connecticut River ( <b>WQ</b> )	—	—	X	X
	Tolland	Hop, Skungamaug, Willimantic, Fenton, and Mount Hope Rivers ( <i>all WQ</i> )	—	—	—	X
	Windham	Connecticut Coastal (Atlantic Ocean) ( <b>WQ</b> )	—	—	X	X
RI	Washington	Pawcatuck River and Chapman Pond ( <i>both WQ</i> )	X	X	X	X
	Providence	Major tributaries of Narragansett Bay ( <b>WQ</b> )	—	—	X	X
MA	Bristol	Major Tributaries of Massachusetts Coastal (Atlantic Ocean) ( <b>WQ</b> )	X	X	X	X
	Norfolk	Neponset River ( <b>WQ</b> )	X	X	X	X
	Worcester	Quinebaug, Little, French, Quinsigamond, Assabet, and Sudbury Rivers ( <i>all WQ</i> )	—	—	—	X

Source: NEC FUTURE team, 2015

X = The Affected Environment of the Action Alternatives includes 250 or more acres of freshwater wetlands associated with resource(s) listed in that county; effects would be subject to Tier 2 analysis.

— = Not applicable within that alternative/option.

**WQ** – Resource or tributary(ies) have a special water quality designation within the corresponding county boundary.

**Table 7.5-4: Affected Environment: Navigable Waterways Crossed by the Existing NEC and Action Alternatives**

State	County	Resource of Interest	Construction Type at Crossing	Existing NEC	Alt. 1	Alt. 2	Alt. 3
MD	Baltimore	Gunpowder River	Major Bridge	X	X	X	X
	Harford	Bush River	Major Bridge	X	X	X	X
DE	New Castle	Christina River	Aerial	—	—	—	X*
			Major Bridge	—	—	X	—
		Brandywine Creek	Aerial	X	X	X	X*
PA	Philadelphia	Schuylkill River	Tunnel	—	—	—	X*
PA/NJ	Bucks/Mercer	Delaware River	Major Bridge	X	X	X	X
NJ	Essex/Hudson	Passaic River	Tunnel	—	—	X*	X*
			Major Bridge	X	X	X	X
	Hudson	Hackensack River	Major Bridge	X	X	X	X
NJ/NY	Hudson/Manhattan	Hudson River	Tunnel	X	X*	X*	X*
NY	Manhattan/Queens/Kings	East River	Tunnel	X	X	X*	X*
			Major Bridge	X	X	X	X
	Kings/Queens	Newtown Creek	Tunnel	—	—	X*	X*
	Manhattan/Bronx	Harlem River	Tunnel	—	—	—	X*
	Suffolk	Port Jefferson Harbor	Tunnel	—	—	—	X*
CT	Fairfield	Pequonnock River	Major Bridge	X	X	X	X
NY/CT	Suffolk/New Haven	Long Island Sound	Tunnel	—	—	—	—
CT	New Hven	West River	Major Bridge	X	X	X	X
			Tunnel	—	—	—	—
		Mill River	Major Bridge	X	X	X	X
			Tunnel	—	—	—	—
		Quinnipiac River	Major Bridge	X	X	X	X
			Tunnel	—	—	—	—
	Hartford	Connecticut River	Tunnel	—	—	X*	X*
	Middlesex/New London	Connecticut River	Major Bridge	X	X	X	X
			Aerial	—	X*	—	—
	New London	Niantic River	Major Bridge	X	X	X	X
			Major Bridge	X	X	X	X
Major Bridge			X	X	X	X	
Stonington Harbor		Major Bridge/ Common Grade	X	X	X	X	
CT/RI	New London/Washington	Pawcatuck River	Aerial	X	X	X	X
		Trench	—	X*	—	—	
RI	Providence	Seekonk River	Tunnel	—	—	X*	X*

Source: NEC FUTURE team, 2015

X = Denotes the Navigable Waterway is crossed by the existing NEC or Action Alternative.

\* Denotes new proposed crossing

— = Not applicable within that alternative/option

**Table 7.5-5: Affected Environment: Water Resources Associated with Floodplains by Action Alternative**

State	County	Resource of interest	Existing NEC	Alt. 1	Alt. 2	Alt. 3
MD	Anne Arundel	Patuxent River	X	X	X	X
	Harford	Gunpowder and Bush Rivers	X	X	X	X
	Cecil	Susquehanna River	—	—	X	X
DE	New Castle	Christina and Delaware Rivers	X	X	X	X
PA	Delaware	Delaware River	—	—	—	X
	Philadelphia	Schuylkill River	—	—	X	X
NJ	Middlesex	Major Tributaries of the Raritan and Lower Hudson Rivers	X	X	X	X
NJ	Hudson	Passaic, Lower Hackensack, and Hudson Rivers	X	X	X	X
NY	Westchester	Mamaroneck and Cross Rivers	—	—	—	X
CT	Fairfield	Major tributaries of Long Island Sound including Rippowam, Goodwives, Fivemile, Norwalk, Indian, Saugatuck, Mill, Rooster, Pequonnock, Housatonic, and Noroton Rivers	X	X	X	X
	New Haven	Major tributaries of Long Island Sound including Wepawaug, Hammonasset, Indian, Oyster, Cove, West, Mill, Quinnipiac, Little, Farm, East, Neck, and Cover Rivers	X	X	X	X
	Middlesex	Major tributaries of Long Island Sound including Hammonasset, Indian, Hammock, Menunketesuck, Patchogue, Oyster, Connecticut, and Patchogue Rivers	X	X	X	X
	New London	Major tributaries of Long Island Sound including Lieutenant, Dick, Threemile, Fourmile, Pattagansett, Niantic, Thames, Poquonock, Mystic, and Pawcatuck Rivers, Stonington Harbor, and Quana duck Cove	X	X	X	X
	Hartford	Connecticut River	—	X	—	—
RI	Washington	Pawcatuck River	X	X	X	X
MA	Worcester	Quinebaug, Little, Quinsigamond, and Sudbury Rivers ( <i>all WQ</i> )	—	—	—	—

Source: NEC FUTURE team, 2015

X = The Affected Environment of the Action Alternative includes 700 or more acres of special flood hazard areas associated with resource(s) listed; potential effects subject to Tier 2 analysis.

— = Not applicable within that alternative/option

(WQ) – Resource has special water quality considerations.

The FRA identified coastal resources within the Affected Environment for each of the Action Alternatives. Given the numerous resources present, Table 7.5-6 lists only those coastal resources within counties in which the Affected Environment of an Action Alternative contains a higher than average number of acres of saltwater wetlands; the average acreage of saltwater wetlands present within the each Action Alternative’s Affected Environment is 200 acres per county. Note that an Action Alternative may bisect a coastal resource and not be listed in the table if less than 200 acres of saltwater wetlands are associated with it for that county.

