Wilmington Riverfront Transportation Infrastructure Project

Revised Environmental Assessment

Appendix I: Final Natural Resources Technical Report

June 2024

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I. Introduction

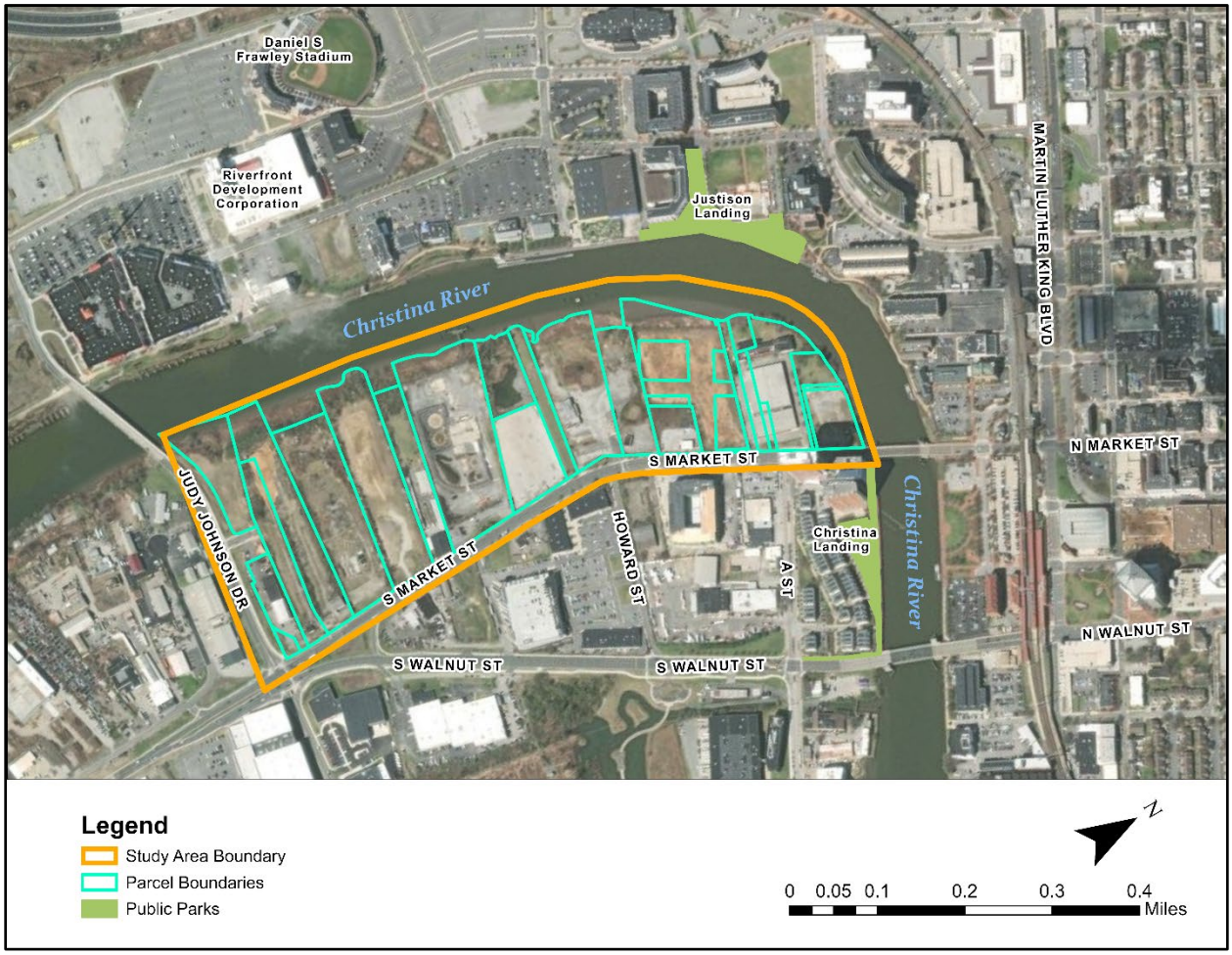
On November 19, 2021, the City of Wilmington, Delaware, was awarded federal funds though a U.S. Department of Transportation FY 2021 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant. The Federal Highway Administration (FHWA), as the lead Federal Agency; the City of Wilmington, as project sponsor and joint lead agency; and in partnership with the Riverfront Development Corporation (RDC), are preparing an Environmental Assessment (EA) for the Wilmington Riverfront Transportation Infrastructure Project (formerly known as the South Market Street Redevelopment Project) in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, FHWA regulations implementing NEPA, and applicable Federal, state, and local laws and regulations.

The Draft Natural Resources Technical Report was developed to support the Draft EA for the Wilmington Riverfront Transportation Infrastructure Project (Project). The following technical report presents the existing conditions and an assessment of potential effects of the Build Alternatives to natural resources. The report begins with a description of the Project study area followed by a summary of the Purpose and Need, and a description of the alternatives evaluated.

A. Study Area

The Project is located along the east Christina riverbank in Wilmington, New Castle County, Delaware. The Project's study area is bound by the Christina River on the north and west and by South Market Street on the east and by Judy Johnson Drive (formerly New Sweden Street) in the south (**Figure 1**).

Figure 1: Wilmington Riverfront Transportation Infrastructure Project Study Area Map



The existing conditions of the Project study area include former industrial buildings and accessory structures, surface parking, former junkyards, miscellaneous uses, and brownfields. This area has been shaped by its history of shipping and manufacturing and was an active industrial area until its decline after World War II. The *City of Wilmington's 2028 Comprehensive Plan*[1]defines the land use in the Project study area as waterfront mixed use and the entire Project study area is within the 100-year floodplain caused by coastal storm surge from the Delaware Bay. The parcels located within the Project study area have limited access for vehicles, pedestrians, and bicycles.

The Christina riverbank on the western and northern boundary of the Project study area is marshy and largely inaccessible. Significant differences of elevation between the high and low tide conditions have created a mud flat condition along the northern and western edges of the Project study area. South Market Street, the eastern project border, is a one-way, four-lane arterial road that extends 0.57 mile along the study area.

The purpose of the Project is to provide transportation infrastructure to further the connectivity of the riverfront area and provide multi-modal resources. The needs of the Project are the following:

- An expanded road network branching from South Market Street west into the Project study area;

[1] https://www.wilmingtonde.gov/government/city-departments/planning-and-development/wilmington-2028

- Pedestrian and cyclist accommodation on new roadways and a new set of pedestrian and bicycle pathways that connect to the existing network of pathways surrounding the site along the Christina riverbank; and
- Rehabilitate and create effective stormwater management.

The proposed improvements would replicate the city grid characteristics of the North Market Street corridor, north of the Christina River and southward to the intersection of South Market Street and Judy Johnson Drive.

B. Alternatives Considered

The alternatives considered in the EA include a No Build and a Build Alternative and are briefly described below.

1. No Build Alternative

The No Build Alternative assumes the roadway infrastructure; Riverwalk; pedestrian, bicycle and mobility improvements; and flood prevention measures; and drainage work would not occur. The No Build Alternative does not meet the purpose and need for this Project, as it would not provide transportation infrastructure to further the connectivity or the area; provide multi-modal resources, including pedestrian and cyclist accommodations; nor rehabilitate or create effective stormwater management. However, the No Build Alternative does provide a baseline condition with which to compare the Build Alternative. Therefore, the No Build Alternative is retained for evaluation purposes.

2. Build Alternative

The Build Alternative proposes to construct transportation infrastructure improvements for the South Market Street Riverfront East area of the City. The Build Alternative proposes to include an expanded road network branching from South Market Street towards the Christina River and replicating the downtown Wilmington grid system in the Project study area (**Figure 2**). Infrastructure improvements are proposed to create continuity of intersection type / spacing and provide key points of access into the Project study area.

The proposed street grid is a balance of defining buildable parcels as well as appropriate infrastructure access for vehicles (local, commuter, public transportation), pedestrians, and bicyclists and will include on street parking. The proposed grid considers major circulation movements, creating three east-west and evenly spaced signalized movements across South Market Street, and connecting the major north-south Market Street and Walnut Street corridors to Orange Street within the limits of the Project study area (from north to south: at A Street, Howard Street, and Jones Street).

Pedestrian routes were also considered while laying out the proposed grid. The Build Alternative proposes to include pedestrian and cyclist accommodations on new roadways and a new set of pedestrian and bicycle pathways that connect to the existing network of pathways surrounding the Project study area (shown in orange in **Figure 2**). The proposed location of the east-west movements at A Street and Howard Street provides direct pedestrian access to and from the South Market Street Bridge, the Walnut Street corridor, the Wilmington Wetland Park, and the Southbridge neighborhood located east of the proposed Project study area. At the south end of the Project study area, proposed pedestrian and bicycle connections from the proposed street grid connect directly to existing pedestrian and bicycle connections that currently cross the river to the western Riverfront via Judy Johnson Drive and the Senator Margaret Rose Henry Bridge.

Adjacent to the eastern riverbank, a Riverwalk similar to the existing Riverwalk on the western riverbank is proposed to be built as part of the Build Alternative to provide access to this currently inaccessible riverfront. The Riverwalk would be a minimum width of 18 feet and include a dedicated eight-foot bike lane alongside a pedestrian walkway. Under the Build Alternative, connections between the east and west Riverwalks are proposed via the existing Senator Margaret Henry Rose Bridge to the south and the South Market Street bridge to the north.

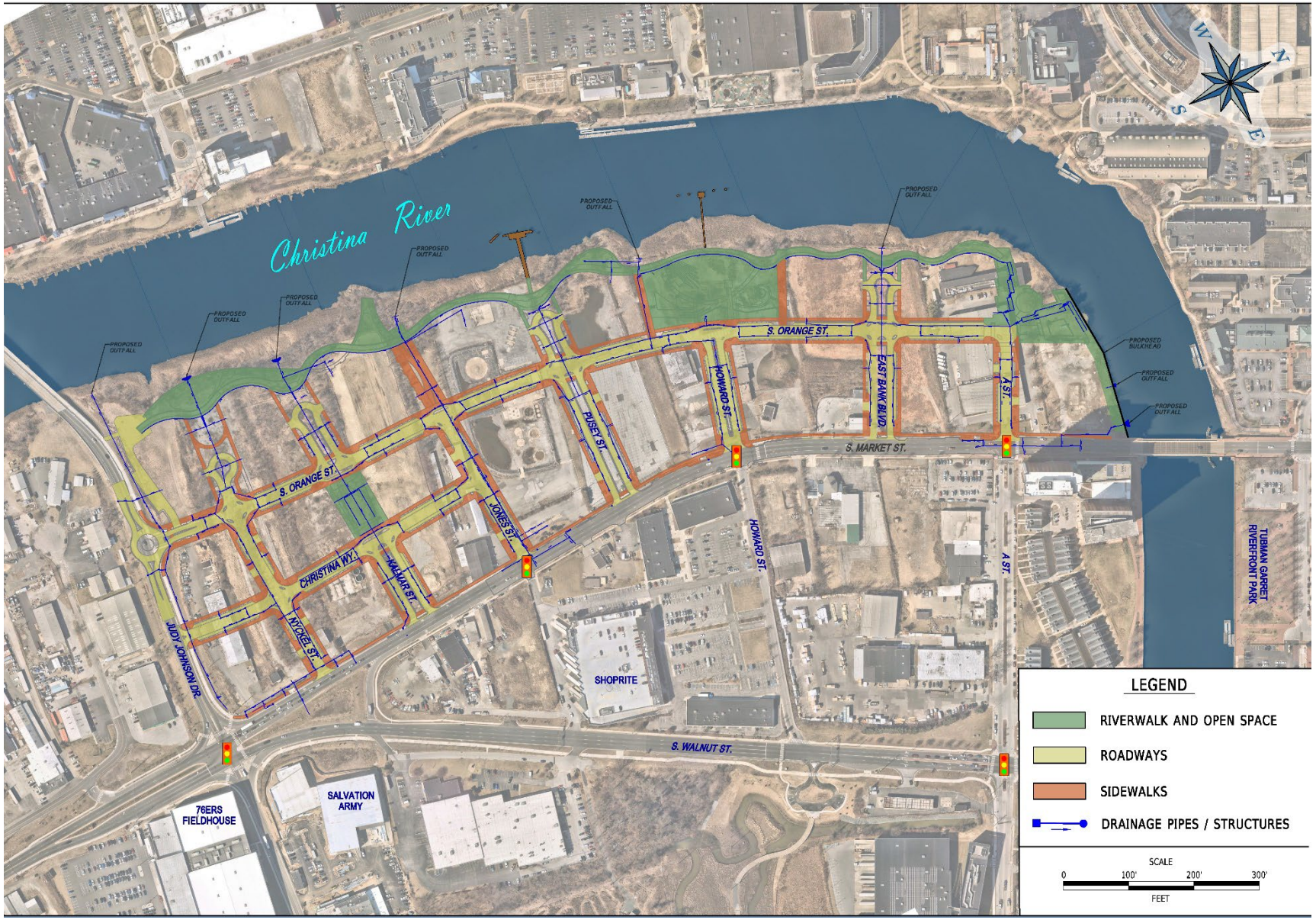
Under the Build Alternative, the proposed in-water work would include repairing the existing bulkhead which is in current disrepair. The Build Alternative proposes to construct a new bulkhead in front of the existing bulkhead. The new bulkhead would be a higher elevation to allow the new Riverwalk to be constructed at a minimum of 18 inches above the 100-year flood elevation. The tidal influence of the river exposes mud flats in front of the existing bulkhead during the tide cycles. The new bulkhead would be constructed from the landside of the existing bulkhead.

The transportation infrastructure improvements under the Build Alternative also incorporate strategic resiliency solutions to environmental challenges currently faced by the site. The Project study area is expected to be entirely inundated in the case of a 100-year flood event under its current condition. The Build Alternative would elevate the transportation elements in compliance with the Federal Emergency Management Agency (FEMA) Floodplain Regulations to protect the site from inundation and flood-related damage. While the existing South Market Street roadway will remain at its existing elevation below the 100-year flood event, all other proposed roads would be constructed at elevations above the 100-year flood event except where they would connect to existing streets at lower elevations. Additionally, proposed sidewalks and the Riverwalk would also be at elevations above the 100-year flood event. These Project elements are aligned with the City of Wilmington's strategies to harden infrastructure vulnerable to sea level rise and extreme weather events.

In addition to raising the elevation of the site, it is anticipated that the Project study area would need a two-foot clean cap over contaminated soils, prior to the infrastructure improvements, to prevent contaminated soil erosion and human contact. The soils and groundwater are contaminated; these contaminants have also been found in sediment and surface water along the bank of the Christina River. Multiple Brownfield Redevelopment Agreements and remedial action plans for the Project study area are under development between the City, the RDC, the U.S. Environmental Protection Agency (EPA), and the Delaware Department of Natural Resources and Environmental Control (DNREC), and existing remediation agreements will be followed accordingly.

Currently, the Project study area has 23.3 acres of impervious area. As part of the Build Alternative, existing impervious surface would be removed accordingly. The proposed transportation improvements would reduce impervious area to 18.6 acres (a decrease of 4.7 acres). The Build Alternative proposes to add drainage outfalls to support the proposed transportation infrastructure. The outfalls would be strategically located throughout the Project study area to address ongoing drainage issues and provide adequate conveyance for the proposed transportation infrastructure. All proposed outfalls would be designed to discharge above Mean Low Water elevation of the Christina River at higher elevations than existing outfalls. In addition to the higher outfall elevation, there would be tide control valves installed at each outfall to eliminate the backup of the tidal water during the tidal fluctuations. The proposed storm drain and trench drain systems would be designed to provide efficient collection of surface runoff and adequate conveyance of stormwater throughout the Project study area. The separation of storm drain networks and proposed construction of new outfalls would provide an overall improvement to the current drainage conditions to the tidally influenced Christina River throughout the Project study area.

Figure 2: Build Alternative Site Plan



II. Affected Environment, Impacts and Minimization

A. Topography, Geology, and Soils

1. Regulatory Context and Methods

Environmental scientists conducted a desktop review of publicly available topography, geology, and soils data within the Project study area. Geological and soils data were sourced from the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) website and Web Soil Survey and elevations were determined using US Geological Survey (USGS) geospatial data.

The Farmland Protection Policy Act (FPPA) **7 United States Code (U.S.C.) 4201 et seq**, implementing regulations **7 Code of Federal Regulations (CFR) Part 658**, of the Agriculture and Food Act of 1981, as amended aims to minimize the conversion of important food and fiber producing farmland into non-agricultural land by federal programs (USDA, 1981). Coordination of an FPPA review by NRCS must be completed at the Alternatives Retained for Detailed Study (ARDS) level if a Project has the potential to convert prime, statewide, unique, or locally important farmland to non-farm use.

2. Existing Conditions

Topography and Geology

The topography of the Project study area is defined by the underlying Potomac formation, which is, "the only Coastal Plain unit present in the [Wilmington] area (with the exception of Quaternary Sediments). The Potomac overlies the basement complex from the Fall Zone south. Potomac sediments are of continental origin and consist mainly of vari-colored clays and silts with some interbedded sands. Encroachment of the sea and marine deposition apparently took place from Late Cretaceous time up to Late Eocene time, but no sediment record of these events remains in [Wilmington]" (Woodruf and Thompson, 1975). The elevation within the Project study area ranges from 0 to 12 feet above sea level. The topography of the area is generally flat with minor undulations, other than the eastern edge of the site where the landscape slopes abruptly into the adjacent Christina River. A one-foot contour map of the topography of the Project study area can be found in **Appendix A, Figure 4.**

The Project study area is entirely within the Atlantic Coastal Plain Physiographic Province, which is composed of unconsolidated sediments including gravel, sand, and silt. The geology of the Project study area (which is also defined by the underlying Potomac Formation) is characterized by "variegated red, gray, purple, yellow, and white, frequently lignitic silts and clays containing interbedded white, gray, and rust-brown quartz sands and some gravel. Individual beds are usually restricted laterally in northern Delaware" (Woodruf and Thompson, 1975).

Soils

Currently, the Project study area includes vacant/vegetated lots, surface parking, structures previously used for commercial/industrial purposes, a gasoline station, former junkyards, and brownfields. Physical site sampling documented in the previous environmental reports reviewed, analyzed soil, groundwater, sediment, and/or surface water samples for various contaminants within the Project study area (refer to **Section V.F of the EA** and **EA, Appendix C** for details on the Hazardous Materials Survey). The Project has sites that were classified as having low, moderate, and high potential for hazardous materials to be present. Three of the 23 sites were determined to have a low potential for hazardous materials present, 17 of the 23 sites were determined to have a moderate potential for hazardous materials present, and four of the 23 sites were determined to have a high/significant potential for hazardous materials present.