**Table 7.5-6: Affected Environment: Coastal Resources Associated with Saltwater Wetlands by Action Alternative**

State	County	Resource of interest	Existing NEC	Alt. 1	Alt. 2	Alt. 3
MD	Baltimore	Back River ( <b>WQ</b> )	X	X	X	X
	Harford	Gunpowder River ( <b>WQ</b> ) and Chesapeake Bay	X	X	X	X
DE	New Castle	Christina River ( <b>WQ</b> )	X	X	X	X
NJ	Hudson	Hackensack and Hudson Rivers	X	X	X	X
NY	New York	Hudson and East Rivers ( <i>both WQ</i> )	X	X	X	X
	Suffolk	Long Island Sound	X	X	X	X
CT	Fairfield	Long Island Sound	X	X	X	X
	New Haven		X	X	X	X
	Middlesex	Long Island Sound and Connecticut River ( <b>WQ</b> )	X	X	X	X
	New London	Major Tributaries of Long Island Sound	X	X	X	X
RI	Kent	Greenwich Bay ( <b>WQ</b> )	X	X	X	X

Source: NEC FUTURE team, 2015

X = The Affected Environment of the Action Alternative bisects 200 or more acres of saltwater wetlands associated with resource(s) listed; potential effects subject to Tier 2 analysis.

**WQ** – Resource or tributaries have a special water quality designation within the corresponding county boundary.

Table 7.5-6 notes the identified resources with special water quality designations. Appendix E, Section E.05, contains a complete list of all surface waters and corresponding water quality designations.

The assessment of the effects on coastal zones by Action Alternatives included identifying counties within the Affected Environment where the Action Alternative intersects CZMA boundaries, as well as describing the CZMA boundaries for each state. Because the coastal zone extends inland from the shoreline only to the extent necessary to control the shoreline as defined by each state, CZMA boundaries differ between jurisdictions. Jurisdictional coastal zones have been established for each affected state with the exception of Washington, D.C. The entire state of Delaware is a designated coastal zone.

Table 7.5-7 summarizes, by state, the CZMAs located in each Action Alternative’s Affected Environment.

**Table 7.5-7: Affected Environment: Coastal Zone Management Act Description Intersected by Action Alternative**

State	County	Coastal Resource	CZMA Description by State	Existing NEC	Alt. 1	Alt. 2	Alt. 3
MD	Baltimore	Chesapeake Bay	The Maryland coastal zone comprises the land, water and subaqueous land between the territorial limits of Maryland in the Chesapeake Bay, Atlantic Coastal Bays and the Atlantic Ocean, as well as the towns, cities, and counties that contain and help govern the thousands of miles of Maryland shoreline. The Maryland coastal zone extends from 3 miles out in the Atlantic Ocean to the inland boundaries of the 16 counties and Baltimore City that border the Atlantic Ocean, Chesapeake Bay and the Potomac River up to Washington, D.C.	X	X	X	X
	Baltimore City			X	X	X	X
	Hartford			X	X	X	X
	Cecil			X	X	X	X
DE	New Castle	Delaware Bay/Delaware River	Under the federal Coastal Zone Management Act, the entire state of Delaware is considered a coastal zone. Major water crossings include White Clay Creek and Christina River.	X	X	X	X
PA	Delaware		Within Pennsylvania, the Delaware Estuary stretches 57 miles along the coastline in Bucks, Philadelphia, and Delaware Counties. The coastal zone varies from one-eighth mile wide in urban areas like Philadelphia, to over 3.5 miles in Bucks County and extends to the Pennsylvania/New Jersey boundary in the middle of the Delaware River. The coastal zone contains environmentally important islands, as well as the marshes and shorelands of tributary streams that are tidally influenced. The head of tide for the Delaware Estuary is located at the falls of the Delaware River near Morrisville, PA, and Trenton, NJ.	X	X	X	X
	Philadelphia			X	X	X	X
	Bucks			X	X	X	X

**Table 7.5-7: Affected Environment: Coastal Zone Management Act Description Intersected by Action Alternative (continued)**

State	County	Coastal Resource	CZMA Description by State	Existing NEC	Alt. 1	Alt. 2	Alt. 3
NJ	Mercer	Delaware Bay/Delaware River Raritan Bay/Raritan River Newark Bay/Hackensack River Hudson River	New Jersey's coastal zone encompasses tidal and nontidal waters, waterfronts, and inland areas. The coastal zone includes the Hudson River from the interstate border with New York, Newark Bay, and Hackensack River, and related tidal waters south to the Raritan Bay. The coastal zone continues along the Raritan Bay then extends south from Sandy Hook to Cape May Point encompassing the state territorial waters of the Atlantic Ocean and associated tidal waterbodies. From Cape May Point, the coastal zone trends north to Trenton and contains waters for the Delaware Bay and River and includes tidal portions of their tributaries. The coastal zone boundary encompasses approximately 1,800 miles of tidal coastline, including 126 miles along the Atlantic oceanfront from Sandy Hook to Cape May and ranges in width from 100 feet to 16.2 miles.	X	X		X
	Middlesex			X	X	X	X
	Union			X	X	X	X
	Essex			X	X	X	X
	Hudson				X	X	X

**Table 7.5-7: Affected Environment: Coastal Zone Management Act Description Intersected by Action Alternative (continued)**

State	County	Coastal Resource	CZMA Description by State	Existing NEC	Alt. 1	Alt. 2	Alt. 3
NY	New York	Hudson River/East River/Long Island Sound	The New York inland coastal boundary varies but is generally 1,000 feet from the shoreline of the mainland in non-urbanized areas of the state. In urbanized and developed coastal locations, the inland boundary is generally 500 feet from the mainland's shoreline, or less than 500 feet where a railroad or roadway runs parallel to the shoreline at a distance of less than 500 feet; in these locations the railroad or roadway defines the coastal boundary. In addition, the coastal zone boundary may extend inland up to 10,000 feet to encompass coastal resources such as areas of exceptional scenic value, agricultural or recreational lands, and major tributaries and headlands in some areas of the state such as Long Island Sound and the Hudson River Valley. The seaward coastal zone boundary in New York extends 3 nautical miles into the Atlantic Ocean for land bordering the ocean. In total, New York has approximately 2,625 miles of coast.	X	X	X	X
	Queens			X	X	X	X
	Kings			X	X	X	X
	Bronx			X	X	X	X
	Westchester			X	X	X	X
	Suffolk			—	—	—	—
CT	Fairfield	Long Island Sound	Connecticut has a two-tiered coastal zone. The first tier "Coastal Boundary" generally extends inland 1,000 feet from the shore. The second tier "Coastal Area" includes all 36 of the state's coastal municipalities. There are 618 miles of coastline in Connecticut. The Long Island Sound is Connecticut's largest and most important natural resource.	X	X	X	X
	New Haven			X	X	X	X
	Middlesex			X	X	X	X
	New London			X	X	X	X

**Table 7.5-7: Affected Environment: Coastal Zone Management Act Description Intersected by Action Alternative (continued)**

State	County	Coastal Resource	CZMA Description by State	Existing NEC	Alt. 1	Alt. 2	Alt. 3
RI	Washington	Narragansett Bay	Rhode Island’s coastal zone encompasses the entire state, although the inland extent of the Coastal Program’s regulatory authority is generally 200 feet inland from any coastal features. Rhode Island has approximately 384 miles of coastline. Narragansett Bay is a major coastal feature in Rhode Island.	X	X	X	X
	Kent			X	X	X	X
	Providence+			X	X	X	X
MA	Suffolk	Boston Bay	The official Massachusetts coastal zone includes the land and waters within the seaward limit of the state’s territorial sea to generally 100 feet landward of the first major land transportation route encountered (e.g., road, highway, rail line, etc.). The following locations are included in the state’s coastal zone: all of Barnstable, Dukes, and Nantucket Counties; tidal rivers and adjacent uplands, at a minimum, to the extent of vegetation affected by measurably saline water; and anadromous fish runs in coastal towns. Coastal zone associated with Boston Harbor in Suffolk County is the only coastal resource within the Affected Environment.	X	X	X	X

Source: NEC FUTURE team, 2015

X = Affected Environment of Action Alternative intersects the state designated coastal zone (CZMA); effects would be subject to Tier 2 analysis.

— = Not applicable within that alternative/option

**7.5.3.1 Existing NEC**

The Affected Environment of the existing NEC encompasses more than 8,500 acres of freshwater wetlands. The majority of these wetlands, more than 40 percent, occur in New Jersey and Rhode Island. Approximately 21,270 acres of SFHA exist within the Affected Environment of the existing NEC with the majority occurring in Connecticut and associated with the Long Island Sound.

There are 226 waterbodies present within the Affected Environment of the existing NEC with special water quality designations. Additionally, there are 24 Navigable Waterways within the Affected Environment of the existing NEC.

Coastal resources along the existing NEC include approximately 6,430 acres of saltwater wetlands, associated with: Gunpowder River and Chesapeake Bay in Maryland; Christina River in Delaware;

Hackensack River and Hudson River in New Jersey; and the East River and Long Island Sound in New York. The existing NEC travels through designated coastal areas protected by the CZMA in Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, and Massachusetts.

### **7.5.3.2 Alternative 1**

The Affected Environment of Alternative 1 encompasses over 9,300 acres of freshwater wetlands, more than 70 percent of which are classified as Forested/Shrub wetlands. Just over 40 percent of the freshwater wetlands present within the Affected Environment occur in Connecticut and Rhode Island and are associated with resources of Long Island Sound and Narragansett Bay. The Affected Environment of Alternative 1 encompasses over 22,100 acres of SFHA. More than 8,000 acres of affected SFHA are present within the Affected Environment in Connecticut and are associated with the Long Island Sound.

The Affected Environment of Alternative 1 encompasses 239 waterbodies with special water quality considerations. There are 24 Navigable Waterways present within the Affected Environment of Alternative 1, three of which are new proposed crossings.

The Affected Environment of Alternative 1 encompasses over 6,640 acres of saltwater wetlands, which is only 4 percent more acres than are within the existing NEC. Nearly 60 percent of the affected saltwater wetlands are in Connecticut and are associated with Long Island Sound. The majority of the CZMA traversed by the Affected Environment of Alternative 1 are in Connecticut and are associated with the Long Island Sound.

### **7.5.3.3 Alternative 2**

The Affected Environment of Alternative 2 encompasses over 11,400 acres of freshwater wetlands, nearly 70 percent of which are classified as Forested/Shrub wetlands. Just under half of the freshwater wetlands encompassed by the Affected Environment are present in Connecticut and Rhode Island and are associated with resources of Long Island Sound and Narragansett Bay. The Affected Environment of Alternative 2 also encompasses wetlands associated with the John Heinz National Wildlife Refuge in Delaware County, PA. The Affected Environment of Alternative 2 encompasses nearly 26,000 acres of SFHA. More than 9,300 acres of affected SFHA are present within Connecticut, CT, and are associated with the Long Island Sound.

The Affected Environment of Alternative 2 includes 291 waterbodies with special water quality considerations. There are 25 Navigable Waterways within the Affected Environment.

Coastal resources associated with the Affected Environment of Alternative 2 encompass 7,200 acres of saltwater wetlands, which is 12 percent more acres than the existing NEC. Approximately 53 percent of the saltwater wetlands are present in the Affected Environment in Connecticut and are associated with Long Island Sound. The majority of the CZMA traversed by Alternative 2 are in Connecticut and are associated with the Long Island Sound.

### 7.5.3.4 Alternative 3

#### Washington, D.C., to New York City

Many water resources are present within the Affected Environment of the Washington, D.C., to New York City portion of Alternative 3. This route option encompasses nearly 5,150 acres of freshwater wetlands. The Affected Environment in Middlesex County, NJ encompasses the highest acreage of freshwater wetlands at approximately 1,060 acres associated with the lower Hudson River. Floodplains (SFHA) are associated with many of these water resources and wetlands. Approximately 13,000 acres of SFHA are present within the Affected Environment of this portion of Alternative 3. Large concentrations of SFHA are associated with the Gunpowder River in Harford County, MD, the Christina and Delaware Rivers in Delaware, the Schuylkill River in Philadelphia, PA, and the Raritan and lower Hudson Rivers in Middlesex County, NJ.

There are 95 waterbodies present within the Affected Environment of this route option that have special water quality designations; 10 waterbodies are considered Navigable Waterways.

Coastal resources associated with this portion of Alternative 3 include approximately 2,530 acres of saltwater wetlands associated with the Back River, Gunpowder River, and Chesapeake Bay in Maryland; the Christina River in Delaware; and the Hackensack and Hudson Rivers in New Jersey. Additionally, this portion of Alternative 3 travels through designated coastal zones that are protected under the CZMA in Delaware, Pennsylvania, and New Jersey.

#### New York City to Hartford

##### **Via Central Connecticut**

This route option encompasses approximately 2,230 acres of freshwater wetlands, most of which are located in New Haven County and Fairfield County, CT, and are associated with the Long Island Sound. Areas of SFHA are also encompassed by the Affected Environment of this route option and are associated with tributaries of the Hudson River in New York and with numerous tributaries that drain to the Long Island Sound in Connecticut. Approximately 7,050 acres of SFHA are present within the Affected Environment of this route option.

There are 116 waterbodies with special water quality designations present within this route option. Seven waterbodies are considered Navigable Waterways.

Coastal resources within this route option include approximately 1,985 acres of saltwater wetlands associated with the Hudson and East Rivers, and the Long Island Sound. This route option also travels through designated coastal zones that are protected under the CZMA in New York and Connecticut.

##### **Via Long Island**

This route option is proposed to tunnel underneath the Long Island Sound. The Affected Environment encompasses approximately 1,580 acres of freshwater wetlands associated with the Long Island Sound and the Connecticut River. New Haven County, CT, has the highest acreage of wetlands within this route option at approximately 870 acres. Areas of SFHA are present within the Affected Environment of this route option and are associated with tributaries to the Hudson and

Mamaroneck Rivers in New York and tributaries that drain to the Long Island Sound. Approximately 6,450 acres of SFHA are present within the Affected Environment of this route option.