Defined areas of the Project study area were determined to have been impacted by metals, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), and/or polychlorinated biphenyl (PCB) from current and past site operations at varying levels of concentrations.

Soil Types

A soil map unit is a collection of areas on a soil map defined by their dominant taxonomic components, which can include a combination of soil type and miscellaneous, non-soil areas (e.g., rock outcrop) (USDA NRCS, 2018). The USDA-NRCS Web Soil Survey (2018) identified 2 soil mapping units within the Project study area: unit VoB (Urban land-Othello complex, 0 to 5 percent slopes), and unit W (water) (**Appendix A, Figure 4**)**.** Unit VoB is composed of 60% urban land soil, 30% Othello, drained, and similar soils, and 10% minor components, while unit W is composed entirely of water (**Table 1**).

Table 1: Mapped Soils Within Project Study Area

Map Unit Symbol	Map Unit Name	Component	Percent of Map Unit	Hydric Rating	Acres in Study Area	Percent of Study Area	K-Factor
VoB	Urban land-Othello complex, 0 to 5 percent slopes	Urban Land	60%	0	33	59%	0
-	-	Othello, drained, and similar soils	30%	30	16.5	29%	0.43
-	-	Minor Components	10%	-	5.5	10%	-
W	Water	Water	100%	0	0.9	2%	0

**Erodibility Coefficient – Value assigned to soil types by NRCS. K > 0.35 are considered to be highly erodible soils*

**Hydric Rating – Value is based on the percentage of hydric soils within the soil type. Non-hydric soils have a value of 0, predominantly non-hydric soils have a value between 0 and 33, partially hydric soils have a value between 33 and 66, predominantly hydric soils have a value between 66 and 99, and hydric soils have a value of 100.*

Soil Hydrologic Groups

The USDA NRCS classifies soils into "hydrologic soil groups" based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration that is expected to occur when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The four hydrologic soil groups are defined in **Table 2.** If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter refers to drained areas and the second refers to undrained areas. About 70% of the soils within the Project study area have not been assigned a hydrologic soil group. The remaining 30% of soils in the Project study area fall in Hydrologic Groups C and D, with

slow to very slow infiltration rates. Soils with slower infiltration rates have higher runoff potential during rain events (USDA NRCS, 2018).

Table 2: Soils Hydrologic Group Descriptions

Group	Description
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

USDA NRCS, 2018

Highly Erodible and Hydric Soils

The National Technical Committee for Hydric Soils (NTCHS) defines hydric soils as soils that are saturated or inundated long enough during the growing season to become anaerobic in their upper layer and support the growth and reproduction of hydrophytic vegetation (**59 FR 16835, proposed July 13, 1994**). The hydric soil ratings shown in **Table 1** indicate the percentage of the soil map units that meet the NRCS criteria for hydric soils. Map units are composed of one or more components or soil types, with each rated as hydric or non-hydric soil. Each map unit is rated based on its respective components and the percentage of each component within the map unit. The five rating groups are separated as hydric (100 percent hydric components), predominantly hydric (66 to 99 percent hydric components), partially hydric (33 to 65 percent hydric components), predominantly non-hydric (1 to 32 percent hydric components), and non-hydric (less than one percent hydric components) (USDA NRCS, 2018).

Within the Project study area, one soil unit component is classified as predominantly non-hydric, covering approximately 29% of the area within the study area. The remaining components of this soil unit and the other soil unit within the Project study area are both classified as non-hydric (covering the remaining 71% of the area within the Project study area).

Highly erodible soils are potentially more prone to erosion from wind, rain, and disturbance (USDA NRCS, 2010). Approximately 30% of the Project area is composed of highly erodible soils (**Table 1)**.

Prime Farmland, Soils of Statewide Importance, and Unique and Locally Important Farmland Soils

USDA NRCS classifies farmland soils as Prime Farmland Soils, Soils of Statewide Importance (also referred to as farmland of statewide importance), or Unique Farmland Soils by identifying the location and extent of soils that are best suited to growing human food, animal feed, fiber, forage, and oilseed crops. Prime Farmland Soils have the best quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to widely acceptable farming

methods. In general, Prime Farmland Soils have an adequate and dependable water supply from precipitation or irrigation, favorable temperature and growing seasons, acceptable pH, adequate salt and sodium content, and few or no rocks. These soils are permeable to water and air, are not excessively erodible or saturated for long periods, and do not frequently flood (**7 CFR 675.5**).

Unique Farmland Soils are soils other than Prime Farmland Soils that have the best combination of physical and chemical characteristics to produce a specific high value food or fiber crop like citrus, tree nuts, olives, cranberries, fruits, or vegetables. Unique Farmland Soils have a combination of soil quality, growing season, temperature, humidity, air drainage, elevation, and other factors like nearness to market that favor the specific crop (**7 CFR 675.5**).

Soils of Statewide Importance are soils, in addition to prime and unique farmland soils, that are of statewide importance to produce human food, animal feed, fiber, forage, and oilseed crops as designated by the appropriate state agency. Soils of Statewide Importance are typically nearly Prime Farmland soils that produce high crop yields when managed properly (**7 CFR 675.5**).

Prime Farmland Soils, Soils of Statewide Importance, and Unique Farmland Soils are not present within the Project study area. Furthermore, the FPPA does not apply to the Project study area because the Project is located within an urban area (**7 CFR 658.2**).

3. Environmental Effects

Topography and Geology

The primary impact to soils from this Project is anticipated to be the removal of highly contaminated soils and the placement of fill to cover remaining contaminated soils and elevate the site above the 100-year floodplain. Additional potential impacts could include leaching of chemicals into the soil from general construction or accidental spills, soil erosion, and soil compaction associated with the use of heavy equipment. Erosion of topsoil may result in the loss of soil nutrients and nutrient holding capacity, as well as a reduction of organic material in the soil. The loss of organic-rich topsoil reduces the soil's natural ability to provide nutrients to plants and regulate water flow, making the soil more susceptible to pests, disease, and compaction. Soil compaction reduces infiltration rates and can cause rapid surface water runoff or ponding, resulting in shifts in vegetation from wet to dry or dry to wet. Soil compaction can also damage roots, leading to plant mortality. Erosion from construction sites can lead to the transport of excess nutrients and sediments downstream.

Since the Project study area contains certified brownfield sites and other contaminated areas, multiple Brownfield Development Agreements are in place and remedial action plans are under development to prevent contaminated soil erosion and human contact with contaminated soil. The Project proposes to include at least 18 inches of clean soil over the transportation infrastructure improvements, which will substantially alter the existing topography of the Project study area. Refer to the *Hazardous Materials Survey Technical Report* (**EA, Appendix C**) for additional details on the remediation plans.

Soils

Impacts to soils within the Project study area are presented in **Table 3**. Note that hydric soil acreage identified in this section are as defined in the NRCS Web Soil Survey and do not reflect the hydric soils identified as jurisdictional wetlands.

Table 3: Impact to Soils by Type in Acres

Soil Type	Acres
Prime Farmland	0
Hydric	0
Predominantly Hydric	0
Partially Hydric	0
Predominantly Non-Hydric	16.5
Non-Hydric	39.4

Approximately 30% of the Limit of Disturbance (LOD), or 16.5 acres, is composed of highly erodible soils, with a K-factor of 0.43.

As mentioned in the above section, part of the remedial action plans to be implemented, which involves the addition of a minimum of 18 inches of clean soil over the transportation infrastructure improvements. This addition will substantially alter the existing surface soil conditions at the site.

4. Minimization & Mitigation

The Project would mitigate any negative effects, such as unstable soils or high-water table, through engineering design. Negative impacts to the surrounding environment, such as sedimentation, would be mitigated through implementation and strict adherence to erosion and sediment control plans, which include adding a minimum of 18 inches of clean soil across the transportation infrastructure improvements and ensuring non-erosive conveyance of stormwater.

Construction within the Project study area requires consideration of hydric and highly erodible soils. Measures to protect soils from erosion would be implemented based on approved Erosion and Sediment Control Plans (E&S Plans). The E&S Plans would include erosion and sediment control devices to avoid or minimize the impacts of soil erosion such as: sediment traps, silt fencing, sedimentation basins, interception channels, and seeding and mulching.

Additional water quality protection measures are required for construction projects to prevent soil erosion and subsequent sediment influx into nearby waterways. Construction contractors will be designated as co-permittees on the National Pollutant Discharge Elimination System (NPDES) permit to ensure compliance.

B. Waters of the US and Subaqueous Lands, Including Wetlands

1. Regulatory Context and Methods

Regulations

Wetlands and waterways are protected by several federal and state regulations. Waters of the US, including wetlands, are jointly defined by the U.S. Environmental Protection Agency (EPA) and the US Army Corps of Engineers (USACE) in **40 CFR 120.2 and 33 CFR 328.3**, respectively**.** On August 29, 2023, the EPA issued a press release[2] regarding the final rule to amend the final "Revised Definition of 'Waters of the United States'" rule[3], published in the *Federal Register* on January 18, 2023. This final rule conforms the definition of "Waters of the United States" to the U.S. Supreme Court's May 25, 2023, decision in the

[2] https://www.epa.gov/newsreleases/conform-recent-supreme-court-decision-epa-and-army-amend-waters-united-states-rule

[3] https://www.federalregister.gov/documents/2023/01/18/2022-28595/revised-definition-of-waters-of-the-united-states

case of *Sackett v. Environmental Protection Agency* and became effective on September 8, 2023. The updated 2023 decision defines Waters of the Unites States (WOTUS) as: "Traditional navigable waters which are currently used or may be used to facilitate interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide, the territorial seas, and all interstate waters (collectively, "traditional navigable waters"); Impoundments of waters otherwise defined as WOTUS; Tributaries of traditional navigable waters that are themselves relatively permanent, standing, or continuously flowing; Wetlands that are adjacent to traditional navigable waters, or relatively permanent, standing, or continuously flowing tributaries of such waters; and Intrastate lakes and ponds that do not fall into any of the above categories, but that are relatively permanent, standing, or continuously flowing bodies of water that share a surface connection with a recognized WOTUS."

Tidal wetlands, as well as non-tidal wetlands that include 400 or more contiguous acres are regulated under the Delaware Wetlands Act (**7 Del. Code, Chapter 66**) and the Wetlands Regulations (**7 DE Admin. Code 7502**). Delaware regulates all tidal waters (up to the Mean High Water Line) as well as all non-tidal rivers, streams, lakes, ponds, bays, and inlets (up to the Ordinary High Water Line) under the Subaqueous Lands Act (**7 Del. Code, Chapter 72**) and the Regulations Governing the Use of Subaqueous Lands (**7 DE Admin. Code 7504**). Subaqueous lands are defined as: Lands lying below the line of mean low tide in the beds of all tidal waters within the boundaries of the State; Lands lying below the plane of the ordinary high water mark of nontidal rivers, streams, lakes, ponds, bays and inlets within the boundaries of the State as established by law; Specific manmade lakes or ponds as designated by the Secretary and lands lying between the line of mean high water and the line of mean low water.

Methodology

Prior to beginning the field investigation, environmental scientists conducted a desktop review of mapped waterways and nontidal/tidal wetlands within the Project study area using existing National Wetlands Inventory (NWI) Wetlands Geographic Information System (GIS) data and Delaware Department of Natural Resources and Environmental Control (DNREC) 1988 Tidal maps. The results of the desktop investigation for the area within the Project study area are included in **Appendix A, Figure 5.**

Environmental scientists delineated wetlands and waterways within the Project study area from November 2018 through May 2022. All features were photographed and given a unique identifier. Data obtained from the field reconnaissance were collected with an iPad and boundary points were located using global positioning systems (GPS).

Wetland features were delineated in accordance with the following:

- USACE Wetlands Delineation Manual, Y-87-I (Environmental Laboratory, 1987) and
- USACE 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE, 2010).

These manuals employ a three-parameter approach to wetland identification, including (1) hydrology, (2) hydrophytic vegetation, and (3) hydric soils. All three parameters must be present for an area to be considered a jurisdictional wetland under Section 404 of the Clean Water Act (CWA). Routine wetland determination methods with onsite inspection were used to determine the presence of wetlands in the Project study area.

Waterways features were delineated using the limits defined in **33 CFR § 328**. The boundaries of nontidal waterways features were set at the ordinary high water (OHW) mark and include but are not limited to

in-line stormwater management (SWM) ponds, palustrine open water (POW or ponds), stream systems (waterways), and some disturbed areas. The OHW mark was determined in the field using physical characteristics established by the fluctuations of water (e.g., change in plant community, changes in the soil character, shelving) in accordance with **USACE Regulatory Guidance Letter No. 05-05.** Only features that fall within the current jurisdictional requirements, detailed in 33 CFR 328.4, were included in the report.

The function and value of the wetland and waterway resources within the Project study area were assessed with four different methods depending on the classification of the resource:

- Wadeable stream function and value was assessed using the Habitat Assessment Field Datasheet – Low Gradient Streams included in the *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition – Form 3.*
- The Christina River, a non-wadeable river, was assessed visually by environmental scientists in the field and existing biological data was reviewed.
- Tidal wetlands were assessed using the Mid-Atlantic Tidal Wetland Rapid Assessment Method (MidTRAM). MidTRAM is a technique designed to assess the condition of estuarine tidal wetlands based on three characteristics: buffer, hydrology, and habitat/plant community.
- The non-tidal wetland was assessed using the USACE Highway Methodology, which identifies the functions and values of a wetland and the rationale for their determination.

2. Existing Conditions

Three tidal waters; one non-tidal, perennial Waters of the U.S.; one estuarine emergent wetland; one palustrine emergent wetland; two DNREC mapped tidal mudflats; three DNREC state mapped tidal marsh areas; and five DNREC subaqueous lands (DNREC designation for its regulated resources) were delineated within the Project study area. The wetland and waterway features are summarized in **Table 4**, which includes feature classifications, description, and agency jurisdiction; described in the Wetland Technical Report in **Appendix C**; and depicted in **Appendix A, Figure 7**. A detailed summary of surface water resources, including stream systems, is included in **Section C. Watersheds and Surface Water Quality**.

Table 4: Total Delineated Features within the Project Study Area

Feature ID	Classification	Feature Description	Hydrologic Class (Tidal or Non-Tidal)	Agency Jurisdiction	Depth/Width or Area
Waters B_T	Tidal	Waters B_T is a tidal channel located in the central western portion of the study area, surrounded by Wetland A_T. Waters B_T originates at a culvert and flows west into the Christina River.	Tidal	USACE and DNREC	Depth: 6 in Width: 4 ft
Waters D	Perennial	Waters D is a perennial channel located in the central portion of the study area. Waters D receives hydrology from Wetland F and flows into Wetland A_T, which abuts the Christina River.	Non-Tidal	USACE and DNREC	Depth: 2-6" Width: 3-5'
Waters E_T	Tidal	Waters E_T is a tidal channel located in the south-central portion of the study area, south of Waters D and Wetland F. Waters E_T flows into Wetland A_T, which abuts the Christina River.	Tidal	USACE and DNREC	Depth: 1-3" Width: 4-8'
Christina River	Tidal	The Christina River is a traditional navigable water located in the western and northern portions of the study area. Wetland A_T abuts the Christina River, and Waters B_T flows directly into the Christina River. No submerged aquatic vegetation was identified within the study area.	Tidal	USACE and DNREC	Depth: 10 ft (average adjacent to study area) Width: 350 ft (average adjacent to study area)
Wetland A_T	EEM	Wetland A_T is an EEM located throughout the western portion of the study area. Wetland A_T abuts and receives tidal influence from the Christina River.	Tidal	USACE and DNREC	241,275.78 SF
Wetland F	PEM	Wetland F is a PEM located in the central portion of the study area. Wetland F receives hydrology from groundwater and the surrounding uplands and drains to Waters D.	Non-Tidal	USACE	3,213.92 SF

* PEM = Palustrine emergent, EEM = Estuarine Emergent

The Rapid Bioassessment Protocols for streams was used to rank the three wadeable channels within the Project study area, Waters B, Waters D, and Waters E, according to the ten habitat parameters listed below. See **Appendix D** for the stream bioassessment datasheets.

- Epifaunal Substrate – an estimate of the amount of substrate available for epifauna to colonize. This parameter rated as Poor in the Condition Category for all three channels.
- Pool Substrate Characterization – identifying the type of channel substate. This parameter rated from Marginal to Suboptimal for the three channels.
- Pool Variability – an estimate of the variation of pool size and depth. This parameter rated as Poor for all three channels.
- Sediment Deposition – Estimate of the extent of bar formation and gravel/sediment deposition within the stream. This parameter was rated Optimal for all three channels.
- Channel Flow Status – An estimate of how much of the available channel is filled by water. This parameter rated ad Optimal for all three channels.
- Channel Alteration – estimates the amount of human impact to the channel. This parameter rated as Suboptimal for all three channels.
- Channel Sinuosity – estimates the degree of channel bends. This parameter rated as Poor for all three channels.
- Bank Stability – estimates how likely a bank is to erode. This parameter rated variably between the three channels, ranging from Poor to Optimal.
- Vegetative Protection – estimates the percentage of riparian vegetation coverage. This parameter rated as Marginal for all three channels.
- Riparian Vegetative Zone – estimates the width of the riparian area. This parameter rated variably for the three channels, from Poor to Optimal.

The Total Score for the habitat assessments for the three wadeable streams within the Project study area ranged from 92 to 106 out of a total possible 200 points.

The tidal wetland within the Project study area, Wetland A, was assessed using the midTRAM method, based on: estimates of disturbance; vegetative cover; natural buffer extent and condition; altered land use; barriers to landward migration; species richness; invasive species cover; and extent of anthropogenic impact. The Final Score for Wetland A was 46.67 out of 100. See **Appendix D** for the midTRAM assessment datasheet.

The nontidal wetland within the Project study area, Wetland F, was assessed using the USACE Highway Methodology. The primary function of this wetland is sediment/toxicant retention, and its other functions and values include floodflow alteration and nutrient removal. See **Appendix D** for the USACE Highway Methodology datasheet.

The biological, chemical, and physical function of the Christina River was assessed visually in the field and by review of available data. There is no submerged aquatic vegetation within the Project study area. The Christina River has poor water quality due to high sediment loads, a high level of toxics due to the industrial land use along much of its banks, and high levels of Nitrogen, Phosphorus, and bacteria, which require reduction by the EPA. Much of the floodplain of the Christina River is developed, which does not allow for natural floodplain interactions and flood flow dynamics. There is a high level of invasive plant and animal species in the river, including *Phragmites australis*, growing along its banks, and fish species such as blue catfish (*Ictalurus furcatus*), northern snakehead (*Channa argus*), common carp (*Cyprinus carpio*), rainbow trout (*Onchorhynchus mykiss*), largemouth bass (*Micropterus salmoides*), and

smallmouth bass (*Micropterus dolomieu*). While the Christina River provides habitat for many species and provides recreational use, the system is highly degraded from anthropogenic disturbances.