There are 87 waterbodies with special water quality designations present within the Affected Environment of this route option. There are eight Navigable Waterways crossed by the Affected Environment of this route option.

Coastal resources exist within the Affected Environment of this route option and include 6,470 acres of saltwater wetlands associated with the East River, Long Island Sound, Connecticut River, Niantic River and the Thames River. This route option also travels through designated coastal zones that are protected under the CZMA in New York and Connecticut.

### Hartford to Boston

#### **Via Providence**

This route option encompasses approximately 5,705 acres of freshwater wetlands associated with the Connecticut River, Pawcatuck River, Chapman Pond, and Neponset River. Approximately 8,510 acres of SFHA are present with the Affected Environment and are also associated with these waterbodies. In addition, SFHA associated with Narragansett Bay, Seekonk River, and Central Pond are present within this route option.

There are 131 waterbodies with special water quality designations present within the Affected Environment of this route option. Ten waterbodies are considered Navigable Waterways.

Coastal resources exist within the Affected Environment of this route option and include approximately 40 acres of saltwater wetlands within Suffolk County, MA. This route option also travels through designated coastal zones in Massachusetts.

#### **Via Worcester**

This route option encompasses approximately 5,820 acres of freshwater wetlands. The majority of the wetlands are associated with the Neponset River in Bristol and Norfolk Counties, MA. Approximately 9,290 acres of SFHA exist within the Affected Environment of this route option and are primarily associated with many streams and tributaries throughout Bristol County, MA, and the Wading River Reservoir.

There are 146 waterbodies with special water quality designations present within the Affected Environment of this route option. Ten waterbodies are considered Navigable Waterways in this route option.

Coastal resources within the Affected Environment are limited to approximately 30 acres of saltwater wetlands in Suffolk County, MA. This route option does not traverse a designated coastal zone.

### **7.5.4 Environmental Consequences**

This section provides an overview of the effects on hydrologic resources of the No Action and Action Alternatives. It presents a general discussion of the types and locations of hydrologic

resources affected for each alternative followed by a more specific discussion organized by hydrologic resource on the types of effects that could occur for the various construction types proposed.

Effects on water resources would result from both improvements included as part of the No Action and Action Alternatives. Improvements anticipated under the No Action Alternative could affect water resources occurring within and adjacent to the existing NEC right-of-way. Mitigation and permitting of water resources affected under the No Action Alternative would be the responsibility of project sponsors undertaking those actions.

Table 7.5-8 provides the total number of acres or route miles of water resource that would be affected by the Representative Route of each Action Alternative, and a discussion of the data follows.

**Table 7.5-8: Environmental Consequences: Quantitative Impacts to Water Resources by Action Alternative**

Resource	Alt. 1	Alt. 2	Alternative 3				
			D.C. to NYC	New York City to Hartford		Hartford to Boston	
				via Central Connecticut	via Long Island	via Providence	via Worcester
SFHA (acres)	1,135	1,520	1,420	355	350	460	495
Freshwater Wetlands (acres)	290	450	545	85	100	340	240
Saltwater Wetlands (acres)	255	295	190	115	465	105	90
Total Wetlands (acres)	540	745	735	200	560	445	330
Coastal Zone (route miles)	225	235	115	110	135	50	15

Source: NEC FUTURE team, 2015

**7.5.4.1 Alternative 1**

Alternative 1 would have the least number of impacts to water resources. Nearly 40 percent of impacts to floodplains and wetlands, and 60 percent of impacts to coastal zones, would occur along the coast between New Haven, CT and Washington, RI, with New London, CT having the largest combined total effects resulting primarily from the Old Saybrook-Kenyon bypass.

**7.5.4.2 Alternative 2**

Alternative 2 would have higher impacts to water resources than Alternative 1 but lesser impacts than Alternative 3. As is the case for Alternative 1, a large portion of the impacts to water resources would occur along the coast of Connecticut; however, the county with the highest number of acres of affected wetlands would be Hartford, CT.

Alternative 2 is the only Action Alternative that would bisect the John Heinz National Wildlife Refuge in Delaware and Philadelphia, PA. The Wildlife Refuge has associated freshwater wetlands and SFHA, is ecologically sensitive and located within a coastal zone.

### **7.5.4.3 Alternative 3**

#### Washington, D.C., to New York City

Impacts resulting from this route option would differ very little from Alternatives 1 and 2. The greatest impacts would occur along coastal areas associated with the Chesapeake Bay, Delaware Bay and River, and Hudson Bay, although a large number of freshwater wetlands would be affected in Central New Jersey.

#### New York City to Hartford

##### **Via Central Connecticut**

This route option would have considerably fewer impacts to water resources than the Long Island route option particularly with regard to wetlands. On the other hand, there is very little difference between the total acreage of affected SFHA between this routing option and the Long Island routing option.

##### **Via Long Island**

This route option would have considerably higher impacts to water resources than the Central Connecticut route option particularly with regard to wetlands. This route option would affect nearly three times the number of acres of wetlands as would the Central Connecticut route option and would traverse through 20 percent more route miles of coastal zone. Much of the impacts would result from the proposed tunnel that would cross Long Island Sound affecting saltwater wetlands, coastal resources, and SFHAs in NY and CT.

#### Hartford to Boston

##### **Via Providence**

This route option would affect just 10 percent fewer acres of SFHA than the Worcester route option, however, approximately 35 percent more acres of wetlands would be affected in RI and MA, and nearly four times as many route miles of coastal zone would be traversed.

##### **Via Worcester**

This route option would affect 10 percent more acres of SFHA than the Providence route option. The impacts to wetlands and coastal resources would be lesser than those impacts from the Providence route option.

Action Alternatives could affect water resources along the Northeast Coastline. Twenty-four waterbodies were identified as experiencing the greatest combined impact to water resources. Combined impact refers to instances where Environmental Consequences may be aggravated by impacts to multiple hydrologic systems (e.g. wetlands and floodplains). Unless otherwise noted, Table 7.5-9 lists each resource that is navigable, has potentially affected associated wetlands and designated SFHA, and is in regulated coastal zones. The tables also notes the counties identified as being at significant risk from climate change related flooding including sea level rise, storm surge,

and riverine flooding. A more detailed discussion and analysis on climate change is provided in Section 7.15. Table 7.5-9 lists those resources crossed by the Representative Route of one or more of the Action Alternatives. Additionally, Table 7.5-9 identifies waterbodies that would be affected by proposed improvements to three stations associated with one or more Action Alternatives, all of which are categorized as existing with proposed improvements. Appendix E, Section E.05, provides quantifiable effects, organized by state and county, for each of the Action Alternatives.

**Table 7.5-9: Environmental Consequences: Water Resources with Greatest Combined Impact within the Action Alternatives**

State	County	Resource	Alt. 1	Alt. 2	Alt. 3	Station ID	Station Name
MD	Baltimore City	Chesapeake Bay	—	—	X	—	
	Baltimore County/Harford	Gunpowder River	—	X	—	—	
	Harford*	Bush River**	X	X	X	—	
DE	New Castle*	Christina River	X	X	X	—	
	New Castle	Brandywine Creek	X	X	X	—	
PA	Philadelphia*	Schuylkill River	X	X	X	—	
NJ	Essex/Hudson	Passaic River	X	X	X	—	
	Hudson*	Hacksack River	X	X	X	—	
NJ/NY	Hudson*/Manhattan	Hudson River	X	X	X	—	
NY	Manhattan/Queens/Kings	East River	X	X	X	—	
CT	Fairfield*	Pequonnock River	—	X	X	105	Bridgeport
	New Haven*	West River	X	X	X	—	
	New Haven*	Mill River	X	X	X	—	
	New Haven*	Quinnipiac River	X	X	X	—	
	New Haven*	Mill River	X	X	X	—	
	Middlesex*/New London	Connecticut River	X	X	X	—	
	Hartford*	Connecticut River**	—	X	X	—	
	New London*	Niantic River	X	X	X	—	
	New London*	Thames River	X	X	X	—	
	New London*	Mystic River	X	X	X	—	
	New London*	Stonington Harbor	X	X	X	—	
CT/RI	New London*/Washington*	Pawcatuck River	X	X	X	123	Westerly
RI	Providence	Seekonk River	—	X	X	—	
MA	Middlesex/Suffolk	Charles River	—	—	X	—	
	Suffolk	Fort Point Channel	X	X	X	143	Boston South Station

Source: NEC FUTURE team, 20154

X = Resource is present within the Action Alternative Affected Environment; potential effects subject to Tier 2 analysis.

\*= County has been identified as having significant risk of climate change related flooding.

\*\* = CZMA associated with this resource at this location is *not* intersected by the Action Alternative Affected Environment

— = Not applicable within that alternative/option

The potential for construction-related impacts, both temporary and permanent, differs depending on the expected construction type. The six primary construction types are Bridge, At-Grade, Embankment, Trench, Tunnel, and Aerial Structure. A discussion of the types of temporary and

permanent Environmental Consequences associated with each construction type for each water resource follows.

#### 7.5.4.4 Freshwater Resources

Temporary construction impacts that involve land-disturbing activities (including the placement of fill) and may cause soil erosion, sedimentation, and stormwater runoff are regulated and may be restricted, prohibited, and/or require special permits. Erosion and sedimentation may result in degradation of aquatic habitat, species, and food sources. Long-term construction impacts that involve land-disturbing activities and that may cause destruction of animal habitat and increased runoff volume caused by an increase in impervious surface and pollution load are also regulated and may be restricted, prohibited, and/or require special permits. Other potential impacts include an alteration of stream discharge caused by silt loading, increased siltation downstream of stream crossings, increased nutrient loading from runoff during construction, destabilization of water temperature, alteration of water levels and flows, and increased potential for toxic substance release from construction vehicles or equipment. These impacts may result in degradation of water quality and aquatic habitat.

- ▶ **Major Bridge:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the runoff volume and/or pollution load (thus degrading water quality, vegetation, and aquatic habitat) are expected but may be temporary.
- ▶ **At-Grade:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Impacts that would affect the runoff volume and/or pollution load (thus degrading water quality and aquatic habitat) will be unavoidable and permanent.
- ▶ **Embankment:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Some impacts that would affect the runoff volume and/or pollution load (thus degrading water quality and aquatic habitat) are expected but may be temporary.
- ▶ **Trench:** Potential impacts resulting from the construction of the Action Alternatives should be negligible. Some impacts that would affect the runoff volume and/or pollution load (thus degrading water quality and aquatic habitat) are expected but may be temporary.
- ▶ **Tunnel:** Potential impacts resulting from the construction of the Action Alternatives should be negligible. No major impacts that would affect the runoff volume and/or pollution load are expected. Areas where the Representative Route of an Action Alternative includes tunnel-type construction and crosses a wetland are not counted as an impact in the quantification of wetland impact.
- ▶ **Aerial Structure:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the runoff volume and/or pollution load (thus degrading water quality and aquatic habitat) are expected but may be temporary.

#### 7.5.4.5 Navigable Waterways

Construction of bridges and aerial structures has the greatest potential to affect Navigable Waterways. Close coordination with the U.S. Army Corps of Engineers and U.S. Coast Guard is

required for any proposed new crossing of a Navigable Waterway to ensure that the crossings are designed so that travel is not impeded either temporarily during construction or permanently.

#### 7.5.4.6 Floodplains

The potential for construction-related impacts differ depending on the expected construction type. Construction that involves buildings, dredging, filling, paving, and excavation within the designated floodplain, may divert flow, cause erosion and sedimentation, and/or cause an increase in the Base Flood Elevation (BFE). These activities are regulated and may be restricted, prohibited, and/or require special permits. However, areas where the Representative Route of an Action Alternative includes tunnel-type construction and crosses a floodplain are not counted as an impact in the quantification of floodplain impact.

- ▶ **Major Bridge:** Potential impacts resulting from the construction of the Action Alternatives should be low to moderate. Some impacts that may divert flow or result in changes to the BFE are expected but may be temporary.
- ▶ **At-Grade:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Impacts that could divert flow and/or result in changes to the BFE are unavoidable and permanent; therefore, impacts to the SFHA are expected.
- ▶ **Embankment:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Impacts that could divert flow and/or result in changes to the BFE are unavoidable and permanent; therefore, impacts to the SFHA are expected.
- ▶ **Trench:** Potential impacts resulting from the construction of the Action Alternatives should be low to moderate. No major impacts that would divert flow or result in changes to the BFE are expected. Temporary construction measures may be necessary to divert flow to prevent water from entering the project site.
- ▶ **Aerial Structure:** Potential impacts resulting from the construction of the Action Alternatives should be low to moderate. Some impacts that may divert flow or result in changes to the BFE are expected but may be temporary.

#### 7.5.4.7 Coastal Resources

##### Saltwater Wetlands

Temporary construction impacts that would involve placing fill material in the designated wetland area and might cause soil erosion, sedimentation, or increased risk of contamination associated with presence of heavy equipment is regulated and may be restricted, prohibited, and/or require special permits. Long-term construction impacts that would involve clearing vegetation or adding fill and might cause destruction of animal habitat is also regulated and may be restricted, prohibited, and/or require special permits. Other potential impacts include changes in light incidence and water clarity and changes in and destabilization of water temperature caused by increased light incidence from vegetation removal, and alteration of water levels and flows due to interruptions and/or additions to surface or groundwater flow. However, areas where the Representative Route of an Action Alternative includes tunnel-type construction and crosses a saltwater wetland are not counted as an impact in the quantification of saltwater wetland impact.