3. Environmental Effects

Direct impacts to wetlands and waters associated with construction of the Build Alternative are anticipated to include grading, riprap installation, and construction-related access. Indirect impacts to wetlands and waters from the limits of work may result from roadway runoff, sedimentation, and changes to hydrology. Direct and indirect impacts may lead to a decrease in available wetland and waters habitat within the Project study area and ultimately a decrease in plant and animal species inhabiting these areas.

The wetlands within the Project study area are categorized as tidal and nontidal wetlands, and Waters of the US including a perennial stream.

A map displaying impacts to USACE-regulated resources can be found in **Appendix A, Figure 8**, and a map displaying impacts to DNREC-regulated resources can be found in **Appendix A, Figure 9.**

Table 5, Table 6, and **Table 7** summarize the direct impacts to delineated features in square feet (SF), linear feet (LF), or acres (AC), by agency.

Table 5: Summary of Direct Impacts to USACE Regulated Resources

Feature and Classification	AC	SF	AC	SF	AC	SF
	Permanent		Temporary		Total	
Wetlands	0.28	12,257	0.73	31,755	**1.01**	**44,012**
Waters	0.25	10,994	0.54	23,653	**0.79**	**34,647**
Grand Total	**0.53**	**23,251**	**1.27**	**55,408**	**1.80**	**78,659**

Table 6: Summary of Direct Impacts to DNREC Regulated Resources

Feature and Classification	AC	SF	AC	SF	AC	SF
	Permanent		Temporary		Total	
Tidal Marsh Wetlands	0.08	3,642	0.19	8,072	**0.27**	**11,714**
Tidal Mudflat Wetlands	0.27	11,743	0.87	37,893	**1.14**	**49,636**
Subaqueous Lands	0.10	4,547	0.10	4,164	**0.20**	**8,711**
Grand Total	**0.45**	**19,932**	**1.16**	**50,129**	**1.61**	**70,061**

Table 7: Detailed Summary of Direct Impacts to Delineated Features

Reason For Impact	Feature ID	Agency Jurisdiction	Permanent		Temporary		Total	
			AC	SF	AC	SF	AC	SF
Brownfields Remediation (Fill)	Wetland F	USACE	0.032	1,411	0	0	**0.032**	**1,411**
	Waters D	USACE & DNREC	0.013	563	0	0	**0.013**	**563**
	Waters E_T	USACE & DNREC	0.036	1,588	0	0	**0.036**	**1,588**

Reason For Impact	Feature ID	Agency Jurisdiction	Permanent		Temporary		Total	
			AC	SF	AC	SF	AC	SF
Stormdrain Outfalls/Bulkhead Repair	Wetland A_T	USACE & DNREC	0.249	10,846	0.729	31,755	**0.978**	**42,601**
	Waters B_T	USACE & DNREC	0.023	1,002	0.004	174	**0.027**	**1,176**
	The Christina River	USACE & DNREC	0.180	7,841	0.539	23,479	**0.719**	**31,320**

These wetlands and waters impacts would require the following permits in Delaware:

- A Department of the Army permit pursuant to Rivers and Harbors Act Section 10 and Clean Water Act Section 404 will be required for the USACE impacts identified above. It is anticipated that confirmation of authorization will occur under Nationwide Permits 38 (for Cleanup of Hazardous and Toxic Waste) and 14 (for Linear Transportation Projects).
- A Section 401 Water Quality Certification from DNREC is required before a Department of the Army permit can be issued for potential water quality impacts to wetlands. DNREC has issued Section 401 Water Quality Certifications for Nationwide Permits 38 and 14.
- A Coastal Zone Management Act Consistency Certification (CZM) from the DNREC Delaware Coastal Management Program is required before a Department of Army permit can be issued. The Delaware Coastal Management Program has issued CZM for Nationwide Permits 38 and 14.
- A Wetlands Permit from DNREC.
- A Subaqueous Lands Permit from DNREC.

Even though these wetlands and waters impacts are located in the Christina River, they do not encroach on the federal navigation channel. US Coast Guard coordination was conducted, and no further coordination is required. See correspondence dated January 23, 2024, included in **Appendix B**.

Indirect effects to wetlands and waters could result from remediation and development of the parcels adjacent to the transportation infrastructure improvements and from roadway runoff, sedimentation, and changes to hydrology. Indirect effects may lead to a decrease in available wetland and waterway habitat within the Project study area and could ultimately lead to a decrease in plant and animal species inhabiting these areas.

Table 8 and Table 9 summarize the direct impacts to delineated features in square feet (SF), linear feet (LF), or acres (AC), by agency.

Table 8: Summary of Indirect Impacts to USACE Regulated Resources

Feature and Classification	AC	SF	AC	SF	AC	SF
	Permanent		Temporary		Total	
Wetlands	0.04	1,803	0.00	0	**0.04**	**1,803**
Waters	0.02	1,021	0.00	0	**0.02**	**1,021**
Grand Total	**0.06**	**2,824**	**0.00**	**0**	**0.06**	**2,824**

Table 9: Summary of Indirect Impacts to DNREC Regulated Resources

Feature and Classification	AC	SF	AC	SF	AC	SF
	Permanent		Temporary		Total	
Subaqueous Lands	0.02	984	0.00	0	**0.02**	**984**
Grand Total	**0.02**	**984**	**0.00**	**0**	**0.02**	**984**

4. Minimization and Mitigation

Efforts to avoid and minimize impacts have occurred throughout the planning process and will continue during more detailed phases of Project design. Avoidance and minimization efforts to reduce impacts to subaqueous lands, including wetlands, involve making every reasonable effort to avoid wetlands and waterways to the maximum extent practicable.

Wetland and stream impacts within the LOD are unavoidable. Wetland F, Waters D, and Waters E_T must be filled and capped with a minimum of 18 inches of clean soil to comply with the remedial action plans and as a result impacts to Wetlands F, Waters D and Waters E_T cannot be minimized. Wetland A_T and the tidal waters of the Christina River are impacted by grading and riprap installation to create stable, non-erosive outfalls from the closed drainage system and to replace a failing bulkhead at the north end of the site. These unavoidable impacts have been minimized to the greatest extent practicable while still meeting DNREC stormwater regulations and repairing the failing bulkhead. A drainage design that would outfall above the high tide line could avoid impacts to Wetlands A_T and the Christina River, however final elevations within the Project study area make this drainage design infeasible. Impacts to Wetland A_T and the Christina River have been minimized by reducing the width and length of the excavated channel and the length and width of the riprap pad to the minimum required for non-erosive conveyance. The number of drainage outfall locations has been reduced to the minimum necessary for adequate drainage of the Project. Bulkhead impacts were minimized by locating the repaired structure as close to the failing structure as possible. Additional impacts could result from roadway runoff, sedimentation, and alterations to hydrology. Some of these impacts could lead to degradation or a decrease in an available wetland and waterway habitat within the Project study area, and ultimately a decrease in plant and animal species inhabiting these areas.

The Project team will work with USACE and DNREC to determine the loss versus impact resulting from the Project activities and identify appropriate mitigation for losses. Currently, wetlands mitigation banks and approved in-lieu-fee programs are unavailable to provide compensatory mitigation, so permittee responsible mitigation will be provided. The initial compensatory mitigation approach is to enhance phragmites dominated tidal wetlands, on-site, along the Project shoreline. Enhancement is anticipated to include involve chemical control of phragmites for 1- or 2-years followed by excavation of phragmites dominated areas to reduce sediment elevations, increasing daily inundation to lengths unsuitable for phragmites growth. Native broadleaved emergent herbaceous vegetation is anticipated to be planted in excavated areas and protection from goose herbivory is expected. Final compensatory mitigation details will be developed in coordination with USACE and DNREC during permitting and a final compensatory mitigation plan will be developed. The compensatory mitigation plan will comply with the requirements included in the 2008 mitigation rule, including provision for long-term management, adaptive management, and site protection. The condition of wetlands that will undergo temporary impacts will be assessed prior to construction and following construction, temporarily impacted wetlands will be restored, if needed, according to the special conditions of the federal and state permits.

C. Watersheds and Surface Water Quality

1. Regulatory Context and Methods

Surface waters include rivers, streams, and open water features such as ponds and lakes. Section 401 and Section 402 of the Federal CWA (**33 U.S.C. 1341 and 1342**) regulate water quality and the introduction of contaminants to waterbodies. Section 401 of the CWA prohibits any applicant for a federal permit or license "to conduct any activity that may result in any discharge into waters of the United States, unless the State or authorized Tribe where the discharge would originate either issues a Section 401 water quality certification finding compliance with applicable water quality requirements or certification is waived" (**40 CFR Part 121**). The Project requires a Section 401 water quality certification from DNREC indicating that anticipated discharges from the Project will comply with state water quality standards. In general, the NPDES stormwater program requires permits for discharge from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development. Individual permits for erosion and sediment control approval will be submitted and approved as contract packages are developed.

In compliance with CWA Sections 303(d), 305(b), and 314 and the Safe Drinking Water Act (SDWA), states are required to develop a prioritized list of waterbodies that currently do not meet water quality standards. The 303(d) prioritized list includes those waterbodies and watersheds that exhibit levels of impairment requiring further investigation or restoration. DNREC uses monitoring data to compare waterbody conditions to water quality standards and determine which streams should be listed. Parameters monitored include temperature, dissolved oxygen (DO), pH, salinity, enterococcus, total phosphorus, chlorophyll a, and total suspended solids. Waterbodies on the prioritized list may be subject to a total maximum daily load (TMDL) of these constituents under Section 303(d) of the CWA. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. Waterbodies can also be listed under Category 5 on the 303(d) list for impairment, which indicates that the waterbody is impaired, does not meet the water quality standard, and that a TMDL restoration plan is required.

Like all surface waters, surface drinking water supplies are protected under Section 401 and Section 402 of the Federal CWA (**33 U.S.C. 1341 and 1342**), which regulate water quality and the introduction of contaminants to waterbodies based on designated use classes. This Project will be permitted under USACE Nationwide Permits 38 for Cleanup of Hazardous and Toxic Waste and 14 for Linear Transportation Projects, for which a Section 401 Water Quality Certification has already been issued. Surface drinking water supplies are also protected under the SDWA, which was enacted to protect public health by regulating the nation's public drinking water supply. The SDWA sets enforceable maximum contaminant levels and post-treatment testing requirements that are enforced during water treatment and delivery. It also sets up a framework for source water protection and prevention to provide multiple barriers to pollution of waterways that provide raw water for drinking water use.

Designated uses are the water uses specified in water quality standards of each water body. The CWA requires that the uses be achieved and maintained. According to the DNREC Surface Water Quality Standards (**7 DE Admin. Code 7401**), the categories of beneficial use of each Delaware watershed must be maintained and protected through application of appropriate criteria. The following designated water uses are protected throughout the Christina River Watershed: industrial water supply; primary contact recreation; secondary contact recreation; fish, aquatic life, and wildlife; and fish consumption. The public water supply source and agricultural water supply designated use categories are only protected in freshwater segments in the watershed. From March 15 to June 30 the cold-water fish use class is

protected along the Christina River from the Maryland/Delaware line through Rittenhouse Park which is located south of the Project study area. Both Waters of Exceptional Recreational or Ecological Significance (ERES) waters and harvestable shellfish waters uses are not designated in the Christina River.

See **Section II.B.1** for the Delaware surface water jurisdiction policies.

2. Existing Conditions

Surface Waters and Watershed Characteristics

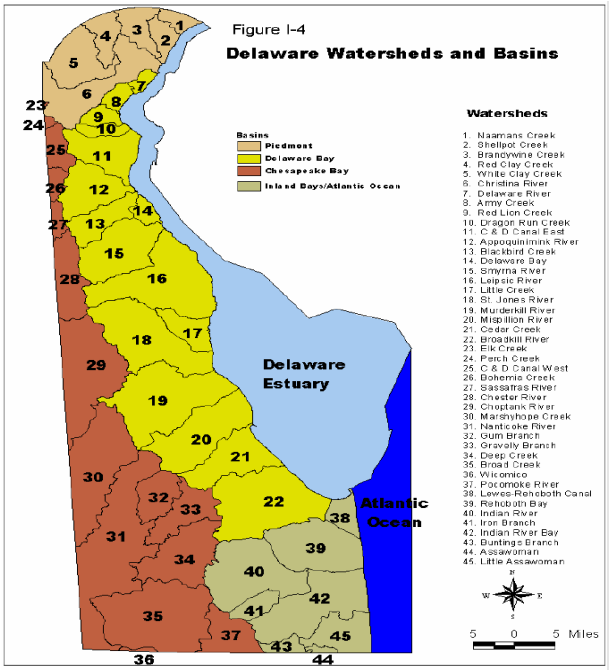
Surface water within the State of Delaware occurs in five drainage basins (including the Delaware Estuary) within forty-five watersheds. The Chesapeake and Delaware Bays are the two major water features which drain surface water in the state. A diagram of the drainage basins and watersheds of Delaware is presented in **Figure 3** below. A total of 2,509 miles of streams and rivers and 2,954 acres of lakes and ponds are located within the state.

The Project study area is located within the Christina River Watershed which is part of the larger Piedmont Drainage Basin. The Christina River Watershed covers about 50,000 acres and extends across Cecil County, Maryland; New Castle County, Delaware; and Chester County, Pennsylvania. The headwaters originate in Maryland and watershed drains east into the Delaware River in Wilmington, Delaware. The total population in the Christina River Watershed is 186,557 based off available U.S. Census Bureau data. The Christina River is the most urbanized watershed within the Piedmont Drainage Basin. Land use within the watershed is comprised of 60% developed area, 29% forest/wetland cover, 10% agricultural lands, 1% water. The tidal and non-tidal portions of the watershed provide habitat for aquatic and avian species such as striped bass, small mouth bass, anadromous fish species and herrings. The watershed characteristic data is obtained from the DNREC website for the Delaware Division of Water Resources and the University of Delaware Water Resources Center.

Major surface waterbodies within the watershed include:

- The Christina River,
- Muddy Run,
- Belltown Run, and
- Dusk Run.

Figure 3: Delaware Drainage Basins and Watersheds



Source: State of Delaware 2004 Combined Watershed Assessment Report (305 (b)) and Determination for the Clean Water Act Section 303 (d) List of Waters Needing TMDL's

The Christina River flows 35 miles west within an urban corridor from the Delaware River. It intersects with White Clay Creek before splitting into two branches. Historically, industrialization along the Christina River negatively impacted habitat health and water quality, however increased efforts to restore wetlands and waters throughout the watershed provides a wide range of benefits to residents and wildlife. The Christina River's tidal stretch begins at its confluence with the Delaware River and ends around Christiana, Delaware. Diverse wetlands, including non-tidal, riverine, and estuarine tidal marsh classifications, are located along the Christina River. The Christina River supports migratory recreation species including the striped bass, river herring, and Atlantic menhaden and could potentially support the federally listed shortnose sturgeon and Atlantic sturgeon.

A diagram of the delineated waterways within the Project study area is presented in **Appendix A, Figure 7**. Major surface waterbodies located within the Project study area include the Christina River, two unnamed tidal channels (**Waters B & E**), and a non-tidal perennial channel (**Water D**). See **Section II.B.2**. for more information about existing surface waters within the Project study area.

Surface Water Quality

The overall health and function of surface water features depends on the quality of water which is transported through the system and the introduction of natural and man-made stressors which can affect the system. Surface water quality within the Project study area was assessed based on data obtained through the DNREC General Assessment Monitoring Network (GAMN) and the EPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS) 2022 Report for the Mid Christina River Waterbody.

Within the Christina River Watershed, the Mid Christina River waterbody extends from White Clay Creek to the Brandywine River. Based on the Delaware water quality standard thresholds, the EPA assesses each

waterbody using the parameters discussed in **Section II.C.1** The Mid Christina River waterbody is categorized as impaired based on the updated EPA ATTAINS data. Nitrogen and phosphorus concentrations downstream of the Project study area occasionally exceed the current Delaware water quality standard and are seasonally influenced. Bacteria concentrations are at elevated levels, which do not support primary contact recreational use of river waters. Fish consumption advisories are currently in effect for the Christina River due to toxics contamination by PCBs and dieldrin. The Christina River has TMDL plans in place for bacteria, sediment, nutrients, and dissolved oxygen in both low and high flow conditions.

3. Environmental Effects

The Build Alternative for the Project is anticipated to affect surface waters and watershed characteristics due to direct and indirect impacts to tidal and perennial channel and the Christina River. However, the three channels the Project would impact have a drainage area of 0.03 square mile and they provide an insignificant contribution of water flow to the Christina River, which has a drainage area of 565 square miles. Site drainage will continue to convey the water that currently flows into these channels to the Christina River. Currently, the Project study area has 23.3 acres of impervious area. As part of the Build Alternative, existing impervious surface would be removed, accordingly. The proposed transportation improvements would reduce impervious area to 18.6 acres, a decrease of 4.7 acres, which could reduce the amount and intensity of stormwater runoff entering surface water features within the Project study area.

Pollutants such as oil, grease, sediment, heavy metals, and petroleum that have been transported from impervious surfaces via stormwater runoff could be released into waterbodies around the Project study area. As discussed in **Section II.A.2**, the Project study area contains soil contaminants. Without proper construction controls, contaminated soils and runoff would enter nearby surface waters. There is evidence indicating that even low levels of some contaminants of emerging concern in the environment may affect wildlife as discussed in **Sections II.G.3** and **II.H.3**, but there is no indication that they pose a threat to human health from consuming water treated to current EPA standards.

4. Minimization and Mitigation

Direct effects to surface waters would be minimized in accordance with the Delaware 5101 Sediment and Stormwater Regulations. Per these regulations **(7 DE Admin. Code 5101, Sections 5.6.2.1 and 5.3.3.3**), the quality and quantity requirement are met through brownfield remediation and conveyance structure use BMPs. As detailed in the remedial action plans, at least 18 inches of clean fill cap will be used to prevent contaminated soil erosion and human contact in the transportation improvement area. Hazardous materials testing requirements would ensure that the clean fill used during construction is not contaminated. A closed stormdrain network will be used for the non-erosive conveyance. Excavation associated with stormwater facilities with vertical depth is discouraged within brownfield sites due to the underlying contaminated soils.