- ▶ **Major Bridge:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the water quality and/or vegetation (thus degrading animal habitat) are expected but may be temporary.
- ▶ **At- Grade:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Impacts that would reduce water quality and/or remove vegetation (thus degrading animal habitat) will be unavoidable and permanent. Retaining walls or steeper side slopes could be evaluated to reduce the overall footprint of the at-grade alternative.
- ▶ **Embankment:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the water quality and/or vegetation (thus degrading animal habitat) are expected but may be temporary.
- ▶ **Trench:** Potential impacts resulting from the construction of the Action Alternatives would likely be moderate. Some impacts that would affect the water quality and/or vegetation (thus degrading animal habitat) are expected but may be temporary.
- ▶ **Aerial Structure:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the water quality and/or vegetation (thus degrading animal habitat) are expected but may be temporary.

### Coastal Zones

The potential for construction-related impacts differs depending on the expected construction type. Temporary construction impacts that involve the clearing of vegetation or soil exposure and may cause soil erosion, sedimentation, or increased risk of contamination associated with presence of heavy equipment are regulated and may be restricted, prohibited, and/or require special permits. Long-term construction impacts in coastal areas that may cause destruction of animal habitat or degradation to circulation, natural erosion, or existing drainage patterns are also regulated and may be restricted, prohibited, and/or require special permits.

- ▶ **Major Bridge:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the vegetation and/or natural patterns are expected but may be temporary.
- ▶ **At-Grade:** Potential impacts resulting from the construction of the Action Alternatives are likely to be high. Impacts that would affect the vegetation and/or natural patterns will be unavoidable and permanent.
- ▶ **Embankment:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the vegetation and/or natural patterns are expected but may be temporary.
- ▶ **Trench:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the vegetation and/or natural patterns are expected but may be temporary.
- ▶ **Tunnel:** Potential impacts resulting from the construction of the Action Alternatives would be high. Effects of tunneling should be further investigated to determine potential effects on tidal

flows and patterns within Long Island Sound, fish spawning and migration, and near-shore flora and fauna.

- ▶ **Aerial Structure:** Potential impacts resulting from the construction of the Action Alternatives should be moderate. Some impacts that would affect the vegetation and/or natural patterns are expected but may be temporary.

Development within the jurisdictional CZMA boundaries requires a Federal Consistency Certification. The federal consistency review is based on the enforceable policies of the state CZMA. Each state's Coastal Zone Management Plan is applicable in those areas within its jurisdiction—all portions of the route within the coastal zone management boundary are included. A summary of each state's enforceable policies as they relate to potential Environmental Consequences and effects from the Action Alternatives are as follows:

- ▶ **Washington, D.C.:** There is no established coastal zone in Washington, D.C.
- ▶ **Maryland:** Maryland's enforceable policies apply to coastal uses associated with transportation and development that affect Chesapeake Bay, tidal and nontidal wetlands, and living aquatic resources.
- ▶ **Delaware:** The Delaware coastal management program policies pertain to living resources, public investment, water supply management, pollution prevention, and natural areas management.
- ▶ **Pennsylvania:** Policies and performance standards contained in the Pennsylvania coastal zone management program include coastal hazard areas, wetlands, fisheries management, and intergovernmental coordination.
- ▶ **New Jersey:** Coastal zone management rules define special areas and establish standards for activities in general water areas, stormwater management criteria, mitigation requirements, and other necessary measures based on the proposed activity type and its location. All tidelands are overseen by the Tidelands Resource Council and the New Jersey Department of Environmental Protection Bureau of Tidelands Management.
- ▶ **New York:** New York's coastal management program is based on 44 coastal policies that guide economic growth while preserving coastal areas. Policy categories include fish and wildlife, water and air resources, flooding and erosion, and public access. The *New York City Waterfront Revitalization Program* is the city's principal coastal zone management tool and contains additional policies that pertain to habitat, wetlands, and visual access.
- ▶ **Connecticut:** For federal undertakings, the proposed activities must demonstrate federal consistency in both the coastal boundary and the coastal area. The coastal management program regulates work in tidal, coastal and navigable waters and tidal wetlands under the Connecticut Coastal Management Act.
- ▶ **Rhode Island:** Coastal Resources Management Council assent is required for all development or operations within, above, or beneath tidal waters that are below the mean high water mark extending out to the extent of the state's jurisdictional boundary in the territorial sea. Council assent is also necessary for actions occurring on coastal features or within all directly associated contiguous areas where it is necessary to preserve the integrity of coastal resources. Areas

requiring more stringent regulations include Greenwich Bay, Pawcatuck River, the Atlantic Ocean, and Shoreline Change Areas.

- ▶ **Massachusetts:** Jurisdictional authority may extend beyond the defined coastal zone boundary when activities in adjacent marine waters or land areas can be reasonably expected to affect the resources, land, or water uses of the Massachusetts coastal zone. The major Massachusetts coastal program policies include coastal hazards, habitat, ocean resources, ports and harbors, and water quality.

### 7.5.5 Context Area

Numerous water resources are located within the Context Area. Some of the larger water resources for each state include the Chesapeake Bay, Patuxent River and Susquehanna River in Maryland; Delaware River in Delaware and Pennsylvania; Assunpink Creek and lower Hudson River in New Jersey; Mamaroneck and Cross Rivers in New York; major tributaries to the Long Island Sound, Connecticut River, Connecticut Coastal (Atlantic Ocean) in Connecticut; Pawcatuck River, Chapman Pond and Scituate Reservoir in Rhode Island; and the Charles River and Neponset River in Massachusetts. Many of these water resources have associated wetlands, floodplains, coastal zones, and navigable waterways.

### 7.5.6 Potential Mitigation Strategies

Potential mitigation strategies to address adverse effects on hydrologic resources are presented below by specific topic. Many of the strategies discussed are most appropriate during the design and construction phases of a project.

#### 7.5.6.1 Water Quality/Stormwater Management

- ▶ Prepare site-specific Stormwater Pollution Prevention Plan.
- ▶ Infiltrate stormwater on-site when possible.
- ▶ Minimize length of waterbody crossing.
- ▶ Incorporate pervious materials in design.
- ▶ Implement soil erosion and sediment control features where applicable.
- ▶ Minimize segments of railway that closely parallel streams and waterbodies.
- ▶ Incorporate vegetative buffers to intercept runoff.

#### 7.5.6.2 Wetlands

Temporary construction access into the wetlands should be limited to the maximum extent practicable. Implementing appropriate soil erosion and sediment control measures—using timber mats, and minimizing compression of the soil—will lessen the severity of the temporary impact. All areas temporarily disturbed should be restored to pre-construction elevations using appropriate soil types and will be replanted with native wetland vegetation. Where permanent impacts are unavoidable, the Tier 2 project proponents should apply the following compensatory mitigation concepts:

- ▶ Elevate tracks using piers.
- ▶ Avoid wetland crossing where feasible.
- ▶ Minimize width of disturbance within wetlands.
- ▶ Utilize wetland protection features while performing activities in wetlands.
- ▶ Implement soil erosion and sediment control features where applicable.
- ▶ Limit removal of vegetation within wetlands.
- ▶ Limit activity in wetlands and re-vegetate immediately following completion of grading.
- ▶ Restore, enhance, and preserve wetland as deemed appropriate.
- ▶ Provide in-lieu fees and wetland mitigation banking.