D. Groundwater and Hydrology

1. Regulatory Context and Methods

In 1974, Congress passed the Safe Drinking Water Act (SDWA) to regulate the public drinking water supply (EPA, 2004). The SDWA Amendments of 1986 require each state to develop Wellhead Protection Programs to assess, delineate, and map source protection areas for their public drinking water sources, and determine potential risks to those sources (**42 U.S.C. 300h-7**). Wellhead Protection specifically

manages the land surface around a well where activities might affect water quality (State of Delaware, 1990). Source water protection is not specifically mandated by the SDWA, though it does mandate source water assessments, as described below. This allows for flexibility in the delineation and development of source water protection areas to fit the needs of the state (**42 U.S.C. 300j-13**). States, tribes, and communities are encouraged to use SDWA guidance to protect their public water sources from pollution of major concern and to pass local regulations (EPA, 2004). The SDWA does not regulate private wells serving fewer than 25 individuals (EPA, 2004). Delaware adopted safe water drinking regulations in May of 1971 in conformance with **Title 16 Section 122(3)(c)** of the *Delaware Code* and has had several revisions with the most recent in 2005.

The EPA, as authorized by **Section 1424(e)** of the SDWA, is responsible for the Sole Source Aquifer (SSA) Program, which allows the EPA to designate an aquifer as a sole source of drinking water and establish a review area for any Federally funded projects that fall within the area (**42 U.S.C. 300h-6**). SSAs are defined as providing at least 50 percent of the drinking water for its service area, and where that service area has no reasonably available alternative drinking water sources. While no SSAs cross the Project study area, the Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA is only 0.5 mile east of the Project study area.

2. Existing Conditions

Groundwater is an important resource and commodity for the State of Delaware. On average, Delaware receives 40 to 44-inches of local rainfall per year, but not all of this water is available for use. From this yearly rainfall supply, approximately 20 inches evaporates, 3 inches is transpired by plants, and 4 to 5 inches is lost to surface run-off. The remaining 13 to 15 inches makes its way into the ground where it is naturally stored in a system of groundwater aquifers that underlie most of the state.

The geology in the Project study area consists of unconsolidated soils of the Coastal Plain Physiographic Province. The Coastal Plain, where the Project is located, extends from the northern part of Delaware southeast to Maryland and the Atlantic Ocean. The unconsolidated soils of the Coastal Plain consist mainly of interbedded layers coarse-grained materials, sand and gravel, and fine-grained soils, silt, and clay, which thicken and dip to the southeast. These unconsolidated Coastal Plain soils allow groundwater to permeate within them and be stored in much higher capacities than in the soils of the Piedmont. The coarse-grained soils are saturated and are the aquifers that supply Delaware with most of its fresh water. Fine-grained soil layers that exist within the Coastal Plain soils restrict the flow of groundwater, horizontally and vertically, and are termed confining layers. These layers may contain pore space to store water but lack the permeability or inter-granular pathways to allow water to freely flow or be quickly recharged.

The Project study area is within an area formed by the Potomac Formation, which is characterized by variegated red, gray, purple, yellow, and white, frequently lignitic silts and clays containing interbedded white, gray, and rust-brown quartz sands and some gravel. Individual beds are usually restricted laterally in northern Delaware. The Potomac Formation, the oldest of sediments that rest upon the basement rocks, comprises about 75 percent of the total Coastal Plain material and forms a wedge that thickens in a southerly direction. This formation is used for water supply in northern Delaware.

Groundwater contaminants can come from a variety of sources, but the type of contaminant is often tied to the pollution source. The EPA's National Primary Drinking Water Standards regulate the allowable amounts of these listed compounds within drinking water due to concerns over human and environmental

health (EPA, 2009). The Secondary Drinking Water Standards recommend acceptable levels of compounds that can cause cosmetic effects or aesthetic effects to drinking water, such as poor taste or smell (EPA, 2009).

The Project study area is currently located on a site that includes certified brownfields, former oil/petroleum storage, fill sites, underground tanks, scrap metal collection/processing, auto storage, and tank trailer cleaning. The Project study area includes 16 properties (23 sites) of potential environmental concern which were classified as having low, moderate, and high potential for hazardous materials to be present, with the majority of the tested sites in the moderate category (BrightFields Inc., 2023). Contaminants that are present on site are discussed in **Section II.A.2**. Many of these contaminants have been found in the local groundwater (BrightFields Inc., 2023), and additional contamination can result from leaching of these contaminants from the soil into the groundwater and leaching of chemicals from one contaminated site to adjacent properties with lower contamination levels.

The EPA's Drinking Water Mapping Application to Protect Source Waters (DWMAPS) contains information on Wellhead Protection Areas across the country. These data are presented at the Hydrologic Unit Code (HUC) HUC12 scale as the percentage of each HUC12 watershed that falls within a Wellhead Protection Area. Of the HUC12 Lower Christina River Watershed (020402050505), only 0.09% of the watershed is within wellhead protection area (zero drinking water wells). However, the EPA mapping is presented at a broad watershed scale and does not provide specific well or well-head protection locations.

3. Environmental Effects

The Build Alternative could add additional sources of groundwater contamination from roadway runoff including substances such as gasoline, oil, and road salts that can seep into the soil and enter the groundwater flow. Soil composition affects how readily contaminants may reach groundwater sources. For example, contaminants are more likely to reach groundwater in sandy soils, which allow more infiltration, than clay soils, which have low infiltration rates. While the clean cap and proposed impervious surfaces will prevent some groundwater recharge, the groundwater will likely stay at the same level of contamination.

4. Minimization and Mitigation

Groundwater impacts will be minimized by the remedial actions in the transportation infrastructure improvement area and by the development of a non-erosive stormwater conveyance system. At least 18 inches of clean cap over contaminated soils and impervious surfaces included in the transportation improvement areas will prevent surface water from infiltrating into the ground through contaminated soils, limiting future groundwater contamination. Contaminants associated with roadway runoff will be conveyed to the Christina River through short surface drainage swales and a non-erosive closed drainage network that will prevent these contaminants from infiltrating into the soil and affecting the groundwater.

E. Floodplains

Any actions (including construction) in base floodplains (i.e., 100-year floodplain) must comply with FHWA's regulation 23 CFR 650 Subpart A. 23 CFR 650 Subpart A prescribes FHWA policies and procedures for the location and hydraulic design of highway encroachments in floodplains. 23 CFR 650 Subpart A includes the FHWA policy of avoiding longitudinal and significant encroachment into the floodplain and minimizing adverse impacts to base floodplains while preserving natural and beneficial floodplain values and remaining consistent with the intent of the FEMA administered National Flood Insurance Program (NFIP). While 23 CFR 650 Subpart A seeks to avoid actions in base floodplains, the regulation also

prescribes studies, procedures and documentation required when the action cannot avoid an encroachment in the base floodplain.

Also regarding floodplains, as administrator of the NFIP, FEMA has regulatory authority (i.e., 44 CFR 60.3) where they may designate special flood hazard areas and requires NFIP communities to regulate activities within such designated special flood hazard areas. As a community within the NFIP, the City of Wilmington (City) follows those standards and requirements for activities in special flood hazard areas. Specifically, the City has promulgated floodplain management ordinance applicable to all development and new construction.

In other words, actions and activities must be compliant with applicable FEMA regulation and those City floodplain management ordinances. Specifically, the City of Wilmington Code of Ordinance (Sec. 48-572) states that construction is not permitted within special flood hazard areas without approval and new construction be built at least 18 inches above the 100-year floodplain.

The following sections describe aspects of these various floodplain regulations and ordinances relevant to the various Project actions and alternatives.

1. § 650.111 Location Hydraulic Studies (FHWA)

(a) National Flood Insurance Program (NFIP) maps or information developed by the highway agency, if NFIP maps are not available, shall be used to determine whether a highway location alternative will include an encroachment.

The majority of locations of the Project study area is within NFIP developed Flood Insurance Rate Map (FIRM) number 10003C0156L, effective January 22, 2020 (included as **Appendix A**, **Figure 10)**. The FIRM depicts that most of the Project study area is within Special Flood Hazard Area Zone AE (EL 9). The "Zone AE" indicates that area is subject to inundation by the 1% annual chance flood event (e.g., base floodplain). The (EL 9) indicates that those base flood elevations are 9 feet. Two small portions, (1) the northeast tip of the Project study area, and (2) a small area in the middle of the Project study area, are either within the 0.2% Annual Change Flood Hazard (i.e., 500-year floodplain) or an area of 1% annual change flood with average depth less than one foot or with average depth less than one foot or with drainage areas of less than one square mile. Another small area of the Project study area is not within any mapped base floodplain.

(b) Location studies shall include evaluation and discussion of the practicability of alternatives to any longitudinal encroachments.

The Build Alternative does include longitudinal encroachments of the FEMA 100-year floodplain. These longitudinal encroachments have inundation as a result the Project study area is mostly within the base (i.e., 100-year) floodplain and surrounded by the 100-year floodplain. Any Build Alternative that would include transportation infrastructure improvements in the Project study area is anticipated to result in longitudinal encroachment, therefore attempting avoidance is not practicable in this location.

(c) Location studies shall include discussion of the following items, commensurate with the significance of the risk or environmental impact, for all alternatives containing encroachments and for those actions which would support base flood-plain development:

(1) The risks associated with implementation of the action,

The risks associated with Project encroachment into the floodplain are minimal. The Project includes fill to raise the transportation infrastructure 18 inches above the 100-year floodplain in accordance with City of Wilmington floodplain development code. In other words, the elevation of the new infrastructure would no longer be in the base floodplain, and not subject to flooding during the 100-year storm. The

Project would support base floodplain development and per City code, the development would also be elevated 18 inches above the 100-year floodplain and not subject to flooding during a 100-year storm.

Placing fill within a 100-year floodplain can cause an increase in floodplain elevations of other locations of in vicinity of the Project. To consider this flood risk, the Project study conducted hydraulic/hydrodynamic modeling of this entire vicinity (see section 2 below for a synopsis of the modeling effort). The modeling demonstrated the proposed transportation infrastructure improvements and anticipated development (i.e., fill associated with the Project and anticipated development) do not increase base flood elevations. The hydraulic modeling conducted for the Project is described below.

Per the Delaware Department of Transportation (DelDOT) provided Bridge Scour Modeling Directive[4], three Scenarios were considered and evaluated:

- Scenario 1: A steady-flow scenario with design upland flow (from the stream or river) for the hydraulic design event and the scour design event with the downstream boundary set to the MHW elevation of the tidal receiving water daily astronomical tide.
- Scenario 2: A steady-flow scenario with design upland flow (from the stream or river) for the hydraulic design event and the scour design event with the downstream boundary set to the MLW elevation of the tidal receiving water daily astronomical tide.
- Scenario 3: An unsteady-flow scenario with the source of flooding being the ebb and flood tides from the tidal receiving water (no upland flow from the stream or river) with the downstream boundary conditions being set to the design, 100-year, and 200-year storm surge hydrographs from the tidal receiving water. Scenario 3, "no upland flow," was simulated for a total period of 60 hours, which comprises the entire surge period in Delaware.

On South Market Street, the first two modeling scenarios for water surface elevation indicate a maximum difference in water surface elevation from existing condition to the build condition of 0.00 feet. The third modeling scenario indicates a maximum difference in water surface elevation of -0.01 feet. See **Appendix A, Figures 11 and 12**. This minor decrease appears to be attributable to 200-year floodwaters escaping the Christina River's right bank, south of the Norfolk Southern crossing, just downstream of the Christina River and Little Mill Creek confluence. The model scenarios do not take into account the ability of the existing pipe network to intercept, re-direct, and reduce the overland flooding. Therefore, the maximum difference in water surface elevation from existing conditions to the build condition is likely less than -0.01 feet. See **Appendix E, Section III Part B** for further discussion of the water surface elevation.

(2) The impacts on natural and beneficial floodplain values,

The Project would have no impact on natural, beneficial floodplain values, since the area within the floodplain is fully developed with little natural habitat. The developed nature of the Project study area in the 100-year floodplain provides little value to fish, wildlife, or plants. In the existing condition the Project does not support open space, natural beauty, or opportunities for scientific study, outdoor recreation, agriculture, or forestry. The floodplain in the Project study area does not provide natural moderation of floods or improvements in water quality.

(3) The support of probable incompatible flood-plain development,

Elevating development parcels by 18 inches above the 100-year floodplain base flood elevation without any increases in other base floodplain elevation in the vicinity would reduce flood risk.

[4] Refer to Appendix I, Natural Resources Technical Report, to the DelDOT Modeling Directive in Appendix A of the of the 2D Modeling, Scour and Drainage Analysis Report, Appendix E.

Indirect effects from the Build Alternative to floodplains area anticipated to be negligible. The transportation infrastructure improvements proposed under the Build Alternative incorporate strategic resiliency solutions. The floodplain effect modeling included proposed development adjacent to the transportation infrastructure and found that the proposed development would not affect 100-year floodplain elevations.

The Project would align with the vision and recommendations set out in *Resilient Wilmington: Preparing Today for Tomorrow's Climate Risks* (City of Wilmington, 2022). The proposed Project and future redevelopment would exceed City regulations that require the lowest floor of new buildings constructed in the floodplain to be at or above base flood elevation plus 18 inches and would incorporate other recommendations for waterfront development as described in *Resilient Wilmington*. The incremental effect of the Build Alternative to floodplains, in light of past, present, and future effects, is expected to be relatively minimal due to existing regulatory controls and regulations, as well as an increased focus by the City of Wilmington to plan for and address the future effects of climate change. Therefore, as described here and as documented throughout this EA, the Project does not support incompatible development.

(4) The measures to minimize flood-plain impacts associated with the action, and

All actions occurring within the FEMA-designated 100-year floodplain would comply with FEMA and City prescribed local floodplain construction requirements. Fill and the clean cap would elevate the infrastructure improvements by 18 inches or more above the 100-year floodplain (i.e., in accordance with City of Wilmington floodplain ordinance). This would mitigate flood risk of life and property in the future.

(5) The measures to restore and preserve the natural and beneficial flood-plain values impacted by the action.

The current (e.g., highly developed and brownfield) conditions in the Project area do not support natural and beneficial floodplain values. As a result, the Project is anticipated to have no impact on natural and beneficial floodplain values. The Project improves natural and beneficial floodplain values as the action includes enhancing wetlands, improving wildlife habitat in enhanced wetland areas and, by eliminating invasive species, improve natural beauty. The Project also includes a riverwalk trail, providing outdoor recreation opportunities.

(d) Location studies shall include evaluation and discussion of the practicability of alternatives to any significant encroachments or any support of incompatible flood-plain development.

The location of nearly all of Project study area is within the 100-year floodplain. The Project goals could not be met in any other location. There are no practicable alternatives to this Project. The Project does not interrupt access for emergency vehicles nor does it represent or impact any emergency evacuation route. As described in this section, the Project does not pose a significant risk. The Project conforms to all City of Wilmington floodplain protection standards. Compared to current (i.e., no build) conditions, the Project actually improves natural and beneficial floodplain values. So, while the Project study area is located in the 100-year floodplain the Project is not considered a significant encroachment.

(e) The studies required by § 650.111 (c) and (d) shall be summarized in environmental review documents prepared pursuant to 23 CFR part 771.

In addition to this section, please refer to the *Natural Resources Technical Report,* Appendix I of this EA and to the 2D Modeling, Scour and Drainage Analysis Report, which is included in Appendix E of the NRTR. Sub-section N.2. below summarizes the 2D modeling efforts.

(f) Local, State, and Federal water resources and flood-plain management agencies should be consulted to determine if the proposed highway action is consistent with existing watershed and flood-plain management programs and to obtain current information on development and proposed actions in the affected watersheds.

A floodplain approval from the City of Wilmington will be required for the Project during final design. Floodplain applications are reviewed by the Floodplain Administrator, who interprets floodplain boundaries and proposed construction activities to assess impacts and provide approval of the Project.

2. 2D Modeling

The Project team modeled potential flooding impacts associated with the Project and documented the results in the *2D Modeling, Scour and Drainage Analysis Report* included in NRTR, Appendix E. Riverine and tidal flooding scenarios were evaluated in detail using a two-dimensional hydrodynamic model, TUFLOW. Surface-water Modeling Systems (SMS), Version 13.1, was used for the graphical user interface. The use of TUFLOW allows for:

- Spatial analysis of velocities and water surface elevations within a channel and floodplain surface areas and not only at individual cross-sections;
- Calculation of varying velocities and water surface elevations laterally across channels and floodplains; and
- More effective modelling of flow transitions, ineffective flow areas, channel and floodplain bend loses, and flow expansion and contraction using a finite volume explicit solution.

Three scenarios were considered and evaluated and are described in **Section II.E.1.**

In addition to the hydraulic design and scour events outlined above, the Project evaluated that the 2D modeling also consider and evaluate the 1-, 2-, 10-, and 25-year storm events and potential consequences of sea level rise (SLR). The tailwater elevations as developed by the 2D modeling, with and without SLR, were evaluated to determine the influences to the proposed drainage network and scour potential at the two bridges.

Modeling results indicate that the Project would have negligible impacts on water surface elevations. See **Appendix E** and **Appendix A, Figures 11 and 12**.

F. Vegetation and Terrestrial Habitat

1. Regulatory Context and Methods

In the City of Wilmington there are relatively few regulations that protect vegetation and terrestrial habitats. However, the City of Wilmington does regulate trees present within the road right-of-way, City Parks, and City owned parcels (**Wilmington City Code Chapter 46**). Any trees that need to be removed for construction that are considered to be City trees, need to go through a permit process before they are removed (**Wilmington City Code Chapter 46 Section 33**).

Terrestrial habitats identified within the Project study area include: barren lands, disturbed hedgerows/marginal forests, open fields, and urban and maintained areas. The majority of the vegetated area is contained within wetlands. While some wetlands have adjacent terrestrial zones, wetlands are considered a separate and distinct habitat type for the purposes of this document and are discussed in **Section II.B.2.**

Urban and maintained areas, as well as barren land, are the most common terrestrial habitats within the Project study area. There are some trees present based on aerial imagery (NearMap Map Browser, May 17, 2023 capture and Delaware Forest Service, 2017), but they are contained within disturbed areas.

2. Existing Conditions

Barren Land

Barren land within the Project study area is composed of brownfields and abandoned properties that have not been colonized by vegetation. Many of these areas contain impervious surfaces, while others are comprised of disturbed soil.

Hedgerows/Forested Areas

The hedgerow and marginal forested areas within the Project study area occur as strips between property boundaries along fences, and on the upland edge of the tidal wetlands along the Christina River. These hedgerows/forests are all highly disturbed, in poor condition, and are comprised of tree species including black locust (*Robinia pseudoacacia*), green ash (*Fraxinus pennsylvanica*), black cherry (*Prunus serotina*), tree-of-heaven (*Ailanthus altissima*), and sumac species (*Rhus* sp.). The understory includes several invasive shrub and woody vine species (**Table 10)**, Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*).

Open Fields

There are areas of open fields where properties have been abandoned for a longer period of time and vegetation has colonized to some degree. Anderson et al. (1976) defines the old field/meadow cover type as abandoned land that has a large portion of shrubs, a few trees, and an extensive herbaceous layer containing a mix of grasses and other plants. Open fields can provide habitat for pollinators and other wildlife species. In the Project study area, the majority of these open field species are weedy or invaded with exotics.

Urban and Maintained Areas

Several of the parcels within the Project study area include active parking lots and businesses. These areas do not contain vegetation and have a high level of impervious surface. There is some minor landscaping on the edges of these active businesses.

Invasive and Exotic Species

Invasive and exotic plants thrive in vegetative edge and fragmented forest environments, competing with and often displacing native plant species. This results in a reduction in diversity of native plant and animal species and overall health of the ecological community (Swearingen et al., 2002). The Project study area contains almost entirely disturbed lands resulting from the development and abandonment of several properties on the site. **Table 10** lists the most common invasive species identified on-site during field visits.

Table 10: Common Invasive Species within the Wilmington Riverfront Transportation Infrastructure Study Boundary

Common Name	Scientific Name	Stratum	Ecological Threat
Tree-of-Heaven	*Ailanthus altissima*	Tree	Tree of heaven invades urban areas, where it can cause damage to man-made structures, and natural habitats, where it displaces native plants and produces toxins, which prevent nearby plants from establishing and/or surviving.

Common Name	Scientific Name	Stratum	Ecological Threat
Amur honeysuckle; Morrow's honeysuckle; Twinsisters; other bush honeysuckles	*Lonicera maackii, Lonicera morrowii and Lonicera tatarica; other Lonicera species*	Shrub	Bush honeysuckles compete with and eventually displace native shrubs, thereby altering the natural habitat. These shrubs also outcompete native shrubs that provide food for native pollinators and seed-dispersing animals, such as birds.
Multiflora rose	*Rosa multiflora*	Shrub	Multiflora rose can invade a wide range of habitats, and displaces native shrubs and herbs, possibly decreasing nesting areas for native birds.
Amur peppervine	*Ampelopsis brevipedunculata*	Vine	Spreading vine, which invades disturbed and open areas, threatens native vegetation by shading out herbs, trees, and shrubs.
Asian bittersweet	*Celastrus orbiculatus*	Vine	Spreading vine, which is tolerant of a wide range of conditions and threatens native vegetation by shading out herbs, trees, and shrubs, girdling native trees and shrubs or uprooting them due to added weight.
Japanese honeysuckle	*Lonicera japonica*	Vine	Evergreen spreading vine, which threatens native vegetation by shading out herbs, trees, and shrubs, or girdling young trees and shrubs.
Common reed	*Phragmites australis*	Herb	Grass species, which invades wet areas, such as marshes, drainage areas, and riverbanks. Forms expansive monocultures, which threaten biodiversity in these areas.
Japanese/Chinese wisteria	*Wisteria floribunda/sinensis*	Vine	Spreading vine, threatens native vegetation by shading out herbs, trees, and shrubs, girdling native trees and shrubs, or uprooting them due to added weight.
Purple loosestrife	*Lythrum salicaria*	Herb	Herbaceous forb that invades wetland areas. Can form monocultures which threaten biodiversity in these areas.

3. Environmental Effects

Construction of the Project is anticipated to have little effect on vegetation since there is such a low cover of plants in the large areas of barren land and urban and maintained areas that currently exist within the Project study area. While hedgerows and marginal forested areas naturally filter ground water, reduce runoff from impervious surfaces, contribute to lower stream temperatures, supply necessary habitat for wildlife, sequester carbon, and contribute to air filtration and cooling (M-NCPPC, 1992), there are very few of these areas within the Project study area and those that do exist are of very poor quality. Brownfield cap placement will involve the removal of the remaining vegetation and invasive cover as there are several areas where hazardous materials need to be mitigated (BrightFields Inc., 2023). Disturbance regimes resulting from construction activities can facilitate environments for invasive species establishment. However, native species replanting efforts will reduce invasive cover throughout the Project study area during and after construction. The completed Project will include bike paths and other pedestrian facilities designed to facilitate and encourage pedestrian use of the open space. The resulting increase in pedestrian traffic could lead to increased litter throughout the site, which would detrimentally impact the terrestrial and aquatic habitats on and near the site, as well as the aesthetic value of the site.

4. Minimization and Mitigation

Since the Project contains many areas that contain hazardous materials (BrightFields Inc., 2023), at least 18 inches of clean cap over contaminated soils will be placed on top of the transportation infrastructure improvements before any construction will take place. During the construction phase, exposed areas will

be stabilized with non-invasive plants to reduce potential runoff impacts and invasive species colonization. The Project is proposing green space and tree plantings once construction is complete. These non-invasive plantings would provide habitat for wildlife, reduce the amount of invasive exotic species, reduce the amount of runoff from impervious surfaces, help provide cooling, and filter groundwater. As discussed in **Section II.B.4**, proposed enhancement of existing wetlands for mitigation purposes involves the removal of invasive species like *Phragmites australis.* Proposed non-invasive species plantings within the wetlands will reduce invasive cover throughout the project study area. After construction at the Project study area is completed, the Project will implement a trash BMP to prevent trash from accumulating due to pedestrian use. The trash BMP will be modeled off the successful trash elimination efforts being used on the Riverwalk on the west bank of the Christina River and includes trash cans and regular trash collection. These efforts would also prevent chemical pollutants and physical debris from entering aquatic resources on and adjacent to the site, thereby protecting them from degradation.

G. Terrestrial Wildlife

1. Regulatory Context and Methods

Terrestrial wildlife in the Project study area is protected under several federal and state provisions. The protection of all migratory birds is governed by the Migratory Bird Treaty Act (**16 U.S.C. 703-712**)**,** under which it is illegal to “take, kill, possess, transport, or import migratory birds or any part, nest, or egg of any such bird" unless authorized by a valid permit (**16 U.S.C. 703**). A list of migratory birds protected by the Migratory Bird Treaty Act (MBTA) is included in **50 CFR 10.13** and includes most of the species found in Delaware.

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer a listed species under the Endangered Species Act (ESA), it is still protected under the Bald and Golden Eagle Protection Act (**16 U.S.C. 668-668d**). The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, purchase, barter, transport, export, or import of any bald or golden eagle (alive or dead), including any part (such as feathers), nest, or egg without a valid permit issued by the Secretary of the Interior (**50 CFR 22.3**). The Act prohibits disturbance of any bald or golden eagle. As defined in **50 CFR 22.3**, to “disturb” includes agitating or bothering “to a degree that causes, or is likely to cause, based on scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

The conservation of terrestrial wildlife is managed in Delaware through the implementation of State Wildlife Action Plans (SWAPs). SWAPs were initiated by the US Fish and Wildlife Service (USFWS) in 2005, requiring all 50 states and the District of Columbia to create a conservation plan for wildlife species and to determine those Species of Greatest Conservation Need (SGCN) as a condition for receiving funding through the State and Tribal Wildlife Grants program. The states participating in the SWAP program were then eligible to receive funding through the State and Tribal Wildlife Grants program to assist with the conservation of at-risk species before they become threatened or endangered. The SWAP program must be updated every 10 years, and Delaware updated its initial SWAP in 2015 (DNREC, 2015). These documents identify each state’s SGCN and identify conservation goals to keep these species from becoming threatened or endangered.

Data on wildlife habitat and documented wildlife species within the Project study area were collected through analysis of aerial imagery of vegetative cover, incidental observations of wildlife species and related habitat made during various natural resource field investigations (e.g., wetland delineations), and data provided by the resource agencies.

2. Existing Conditions

Composition of terrestrial wildlife species is limited by the highly urbanized and disturbed environments within the Project study area. The majority of the Project study area contains barren land, old fields, disturbed hedgerows/small forests, and tidal shorelines (**Section II.F.2**).

As noted in **Section II.B.2 Waters of the US and Subaqueous Lands, Including Wetlands** and **Section II.F.2, Vegetation and Terrestrial Habitat**, the smaller remnant forest patches and old fields within Project study area are primarily disturbed and contain numerous invasive vines, shrubs, and trees. These disturbed remnant forests and old fields surrounded by development provide marginal habitat for edge adapted and disturbance tolerant wildlife species. More disturbance tolerant species observed within the study area include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), groundhog (*Marmota monax*), red fox (*Vulpes vulpes*), and gray squirrel (*Sciurus carolinensis*). In addition, aquatic insect species such as the Eastern pondhawk (*Erythemis simplicicollis*), mollusks, and various shorebirds are located along the tidal shoreline.

3. Environmental Effects

As the majority of the Project study area consists of barren area, old fields, and hedgerow/fragmented forest habitats, and tidal shorelines, there would be displacement of some edge specialized species, but not a substantial loss of wildlife habitat due to the construction of the Project.

Bald eagles are not expected to be negatively affected by the Project, as no bald eagle nests have been identified by USFWS within the Project study area. Since bald eagle populations are expanding, and this Project is located along the Christina River, it is possible that additional nesting pairs may utilize areas near the Project study area in the future.

As the transportation improvement areas will be capped with a minimum of 18 inches of clean soil prior to construction, there would not be any remaining marginal forest habitat, therefore, some less motile wildlife could be killed during construction and other more motile species will be shifted away from the new construction, potentially into already occupied territories requiring further movement into unoccupied suitable habitat, if available.

4. Minimization and Mitigation

Prior to construction, the transportation improvement areas would be completely cleared and capped with a minimum of 18 inches of soil because of hazardous materials on site; therefore, there is no way to avoid impacts to edge and disturbance acclimated species located on site. However, the abatement of hazardous materials should improve habitat for wildlife where it can recolonize. After construction, the Project is proposing green space and tree plantings that will provide some available habitat for wildlife. In addition, the use of erosion and sediment control best management practices will help to minimize pollutant runoff into surrounding wildlife habitat.

H. Rare, Threatened, and Endangered Species

1. Regulatory Context and Methods

Section 7 of the ESA of 1973 (**16 U.S.C. Sections 1531-1544**) requires all federal agencies to use their authorities to conserve endangered and threatened species in consultation with the USFWS and/or National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). **Section 7(a)(2) (16 U.S.C. § 1536)** establishes substantive requirements for federal agencies to insure, in consultation with the USFWS, any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify designated

critical habitat. The Section 7 implementing regulations (**50 CFR Part 402**) specify how federal agencies must fulfill their Section 7(a)(2) consultation requirements. The USFWS administers the ESA for all terrestrial and nontidal freshwater species, while the NMFS administers the ESA for marine and anadromous species or critical habitat.

The DNREC Species Conservation and Research Program (SCRP) under the Division of Fish and Wildlife regulates activities that impact plants and wildlife, including their habitats under the Delaware Administrative Code (**7 Del. Code § 601**). DNREC maintains a list of state rare, threatened, and endangered species, which includes those species of fish and wildlife designated by the DNREC Division of Fish and Wildlife as seriously threatened with extinction. Any federal, state, local, or private constructing agency is required to cooperate and consult with DNREC regarding: the presence of listed species within a Project area, field verification of habitat and/or populations of listed species, and avoidance and minimization efforts, as appropriate.

The Information for Planning and Consultation (IPaC) tool was used to assess the potential presence of federally listed species under the jurisdiction of the USFWS. This online resource allows an assessment of potential listed species within an estimated action area. The IPaC official species list for the Chesapeake Bay Ecological Services field offices of the USFWS were originally accessed on July 16, 2023. NOAA Section 7 mapping tools were used to assess potential impacts to protected marine species. See results below.

2. Existing Conditions

Federal Species Managed by USFWS

The Information for Planning and Consultation (IPaC) tool was used to assess the potential presence of Federally listed species under the jurisdiction of the USFWS on May 14, 2024 with a final determination made on May 21, 2024; the correspondence is included in **Appendix B**. The IPaC Official Species List includes the Northern Long-eared Bat (*Myotis Septentrionalis*), an Endangered species, and the Tricolored Bat (*Perimyotis subflavus*), a Proposed Endangered species, indicating that these species may occur within the Project study area. Based on the IPaC submission and the standing analysis of the Determination Key, the Project was given a "May Affect" determination for the Northern Long-eared bat and further coordination with USFWS was needed.

In an email dated May 21, 2024, USFWS determined the Project is "not likely to adversely affect" the Northern Long-eared bat. There is a proposed rule to list the Tricolored Bat as an endangered species, but a final listing determination is still pending. The Monarch Butterfly (*Danaus plexippus*) is also included on the Official Species List and may be present within the Project study area; however, this species has not yet been listed as Federally threatened. No additional Section 7 requirements are needed for the Tricolored Bat or Monarch Butterfly. The final determination from USFWS is included in **Appendix B**.

Federal Species Managed by NOAA

NOAA Section 7 mapper data indicated that the federally listed Atlantic sturgeon (*Acipenser oxyrinchus*) and the shortnose sturgeon (*Acipenser brevirostrum*) may be present in the Christina River, which intersects the Project study area. The Atlantic and shortnose sturgeon are both found in rivers and coastal waters ranging from Canada to Florida. The Atlantic sturgeon spends most of its lifespan in the ocean and the shortnose sturgeon inhabits estuaries. Both species possess similar traits, however the Atlantic sturgeon is larger, with a longer snout shape growing up to 16 feet long, while the shortnose sturgeon only grows up to 4.5 feet long. Coordination with NOAA Greater Atlantic Regional Fisheries Office (GARFO) is required to prevent adverse effects to these ESA-listed species.

State Species Managed by DNREC

A letter requesting information on rare, threatened, and endangered species was sent to DNREC Division of Fish and Wildlife on August 16, 2023. DNREC indicated in a letter dated September 6, 2023, that there are no records of state-rare or federally listed plants, animals, or natural communities within the Project study area. See summary of suggestions below.

Soil Erosion and Sedimentation

DNREC data indicated that there is a high potential for soil erosion and sedimentation into the Christina River, due to the nature of the Project. It is recommended that appropriate erosion and sediment control measures be taken to minimize potential impacts during construction. For erosion control, DNREC suggests using materials that are biodegradable and do not include plastic, in an effort to reduce wildlife entanglement in plastic netting.

Fisheries

DNREC indicated that several important resident and anadromous fish species such as alewife, blueback herring, American shad, white perch, and possibly striped bass are present within the Christina River. The protection of spawning and nursery habitats and migratory corridors during the spawning season is important in maintaining these fisheries resources. It is recommended that a time of year restriction for no in-water work from March 1st to June 30th is enacted to avoid impacts to these species.

Additionally, DNREC recommends that native species are replanted when possible.

3. Environmental Effects

Federal Species Managed by USFWS

The Build Alternative would remove small, remnant forest patches and hedgerows between the industrial parcels in the Project study area and would modify the grasslands and old fields adjacent to these forest patches and hedgerows. These forest patches and hedgerows qualify as suitable summer habitat for the Northern Long-eared Bat and the Tricolored Bat and their removal may impact bats to a small degree. The Tricolored Bat's suitable summer habitat includes grasslands and old field adjacent to forest and hedgerows. Modification of these areas may also impact the Tricolored Bat to a small degree. Since meadow, wildflower, and pollinator habitats are not present in the Project study area, monarch habitat would not be affected by construction activities even if species listing status changes in the future.

Federal Species Managed by NOAA

NOAA Section 7 mapping data indicated that the Atlantic sturgeon and shortnose sturgeon have the potential to be present in the Christina River within the Project study area. The Project has the potential to impact the sturgeon by causing underwater noise associated with pile driving during the repair to the bulkhead. The construction of the Build Alternative would require driving 66 14" steel H-piles at a rate of 2 piles per day. These piles would be driven in the intertidal zone of the Christina River in 0 to 2 feet of water and the disturbance could last for 33 days. The Project evaluated the noise impacts on the sturgeon using the GARFO Acoustic Tool. The details of the pile driving were entered into the GARFO acoustic tool and it indicates that the noise impact of the installation of a 14" steel H pile in the intertidal zone of the Christina River would be over the minimum disturbance threshold (150 dB) for sturgeon. However, the short duration (90 minutes per pile) and slow rate of pile driving (2 piles per day) indicate that the waterway would be unaffected by noise for 85% of each day construction occurs. Due to the low duration and length of impact, NOAA determined that the Project would have the potential to impact, but not adversely affect, the ESA-listed fish species.

State Species Managed by DNREC

Changes in water quality can impact fishery resources within the Christina River. Construction activities can lead to increased sediment runoff, noise disturbance, altered migratory corridors, and impacts to spawning and overwintering grounds which can influence resident and anadromous fish health and populations. Erosion control measures can lead to wildlife entanglement, especially those containing plastic netting. Construction vehicles and materials could introduce invasive exotic species that could threaten and compete with native species.

4. Minimization and Mitigation

Federal Species Managed by USFWS

Coordination with USFWS on Section 7 consultation is complete, refer to **Appendix B** for a copy of the correspondence. No mitigation is proposed for the candidate species monarch butterfly because no habitat is present within the Project study area. Additionally, it is unlikely that mitigation efforts would be required if the species is uplisted in the future.

Federal Species Managed by NOAA

To minimize effects to RTE species, various Project Design Criterion (PDC) will be implemented. PDCs are impact minimization tactics that aim to control underwater noise, impingement/entrainment and entanglement, water quality/turbidity, habitat alteration and vessel traffic. Detailed PDCs that would be implemented during construction of this Project are listed in **Table 11** and **Appendix B** on the third page of the FHWA GARFO NLAA Program *Appendix A. Verification Form* in the *Project Design Criteria (PDC) Checklist*, including for instance no blasting or use of explosives will occur and work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Table 11: RTE Protection Project Design Criterion

PDC Number	PDC Type	PDC Description
1	General	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
2	General	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
7	General	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.
9	General	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
10	General	No blasting or use of explosives will occur.
11	General	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).
12	Underwater Noise	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* For impact pile driving: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two

PDC Number	PDC Type	PDC Description
		subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. For vibratory pile installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
15	Impingement/ Entertainment and Entanglement	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. Note: We consider excavating a smaller scale form of mechanical dredging.
16	Impingement/ Entertainment and Entanglement	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. Note: We consider excavating a smaller scale form of mechanical dredging.
17	Impingement/ Entertainment and Entanglement	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
18	Impingement/ Entertainment and Entanglement	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA- listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
19	Impingement/ Entertainment and Entanglement	No new permanent surface water withdrawal, water intakes, or water diversions.
20	Impingement/ Entertainment and Entanglement	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
21	Impingement/ Entertainment and Entanglement	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.
23	Water Quality/Turbidity	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
24	Water Quality/Turbidity	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
25	Water Quality/Turbidity	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be

PDC Number	PDC Type	PDC Description
		present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).
26	Water Quality/Turbidity	Minimize all new waterward encroachment and permanent fill.
29	Vessel Traffic	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
31	Vessel Traffic	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
32	Vessel Traffic	The project must not result in the permanent net increase of commercial vessels.