### 7.5.6.3 Floodplains

- ▶ Use construction best management practices to reduce or prevent sedimentation from construction site.
- ▶ Construct at-grade sections on embankments with culverts.
- ▶ Construct tracks above the BFE using piers.

### 7.5.6.4 Coastal Resources

- ▶ Elevate tracks using piers.
- ▶ Prepare site-specific Stormwater Pollution Prevention Plan.
- ▶ Infiltrate stormwater on-site when possible.
- ▶ Incorporate pervious materials in design.
- ▶ Minimize length of waterbody crossing.

### 7.5.7 Subsequent Tier 2 Analysis

Analysis presented in this Tier 1 Draft EIS is based on readily available information and mapping. As such, the FRA did not undertake any field investigations to confirm resources identified. During subsequent Tier 2 analysis, site-specific identification of hydrologic resources and assessment of the extent of effects are necessary. Considerations pertaining to coordination and permitting that may be required as parts of the Tier 2 analysis are provided below for each water resource subcategory.

#### 7.5.7.1 Water Quality

Federal statutes governing watersheds and surface water quality include the following:

- ▶ **Section 402 of the Clean Water Act (CWA)** requires the EPA to develop and implement the National Pollutant Discharge Elimination System.
- ▶ **National Pollutant Discharge Elimination System (NPDES)** is a permit program that controls water pollution by regulated point sources and stormwater that discharges pollutants into Waters of the United States.

The NPDES is administered by the EPA; however, the NPDES permit program is administered by authorized states. For all jurisdictions, the presence of CWA Section 303(d) must be determined and the jurisdictions must establish priority rankings and develop Total Maximum Daily Loads for these waters. In addition to the NPDES regulations, many states have additional regulations regarding water quality and stormwater management. Table 7.5-10 discusses additional state regulations.

**Table 7.5-10: Water Quality/Stormwater Regulations by Geography**

Geography	Water Quality/Stormwater Management Considerations for Tier 2 Analysis
D.C.	<p><b>District Department of the Environment</b></p> <p>Chapter 5 of Title 21 of the D.C. Municipal Regulations establishes regulations pertaining to water quality and pollution. The regulations aim to prevent and control:</p> <ul style="list-style-type: none"> <li>■ The pollution of the Potomac River and its tributaries</li> <li>■ Land-disturbing activities</li> <li>■ Accelerated soil erosion and sediment control</li> <li>■ Sediment deposition into the Potomac River and its tributaries (including the Anacostia River)</li> <li>■ Health hazards due to pollution of the Potomac River and its tributaries.</li> </ul> <p>The chapter requires the creation and approval of a soil erosion and sediment control plan in addition to a stormwater management plan for development.</p>
MD	<p><b>Department of the Environment</b></p> <p>In Maryland, higher pollutant removal or environmental performance than the minimum standards established in the Maryland Stormwater Management Design Manual is needed to fully protect aquatic resources and/or human health and safety within a high valued watershed or receiving water. Watershed classifications that are required to meet higher standards include:</p> <ul style="list-style-type: none"> <li>■ Maryland Critical Area Intensely Developed Areas (IDA)</li> <li>■ Coldwater Streams (Uses III and IV)</li> <li>■ Sensitive Streams</li> <li>■ Wellhead Protection</li> <li>■ Reservoir Protection (USE I-P, III-P and IV-P)</li> <li>■ Shellfish/Beach (Use II)</li> <li>■ EPA Tier II waters</li> </ul> <p>The Code of Maryland Regulations requires that the environmental site design process begin at the project conception and proceed through the final approval with phased plans submitted for the concept, site development and final stormwater management that include both the stormwater management plan and soil erosion and sediment control features.</p>

**Table 7.5-10: Water Quality/Stormwater Regulations by Geography (continued)**

Geography	Water Quality/Stormwater Management Considerations for Tier 2 Analysis
DE	<p><b>Department of Natural Resources and Environmental Control, Division of Watershed Stewardship</b></p> <p>Section 7400 of Title 7 Natural Resources and Environmental Control of the DE Administrative Code established surface water quality standards and designated uses for the defined watersheds included the following uses:</p> <ul style="list-style-type: none"> <li>■ Public Water Supply Source.</li> <li>■ Industrial Water Supply.</li> <li>■ Primary Contact Recreation.</li> <li>■ Secondary Contact Recreation.</li> <li>■ Coldwater Fish.</li> <li>■ Agricultural Supply.</li> <li>■ Waters of Exceptional Recreation of Ecological Significance.</li> <li>■ Fish Aquatic Life &amp; Wildlife.</li> <li>■ Harvestable Shellfish Waters.</li> <li>■ Sediment and stormwater approvals per the 5101 Sediment and Stormwater Regulations are required for land use changes or construction activities for residential, commercial, industrial, or institutional land use.</li> </ul>
PA	<p><b>Department of Environmental Protection, Bureau of Land and Water Conservation</b></p> <p>25 Pa Code 93.9 designates water uses and water quality criteria for surface waters in Pennsylvania. Under PA DEP Chapter 102 Regulations, any project proposing earth disturbance activities is required to develop and implement a written Post Construction Stormwater Management (PCSM) plan. The PCSM design shall be planned according to the following principles:</p> <ul style="list-style-type: none"> <li>■ Protect the integrity of stream channels and maintain and protect the physical, biological, and chemical qualities of the receiving stream;</li> <li>■ Prevent an increase in the rate of stormwater runoff;</li> <li>■ Minimize any increase in stormwater runoff volume;</li> <li>■ Minimize impervious areas;</li> <li>■ Maximize the protection of existing drainage features and vegetation;</li> <li>■ Minimize disturbance including land clearing and grubbing;</li> <li>■ Minimize soil compaction; and</li> <li>■ Utilize structural and non-structural best management practices to prevent or minimize changes in stormwater runoff.</li> </ul>

Table 7.5-10: Water Quality/Stormwater Regulations by (continued)