As a result of implementation of all the PDCs above, programmatic consultation with NOAA GARFO was concluded on July 17, 2023, with a not likely to adversely affect decision for the Atlantic sturgeon and shortnose sturgeon. Refer to **Appendix B** for copies of the correspondence.

State Species Managed by DNREC

A time-of-year (TOY) restriction for construction activities will be enacted to minimize impacts to anadromous fish species. No in-water work will occur during the spawning season of March 1st to June 30th. Appropriate erosion, sediment, and turbidity controls will be implemented during construction to reduce potential runoff into the Christina River. Erosion control BMPs will be selected that will not entangle wildlife. Construction crews will keep vehicles and equipment clean to limit the likelihood of introducing invasive exotic species to the Project study area.

I. Aquatic Biota

1. Regulatory Context and Methods

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the Fish and Wildlife Coordination Act (FWCA) protect some of the fish and shellfish species that inhabit the Christina River. Under the MSFCMA, Essential Fish Habitat (EFH) is protected from adverse effects. Adverse effects are defined as any direct or indirect effect that reduces the quality and quantity of the habitat and range from large-scale ocean uses to small-scale Projects along the coast. Under the Delaware Administrative Code (**7 Del. Admin Code 7504, Section 4.10.1.6.1**), erosion sediment control practices are required to follow standards that protect aquatic biota, wetlands, and nearshore shallow water habitat.

Field crews made observations of aquatic life within the Christina River, tidal wetlands, and tidal tributaries during investigations of the study area. The presence of aquatic life in smaller channels and wetlands was less common and centered around those areas where surface water appeared to be the most constant. NOAA EFH mapping was also reviewed to identify fish species with essential fish habitat within the Project study area.

2. Existing Conditions

Major impacts to aquatic biota have historically been the result of a decrease in water due to the development of water resources as a source of drinking water, agricultural use and other domestic purposes. Aquatic biota within the Project study area have been historically affected through population growth, industrial and urban development, and harvesting of natural resources since the 1800's. The condition of aquatic habitats is moderate throughout the Project study area.

Aquatic life observed during field investigations of the Project study area included species of fish, birds and mollusks that live in and around these freshwater systems, including the Eastern pondhawk (*Erythemis simplicicollis*), which has aquatic larvae, and freshwater clams (*Corbicula sp.)*.

Within the Christina River portion of the Project study area, EFH was identified. Essential Fish Habitat Mapper results were provided to FHWA for consultation and are included in **Appendix B**.

3. Environmental Effects

The Build Alternative has the potential to affect aquatic biota due to direct and indirect impacts to tidal waters and wetlands. Permanent impacts to aquatic biota may include mortality of aquatic organisms during construction and permanent loss of natural habitat from grading and placement of riprap to create stable outfalls. Aquatic life passage will not be affected by construction since the impacted channels do not extend beyond the Project study area. Temporary impacts to aquatic biota could result from minor sediment discharges during construction, however these impacts will be limited by Erosion and Sediment Control best practices. Construction activities may cause noise and vibration that could temporarily impact aquatic biota. Affects to rare, threatened, and endangered aquatic biota are covered in **Section II.H**.

4. Minimization and Mitigation

Aquatic biota is likely to be minimally affected within the Project study area. Potential water quality impacts from construction would be minimized through strict adherence to Delaware mandated erosion and sediment controls. Impacts following construction would be minimized through development of a non-erosive conveyance. Impacts to EFH will be avoided by adherence to DNREC TOY restrictions, reducing underwater noise using a soft start pile driving system, minimizing water quality impacts through use of erosion and sediment control BMPs, limiting construction debris, and minimizing habitat impacts by reducing the channel size to the minimum size that still allows non-erosive conveyance. The EFH project criteria summarized above is included in the programmatic consultation with NOAA GARFO included in agency correspondence in **Appendix B**. NOAA Fisheries provided a “May Affect” final EFH consultation determination via a Federal Interagency Comment Form signed on May 14, 2024, which is included in **Appendix B**. The Project commits to the following four Essential Fish Habitat Conservation Recommendations provided by NOAA Fisheries Habitat and Ecosystem Services Division (HESD):

1. Restrict in-water work between March 1 and June 30 to minimize impacts to anadromous fish migration and spawning.
2. Waterborne equipment associated with construction (e.g. barges) should float at all stages of the tide.
3. All work that may suspend sediment in the water column should be enclosed within a turbidity curtain.
4. Provide compensatory mitigation for all intertidal and subtidal impacts. A draft mitigation plan should be provided to NOAA Fisheries HESD for review and approval.

Furthermore, the City will provide NOAA HESD with the draft mitigation plan and a copy of the Department of the Army permit pursuant to Rivers and Harbors Act Section 10 and Clean Water Act Section 404 prior to construction.

J. Unique and Sensitive Areas

1. Regulatory Context and Methods

Unique and Sensitive Areas are ecological resources designated by state and local municipalities that do not fall within the regulations of other environmental resources such as waterways or forests. In Delaware, there are a variety of areas that could be identified as Unique and Sensitive. These would include state resource areas, state wildlife area lands, greenways and trails, sensitive wildlife habitat, private and public open spaces, designated natural areas, coastal zone management areas, and green infrastructure. Various resources were used to identify Unique and Sensitive Areas including GIS databases, and several website searches including DNREC and the City of Wilmington Parks and Recreation.

2. Existing Conditions

The Project study area does not fall within any protected Unique and Sensitive Areas.

The Project study area falls within the Christina-Brandywine River Remediation Restoration Resilience (CBR4) Project boundary (CRB4, 2023). While this is not a protected resource, the CBR4 Project is an initiative to address legacy toxic contamination, restore the native ecology and prepare for the changing climate as well as other threats to river health in the lower Christina River and tidal Brandywine River. The CBR4 Project is currently still in the planning stages.

3. Environmental Effects

None of the Project study area is within a protected Unique and Sensitive Area, therefore there would be no impacts to these resources.

4. Minimization and Mitigation

Since none of the Project study area is within a protected Unique and Sensitive Area, avoid, minimize, or mitigation these resources would not be needed. The hazardous materials remediation would benefit the CRB4 Project by reducing additional contamination from toxic runoff into the Christina River.

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Appendix A – Figures

Project Location

Wilmington Riverfront Transportation Infrastructure

Wilmington, DE

Figure 1: Vicinity Map

February 2024

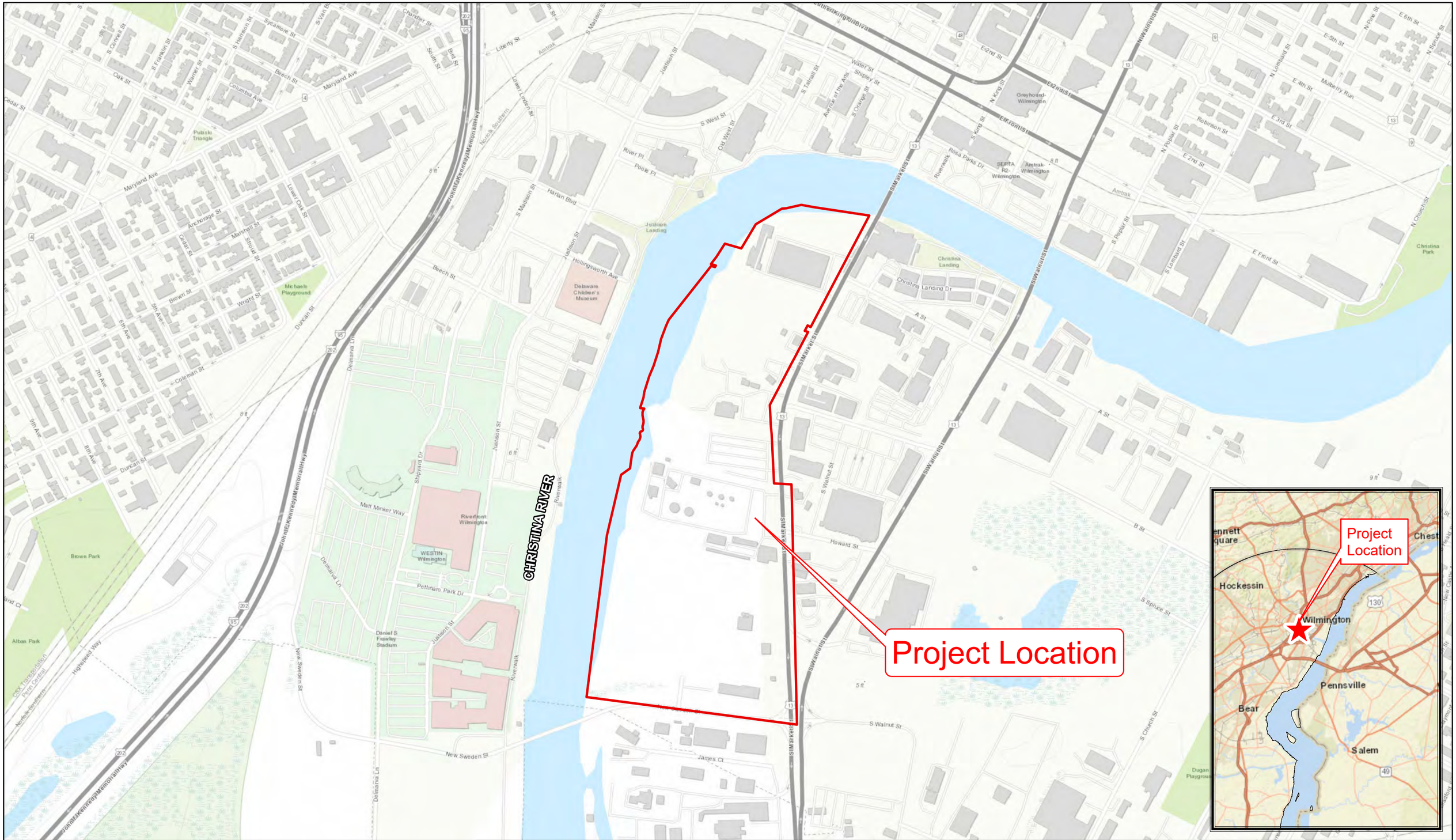
LEGEND

Project Study Area

N

0 500 1,000 2,000 Feet

1 inch = 1,000 feet



Wilmington Riverfront Transportation Infrastructure

Wilmington, DE

Figure 2: USGS Topo Map

February 2024

LEGEND

Wetland Investigation Area

N

0 250 500 1,000 Feet

1 inch = 500 feet

Wilmington Riverfront Transportation Infrastructure
Wilmington, DE
Figure 3: Location Map
February 2024

LEGEND

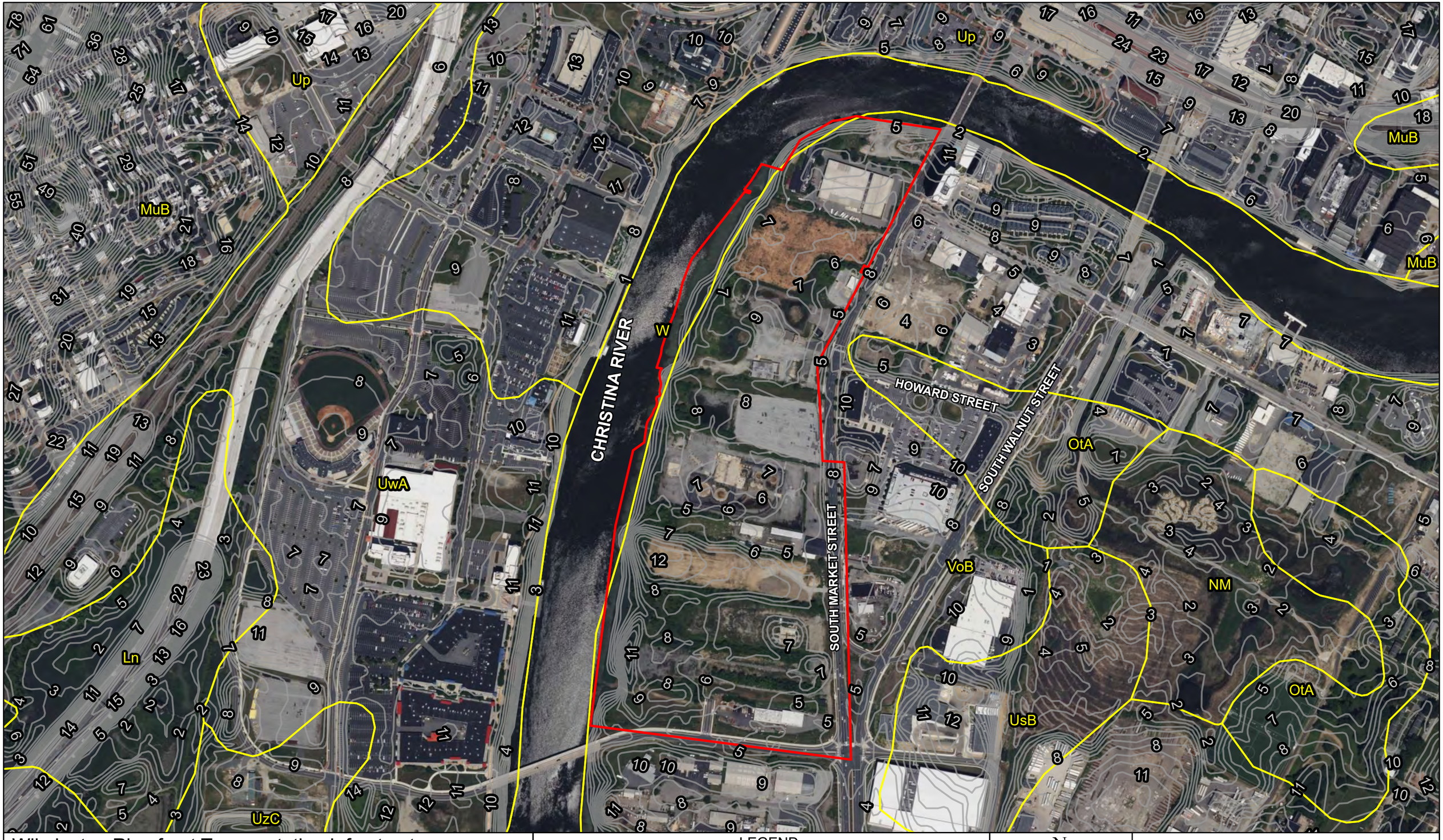
Wetland Investigation Area

Parcel Boundaries

N

0 200 400 800 Feet

1 inch = 400 feet



Wilmington Riverfront Transportation Infrastructure

Wilmington, DE

Figure 4: Soils and Contours Map

February 2024

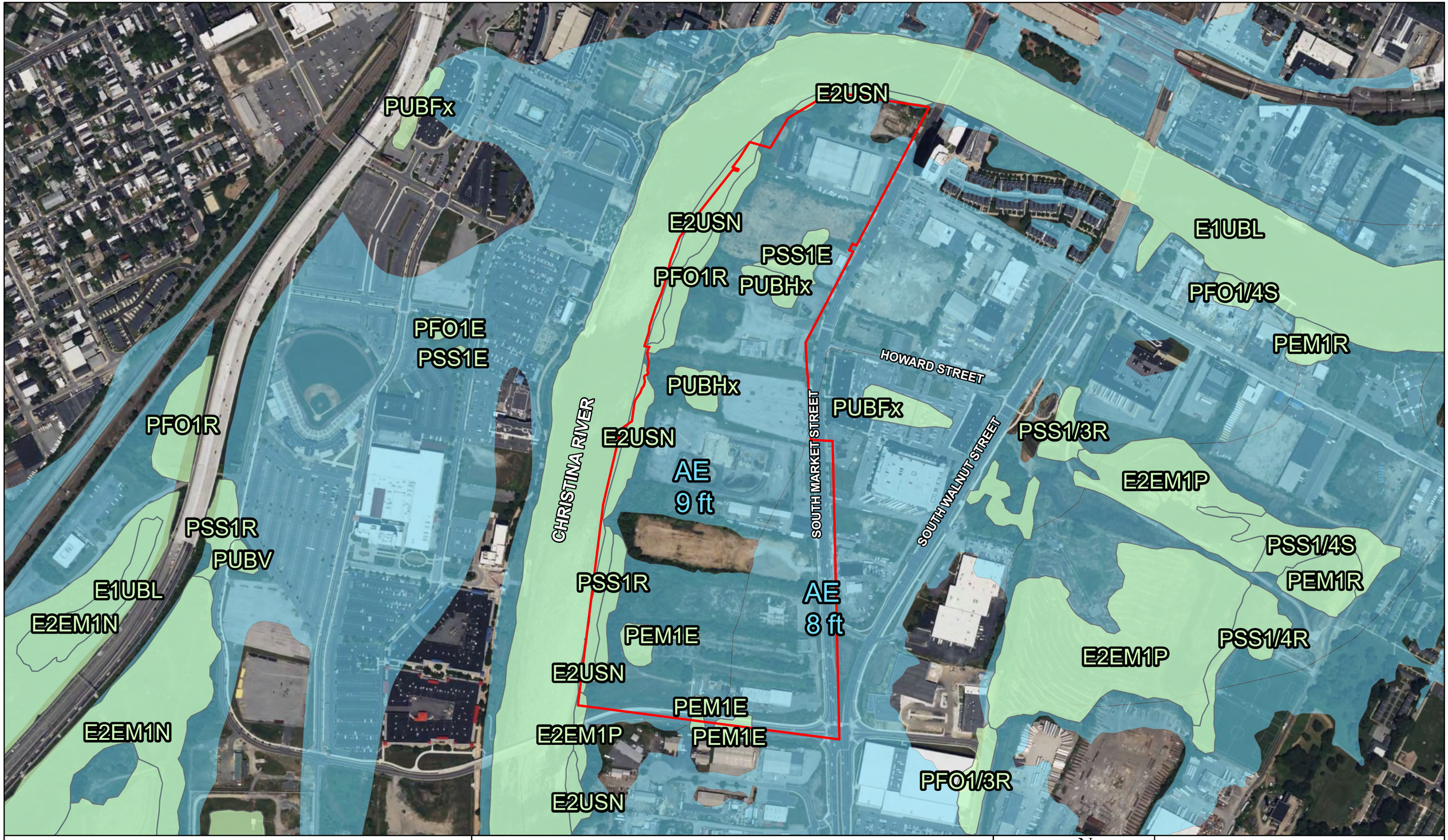
LEGEND

- Wetland Investigation Area
- Soil Boundary
- Contours (1')

N

0 300 600 1,200 Feet

1 inch = 300 feet



Wilmington Riverfront Transportation Infrastructure
Wilmington, DE
Figure 5: Water Resources Map
February 2024

LEGEND

- Wetland Investigation Area
- DE NWI
- FEMA 100-Year Floodplain

N

0 200 400 800 Feet

1 inch = 400 feet

Wilmington Riverfront Transportation Infrastructure
Wilmington, DE

Figure 6: Sea Level Rise Map
February 2024

LEGEND

- Wetland Investigation Area
- Coastal Inundation 1 ft
- Coastal Inundation 2 ft
- Coastal Inundation 3 ft
- Coastal Inundation 4 ft
- Coastal Inundation 5 ft

N

0 200 400 800 Feet

1 inch = 400 feet

South Wilmington Infrastructure Improvements

Wilmington, DE

Figure 7: DNREC 1988 State Tidal Wetland Boundary and Wetland Delineation Map

April 2023

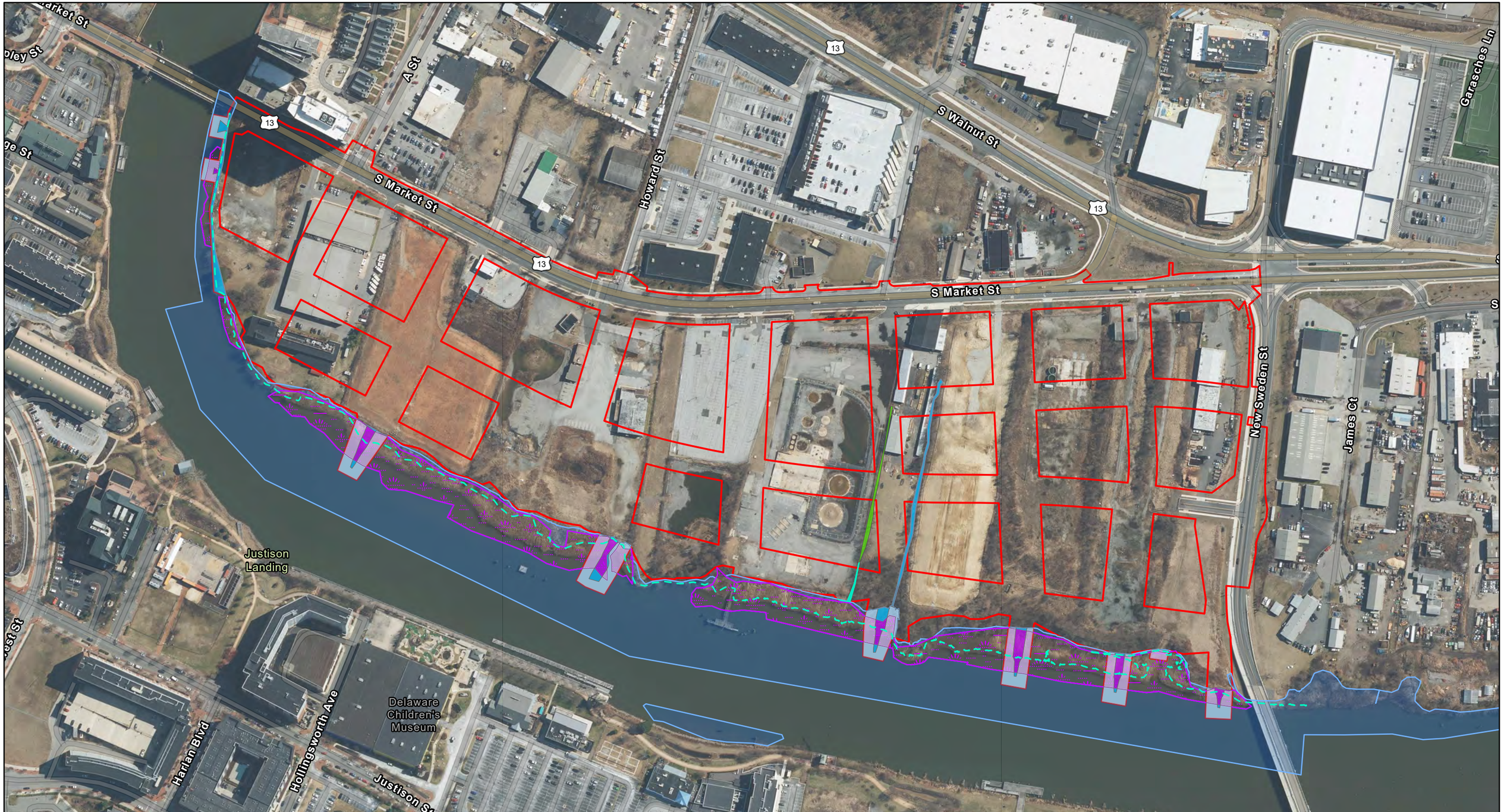
LEGEND

- DNREC State Tidal Wetland Boundary
- Wetland Investigation Area
- High Tide Line
- Wetland Feature
- Waters Feature

N

0 120 240 480 Feet

1:3,000



Wilmington Riverfront Transportation Infrastructure

Wilmington, DE

Figure 8: USACE Impacts
Waters and Wetlands Temporary
and Permanent Impacts Map

February 2024

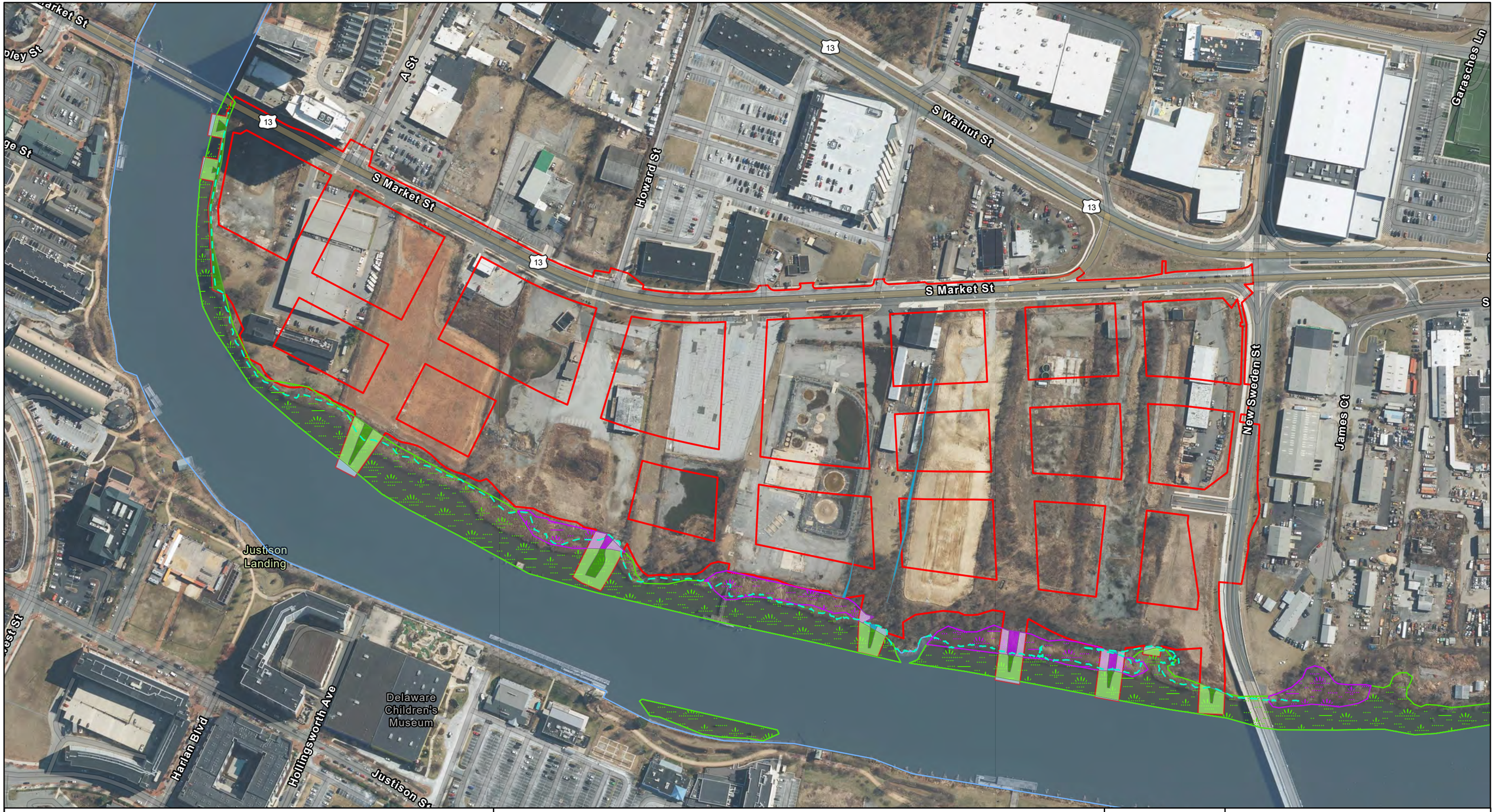
LEGEND

- Infrastructure Improvement Area
- Mean High Water Line
- USACE Tidal Waters
- USACE Tidal Wetlands
- USACE Tidal Waters Temporary Impact
- USACE Tidal Waters Permanent Impact
- USACE Nontidal Waters Permanent Impact
- USACE Tidal Wetlands Temporary Impact
- USACE Tidal Wetlands Permanent Impact
- USACE Nontidal Wetlands Permanent Impact

N

0 120 240 480 Feet

1:3,000



Wilmington Riverfront Transportation Infrastructure

Wilmington, DE

Figure 9: DNREC Impacts
Waters and Wetlands Temporary
and Permanent Impacts Map

February 2024

LEGEND

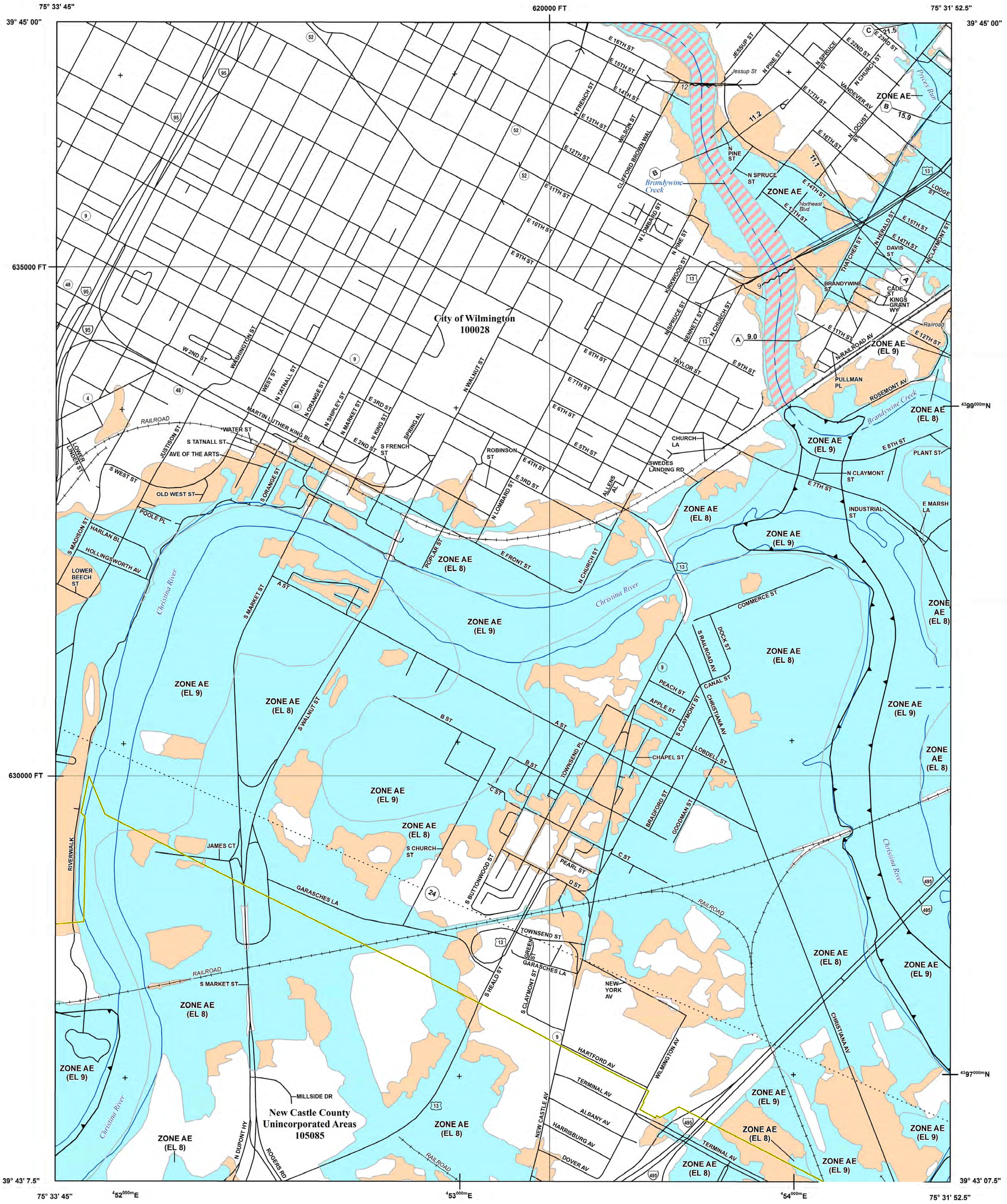
- Infrastructure Improvement Area
- Mean High Water Line
- DNREC Subaqueous lands
- DNREC Tidal Marsh Wetlands
- DNREC Tidal Mudflat Wetlands
- DNREC Subaqueous Lands Temporary Impact
- DNREC Subaqueous Lands Permanent Impact
- DNREC Tidal Marsh Wetlands Temporary Impact
- DNREC Tidal Marsh Wetlands Permanent Impact
- DNREC Tidal Mudflat Wetlands Temporary Impact
- DNREC Tidal Mudflat Wetlands Permanent Impact

N

0 120 240 480 Feet

1:3,000

Figure 10: FEMA Flood Hazard Map



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study (FIS) Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by New Castle County GIS Department in 2015. For information about base maps, refer to Section 6.2 "Base Map" in the FIS Report.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

N

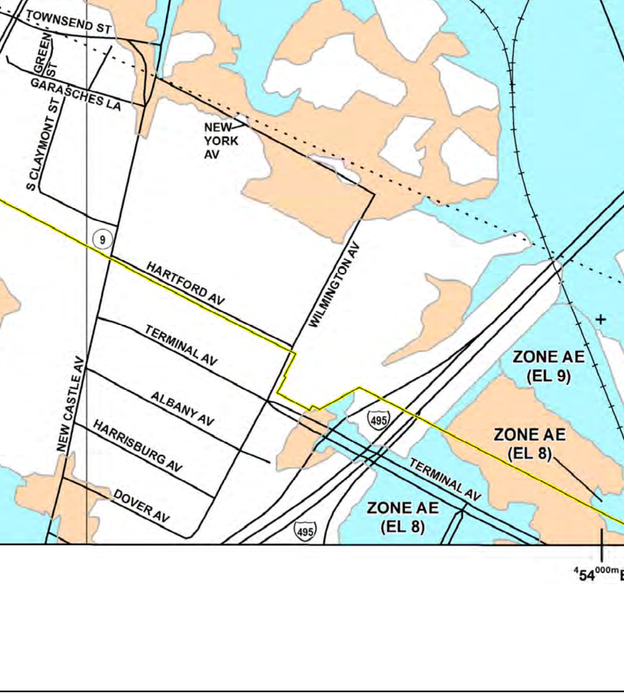
Map Projection:
NAD 1983 StatePlane Delaware FIPS 0700 Feet;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

NEW CASTLE COUNTY, DELAWARE
and Incorporated Areas

PANEL 156 OF 0475

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW CASTLE COUNTY	105085	0156	L
WILMINGTON, CITY OF	100028	0156	L