Geography	Water Quality/Stormwater Management Considerations for Tier 2 Analysis
NJ	<p><b>Department of Environmental Protection and Department of Agriculture, Division of Agricultural and Natural Resources</b></p> <p>The New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B) designate water uses and water quality criteria for surface waters in New Jersey. Projects discharging into surface waters classified as FW1 and Category one (C1) are required to meet more stringent stormwater runoff quality criteria. C1 waters are those that are protected from measurable changes in water quality based on their exceptional ecological, recreational, water supply or fisheries resources significance. FW1 waters are those waters that are to be maintained in their natural state of quality (set aside for posterity) and not subject to any manmade wastewater discharges or increases in runoff from anthropogenic activities.</p>
NY	<p><b>Department of Environmental Conservation, Division of Water</b></p> <p>In New York State, waterbodies are assigned a “best use” classification:</p> <ul style="list-style-type: none"> <li>■ Class AA and A – drinking water</li> <li>■ Class B – public swimming and contact recreation activities</li> <li>■ Class C – fishing and non-contact activities</li> <li>■ Class D – does not support any of the uses listed above</li> </ul> <p>Waterbodies with AA, A, B and C classifications may also have a “T” or “TS” classification, meaning they support trout populations or trout spawning. The Division of Water implements its water protection and restoration activities through the State Pollutant Discharge Elimination System permit program. A permit must be obtained for construction activities with one or more acres of disturbance.</p>
CT	<p><b>Department of Energy and Environmental Protection, Water Division</b></p> <p>The Connecticut Water Quality Standards divided surface water into three classifications that include inland surface waters, coastal and marine surface waters, and groundwater. Construction general permits apply to construction activities which result in the disturbance of one or more acres of land area on a site.</p>
RI	<p><b>Department of Environmental Management, Stormwater Program</b></p> <p>The Rhode Island Office of Water Resources implements the State’s Water Quality Standards Program. Surface waters are assigned the as designated uses that include freshwater and seawater. General permits for construction activities apply to construction activities which disturb one or more acres of land. In Rhode Island, there are other regulatory mechanisms to control erosion and sedimentation as required by the Rhode Island Department of Environmental Management Freshwater Wetlands, Water Quality Certification Programs, the Coastal Resources Management Council, and in towns and cities that have a Qualifying Local Program that have been formally approved by the Rhode Island Department of Environmental Management and the Rhode Island Pollutant Discharge Elimination System Program.</p>

**Table 7.5-10: Water Quality/Stormwater Regulations by (continued)**

Geography	Water Quality/Stormwater Management Considerations for Tier 2 Analysis
MA	<p><b>Department of Environmental Protection, Water, Wastewater &amp; Wetlands and Bureau of Resource Protection</b></p> <p>The Massachusetts Department of Environmental Protection issued the Stormwater Management Standards to address water quality and water quantity which includes pollution, flooding, low base flow and recharge. More stringent requirements are in place for critical areas. Critical Areas include:</p> <ul style="list-style-type: none"> <li>■ Outstanding Resource Waters;</li> <li>■ Special Resource Waters;</li> <li>■ Recharge areas for public water supplies;</li> <li>■ Bathing beaches;</li> <li>■ Coldwater fisheries; and</li> <li>■ Shellfish growing areas.</li> </ul>

Source: NEC FUTURE team, 2015

### 7.5.7.2 Wetlands

Wetlands and surface waters fall under the broad category of “Waters of the United States,” as defined in 33 CFR 328.3 and in accordance with provisions of Section 404 of the Clean Water Act (CWA) (33 USC 1344). These waters are regulated by the USACE. Any action that proposes to dredge or place fill material into surface waters or wetlands is subject to these provisions. The USACE issues general and individual permits. In issuing permits, the USACE must comply with the Section 404(b)(1) Guidelines (40 CFR Part 230), which generally require selection of the practicable alternative that causes the least harm to the aquatic ecosystem.

In New Jersey, the New Jersey Department of Environmental Protection (NJDEP) has assumed the USACE’s responsibility for administering the Section 404 permitting program. Therefore, Section 404 permits in New Jersey are issued by NJDEP rather than USACE, pursuant to the same legal standards that apply to the USACE.

Each state in the Study Area has enacted laws and regulations to protect wetlands and regulate activities impacting certain types of wetlands as defined by each state. The following laws and programs with the corresponding state oversight agencies must be considered as part of the Tier 2 analysis:

- ▶ Maryland Tidal Wetlands Act – Maryland Department of the Environment, Water Management Administration
- ▶ Maryland Nontidal Wetlands Protection Act– Maryland Department of the Environment, Water Management Administration
  - MD DEP can and has, delegated regulatory authority to county governments that have enacted a nontidal wetland protection program.
- ▶ Delaware Wetlands Act of 1973 –Department of Natural Resources and Environmental Control of Delaware

- ▶ Pennsylvania Dam Safety and Waterway Management Act – Pennsylvania Department of Environmental Protection
- ▶ New Jersey Freshwater Wetlands Protection Act – New Jersey Department of Environmental Protection
- ▶ New York Freshwater Wetlands Act – New York State Department of Environmental Conservation
- ▶ Connecticut Inland Wetlands and Watercourses Act – Connecticut Department of Energy and Environmental Protection
  - In 1987, the Connecticut legislature amended the Act to include language assigning regulatory authority to its municipalities. As a result, all 169 of Connecticut’s municipalities have municipal inland wetland agencies.
- ▶ Rhode Island Freshwater Wetlands Act – State of Rhode Island and Providence Plantations Department of Environmental Managements

Massachusetts Wetlands Protection Act – Massachusetts Department of Environmental Protection

### 7.5.7.3 Navigable Waters

U.S. Coast Guard (USCG) bridge permits are required for the construction or modification of a bridge or causeway across a Navigable Waterway of the United States. A bridge permit is the written approval of the location and plans of the bridge or causeway to be constructed or modified. Federal law prohibits the construction of these structures unless authorized by the USCG. Coordination with the USCG should be initiated in the early stages of development of the project and continue throughout the development of the project.

### 7.5.7.4 Floodplains

The Federal Emergency Management Agency administers the National Flood Insurance Program and is charged with identifying and delineating SFHAs. Floodplain management permits are typically obtained at a local level. Municipalities maintain floodplain management ordinances that meet minimum federal regulations and often require more restrictive provisions based on additional state, county, and local requirements. For areas where floodplains may be affected, specific information about the type of development, size of development, the SFHA zone and proposed elevation must be provided to obtain a permit.

As part of the President’s Climate Action Plan, the President released Executive Order 13690, Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input (FFRMS). The FFRMS requires all future federal investments in and affecting floodplains to meet the level of resilience as established by the Standard.

Tier 2 analysis will further define the effects on floodplains and determine the actual results of encroaching/filling identified floodplains at specific locations, as well as include the development of mitigation measures and designs that would avoid or minimize the effects on floodplains. Additionally, requirements of FFRMS will be integrated into subsequent analysis to ensure adherence to resiliency standards pertaining to floodplains.

#### 7.5.7.5 Coastal Zones

Coastal resources are protected at the federal level by the CZMA. Under the CZMA, direct federal actions, federal license or permit activities, and federal financial assistance activities that have reasonably foreseeable coastal effects must be consistent with the enforceable policies of state coastal management programs. For development within a designated coastal zone, a Coastal Zone Federal Consistency Certification will be required.

The following state agencies have jurisdiction over review and approval of coastal zone consistency determinations and further coordination with each entity will be required as part of the Tier 2 analysis:

- ▶ Maryland Department of Natural Resources, Chesapeake & Coastal Program
- ▶ Delaware Department of Natural Resources and Environmental Control, Delaware Coastal Management Program
- ▶ Pennsylvania Department of Environmental Protection, Coastal Resources Management Program
- ▶ New Jersey Department of Environmental Protection, Division of Land Use
- ▶ New York State Department of State, Office of Coastal, Local Government and Community Sustainability
- ▶ Connecticut Department of Energy and Environmental Protection, Office of Long Island Sound Program
- ▶ Rhode Island Coastal Resources Management Council
- ▶ Massachusetts Executive Office of Environmental Affairs, Office of Coastal Zone Management