FEMA

National Flood Insurance Program

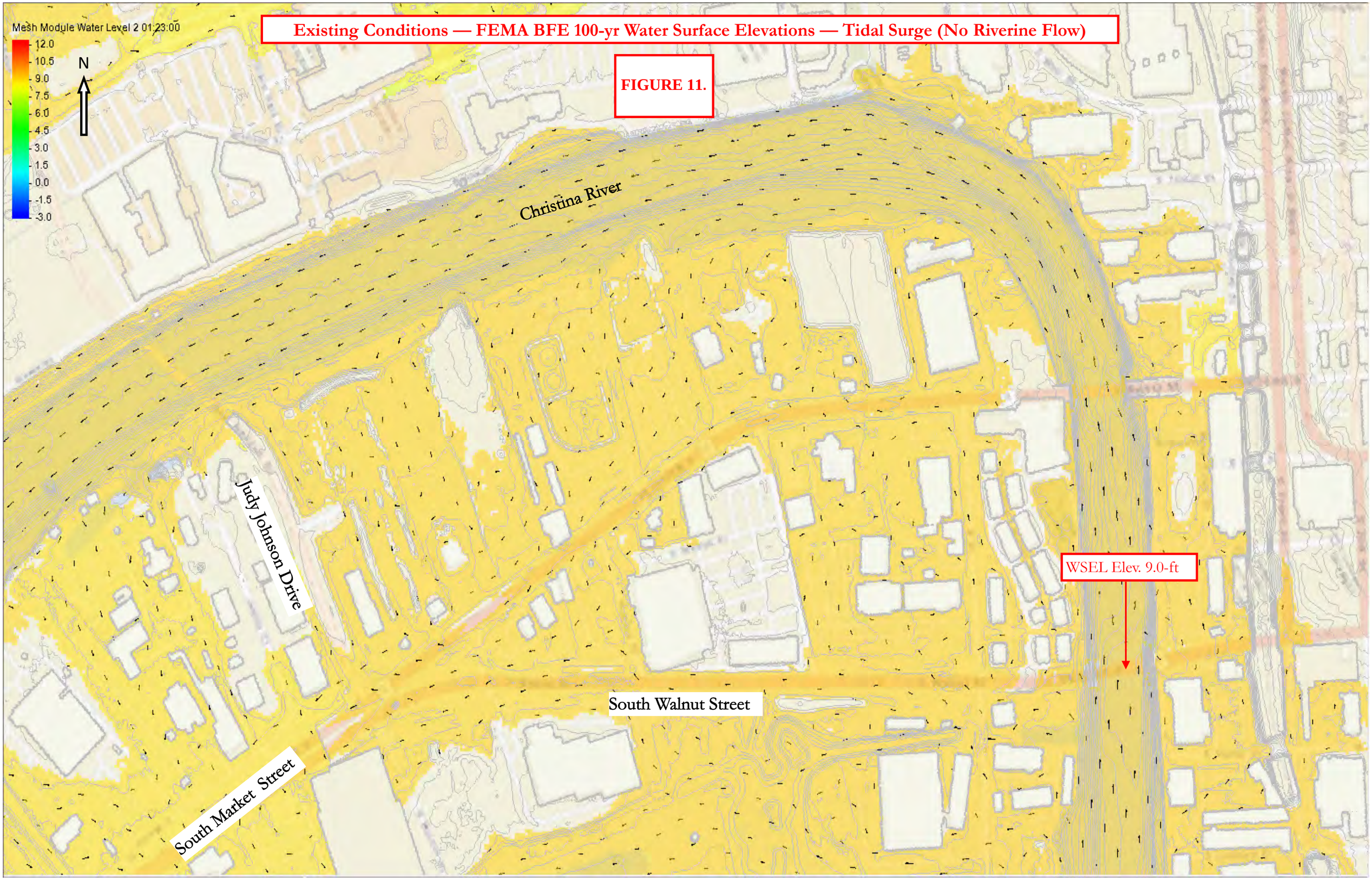
VERSION NUMBER
2.3.3.3

MAP NUMBER
10003C0156L

MAP REVISED
JANUARY 22, 2020

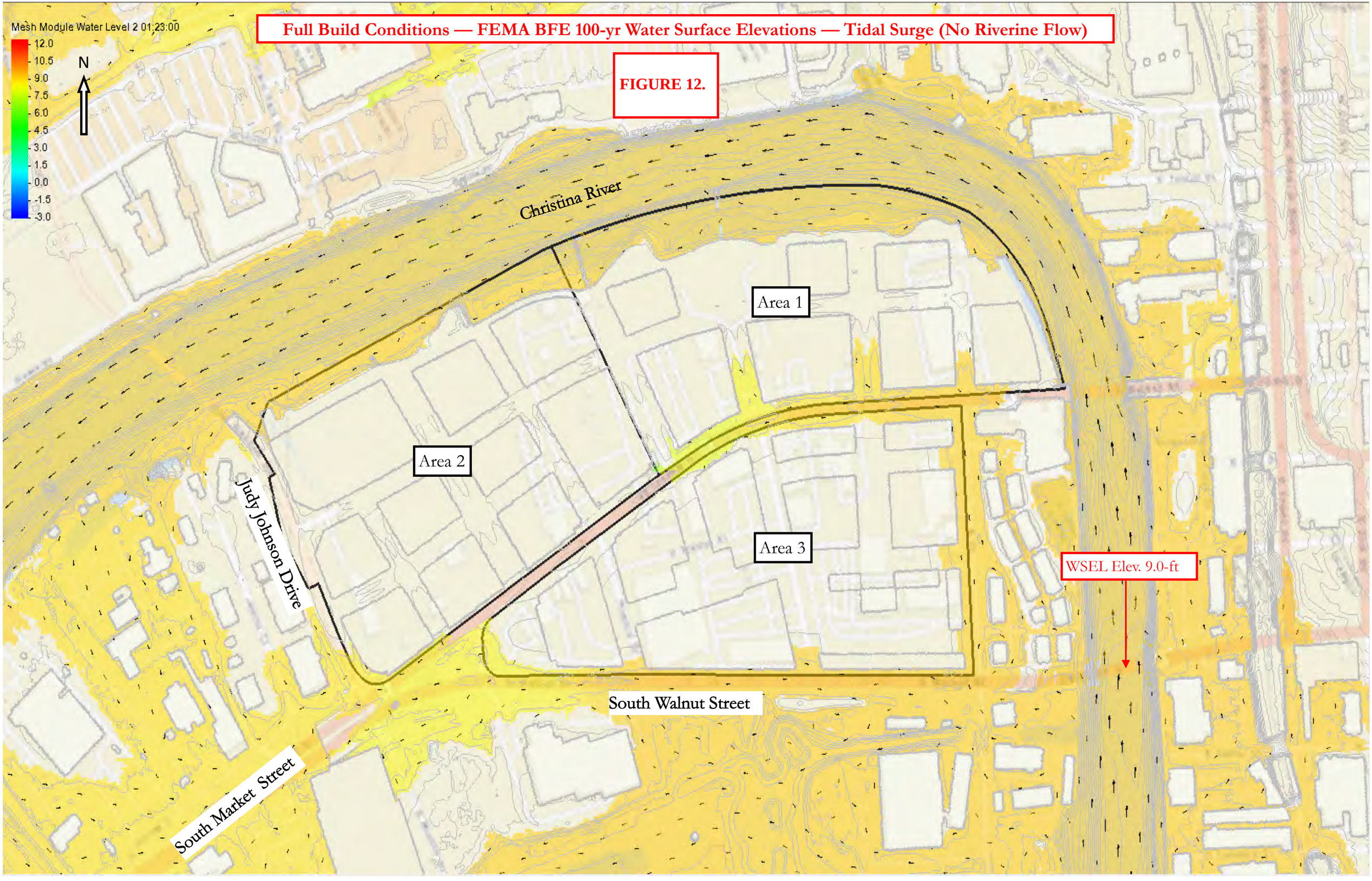
Existing Conditions — FEMA BFE 100-yr Water Surface Elevations — Tidal Surge (No Riverine Flow)

FIGURE 11.



Full Build Conditions — FEMA BFE 100-yr Water Surface Elevations — Tidal Surge (No Riverine Flow)

FIGURE 12.



Appendix B – Agency Correspondence

U.S. Department of Homeland Security
United States Coast Guard

Commander
United States Coast Guard
Fifth Coast Guard District

431 Crawford Street
Portsmouth, VA 23704-5004
Staff Symbol: dpb
Phone: (757) 398-6222
Fax: (757) 398-6334
Email: Hal.R.Pitts@uscg.mil or
CGDFiveBridges@uscg.mil

16591
23 JAN 2024

Ms. Rebecca Ledebohm
Federal Highway Administration
1201 College Park Drive, Suite 102
Dover, DE 19904

Dear Ms. Ledebohm:

The Coast Guard has cancelled the bridge permitting project for the proposed pedestrian fixed bridge (Riverwalk) in conjunction with the South Market Street Redevelopment Project, since no portion of the Riverwalk will be constructed on or over the Christina River, at Wilmington, New Castle County, DE. This decision is based on the enclosed project graphic dated January 2024, and your email dated January 23, 2024.

The Coast Guard hereby rescinds our acceptance as a cooperating agency/consulting party for this Federal undertaking as contained in my letter dated January 11, 2024.

Please contact Mr. Hal R. Pitts, project officer, at the above telephone number or email address if you have any questions.

Sincerely,

HAL R. PITTS
Bridge Program Manager
By direction

Encl: (1) South Market Street Redevelopment Project graphic dated January 2024

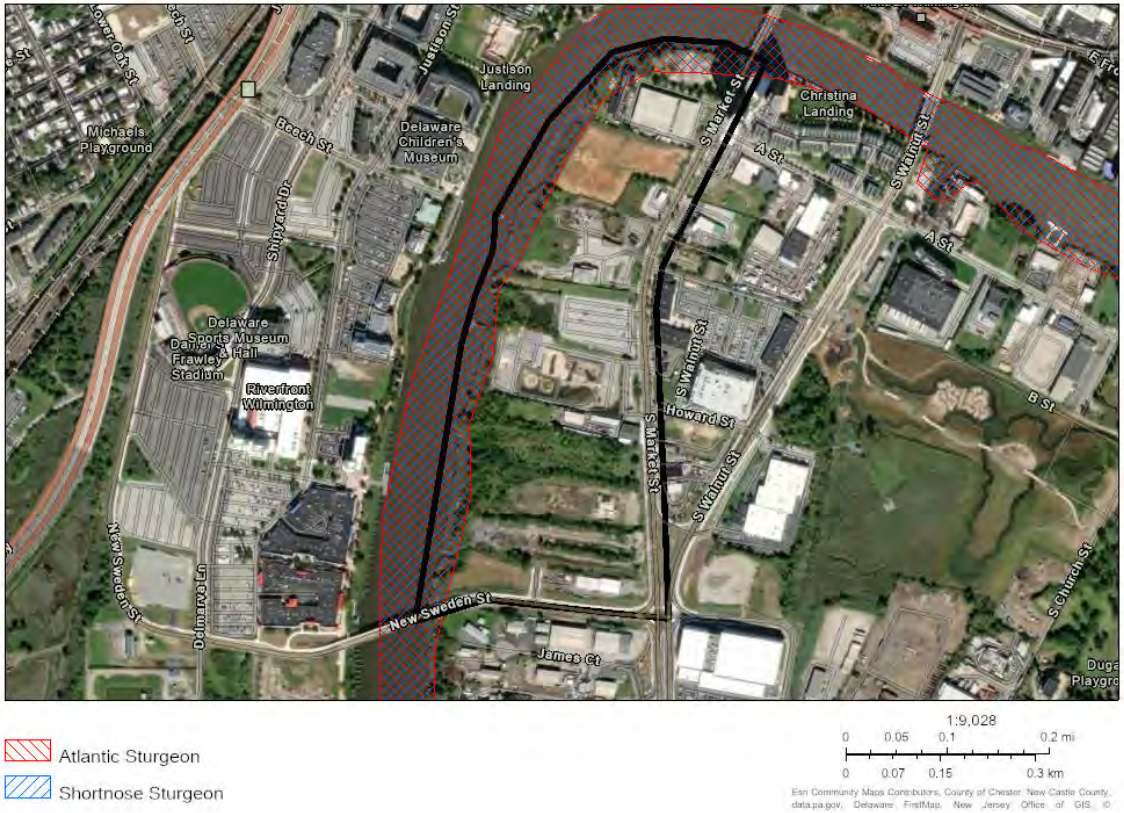
Copy: CG Sector Delaware Bay, Waterways Management
U. S. Army Corps of Engineers, Baltimore District
Federal Highways Administration, Dover, DE

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 3,092.95 acres

Aug 15 2023 7:43:22 Eastern Daylight Time



Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	5	776.10	N/A
Shortnose Sturgeon	5	776.10	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	0	0	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	0	0	N/A

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	ANS_DEL_PYL_MAF	Atlantic sturgeon	Post Yolk-sac Larvae	Migrating & Foraging	Delaware River	04/01	09/30	N/A	N/A	155.22
2	ANS_DEL_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	Delaware River	03/15	11/30	N/A	N/A	155.22
3	ANS_DEL_YOY_MAF	Atlantic sturgeon	Young of year	Migrating & Foraging	Delaware River	01/01	12/31	N/A	N/A	155.22
4	ANS_DEL_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	Delaware River	03/15	11/30	N/A	N/A	155.22
5	ANS_DEL_JUV_MAF	Atlantic sturgeon	Juvenile	Migrating & Foraging	Delaware River	01/01	12/31	N/A	N/A	155.22

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	SNS_DEL_YOY_MAF	Shortnose sturgeon	Young of year	Migrating & Foraging	Delaware River	01/01	12/31	N/A	N/A	155.22
2	SNS_DEL_PYL_MAF	Shortnose sturgeon	Post Yolk-sac Larvae	Migrating & Foraging	Delaware River	03/15	07/31	N/A	N/A	155.22
3	SNS_DEL_JUV_WIN	Shortnose sturgeon	Juvenile	Overwintering	Delaware River	11/01	03/31	N/A	N/A	155.22
4	SNS_DEL_JUV_MAF	Shortnose sturgeon	Juvenile	Migrating & Foraging	Delaware River	01/01	12/31	N/A	N/A	155.22
5	SNS_DEL_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	Delaware River	01/01	12/31	N/A	N/A	155.22

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: March 04, 2024
Project Code: 2023-0105326
Project Name: South Market Street Redevelopment Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
(410) 573-4599

PROJECT SUMMARY

Project Code: 2023-0105326
Project Name: South Market Street Redevelopment Project
Project Type: Mixed-Use Construction
Project Description: The Riverfront Development Corporation (RDC) is proposing to revitalize the South Market Street corridor in South Wilmington, Delaware.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.7321807,-75.55753042180487,14z

Counties: New Castle County, Delaware

ENDANGERED SPECIES ACT SPECIES

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: RK&K
Name: Emily Haight
Address: 700 E Pratt St. Suite 500
City: Baltimore
State: MD
Zip: 21202
Email ehaight@rkk.com
Phone: 3017711196

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

DIRECTOR'S OFFICE

PHONE
(302) 739-9910

September 6, 2023

Emily Haight
Rummel, Klepper & Kahl, LLP
700 East Pratt Street
Suite 500
Baltimore, MD 21202

Re: RK&K 2023 S Market St Redevelopment

Dear Emily:

Thank you for contacting the Species Conservation and Research Program (SCRP) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

State Natural Heritage Site
A review of our database indicates that there are currently no records of state-rare or federally listed plants, animals or natural communities at this project site. As a result, at present, this project does not lie within a State Natural Heritage Site, nor does it lie within a Delaware National Estuarine Research Reserve which are two criteria used to identify "Designated Critical Resource Waters" in the Army Corps of Engineers (ACOE) Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the Army Corps of Engineers for activities on this property.

Soil Erosion and Sedimentation
Due to the nature of this project, there is high potential for soil erosion and sedimentation into the Christina River. Appropriate erosion and sediment control measures should be taken during construction activities to minimize potential impacts to the stream system. For erosion control, we recommend (if feasible) using materials that are biodegradable and that do not include plastic netting or have welded-joint poly-based matting. Wildlife entanglement in rolled erosion control products (RECP), especially those that contain plastic netting, is well documented (references available upon request). For additional information, contact the Sediment and Storm Water Management Program within the Division of Watershed Stewardship at (302) 739-9921.

Fisheries
The Christina River is the largest tidal tributary in northern New Castle County with important resident and migratory anadromous fish species, such as alewife, blueback herring, American shad, white perch, and possibly striped bass. The protection of spawning and nursery habitats and migratory corridors during the spawning season is important in maintaining these fisheries resources. A time of year restriction for no in-water work from **March 1st to June 30th** is recommended to avoid impacts to this species.

Bird Friendly-Windows
Glass collisions from structures kill up to 1 billion birds, annually. We recommend that bird-friendly methods be considered with building plans, in particular bird friendly-windows. The American Bird Conservancy (Glass Collisions: Preventing Bird Window Strikes | ABC (abcbirds.org)) has extensive resources on bird-friendly building guides, including aesthetically pleasing window and lighting solutions at little to no extra cost.

Native Plants
We encourage planting native plants wherever possible. Our program botanist, Bill McAvoy, would gladly assist in drafting a list of plants suitable for this site. Bill can be contacted at (302) 735-8668 or William.McAvoy@delaware.gov.

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me with any questions or if you require additional information.

Sincerely,

Danielle Ellis

Danielle Ellis
Environmental Review Coordinator
Phone: (302) 223-2446
6180 Hay Point Landing Road
Smyrna, DE 19977

(See invoice on next page)

INVOICE - PAYMENT DUE

It is our policy to charge a fee for this environmental review service. This letter constitutes an invoice for $35.00 ($35.00/hour for a minimum of one hour). Please make your check payable to "Delaware Division of Fish and Wildlife" and submit to:

DE Division of Fish and Wildlife
97 Commerce Way
Suite 106
Dover, DE 19901
ATTN: DFW Fiscal

In order for us to properly process your payment, you must reference "RK&K 2023 S Market St Redevelopment**" on your check.**

cc: Division of Fish and Wildlife Fiscal (dnrec_dfw_payroll@delaware.gov); Code to 72900

Appendix A. Verification Form (updated December 10, 2020)

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (DOT) shall submit a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Protected Resources Division (GARFO PRD) at nmfs.gar.esa.section7@noaa.gov with "FHWA GARFO NLAA Program: [Project Title or Number]" in the subject line. **Note:** project design contractors and/or consultants may assist in preparing the form, but only FHWA/DOT staff shall sign off on it on the final page.

Project Activity Type (check all that apply to the entire action):

☐ 1. Bridge repair, demolition, or replacement project
☐ 2. Culvert repair or replacement project
☐ 3. Dock, pier, or waterway access project (includes construction, demolition, and repairs)
☒ 4. Slope stabilization project

Transportation Project Information

Name of Project:	South Market Street Redevelopment Project		
Reinitiation (Yes/No):	No		
State DOT/Program:	FHWA		
DOT ID Code:	N/A		
Contact Person:	Becky Ledebohm		
Phone:	302-734-2378	Email:	rebecca.ledebohm@dot.gov
Project Latitude (e.g., 42.625884):		39.736045	
Project Longitude (e.g., -70.646114):		-75.554423	
Maximum Water Depth (m)		1.0	
Anticipated Project Start Date:	3/1/2024	Anticipated Project End Date:	6/1/2029
City/Town:	Wilmington, DE	Water body:	Christina River
Project/Action Description and Purpose:	The South Market Street Redevelopment Project will provide appropriate infrastructure for vehicles (including public transportation), pedestrians, and bicycles in support of the City of Wilmington Comprehensive Plan for redeveloping the South Market Street Riverfront East area. This Project would construct transportation infrastructure improvements for the South Market Street Riverfront East area of the City, including a comprehensive network of bicycle and pedestrian linkages and safety improvements, that may expand the network of streets on site and may develop a comprehensive network of bicycle and pedestrian linkages and safety improvements. The South Market Street Redevelopment Project is a key component of a larger comprehensive plan, The South Market Street Master Plan, for the planned redevelopment of the eastern Christina Riverfront corridor. The project proposes grading to allow seven stormwater outfalls to reach the Christina River with no rip-rap. There are two locations where rip-rap will be placed to stabilize outfalls through a bulkhead to the Christina River. Construction of a replacement sheet pile bulkhead immediately adjacent to the existing bulkhead will require sheet pile and H-pile driving. Piles will be driven within inter-tidal mudflats in 0-2 feet of water and it is expected that impacts to fish species will be limited, since they will be within this tidal area. While a total area of impact to EFH of 1.20 acres is reported, this is in discrete areas along the banks of the Christina River and includes 1.01 acres of temporary		

ESA-listed species and/or critical habitats in the action area (Check all that apply)

☑	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☐	Atlantic sturgeon critical habitat Indicate which DPS (GOM, NYB, Chesapeake Bay DPSs): Select DPS	☐	Loggerhead sea turtle (Northwest Atlantic DPS)
☑	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (North Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

The following stressors are applicable to the action:

- ■ Underwater Noise
- ☐ Impingement/Entrainment and Entanglement
- ■ Water Quality/Turbidity
- ■ Habitat Alteration
- ☐ Vessel Traffic

Impacts Table

Habitat Alteration		
	Permanent (acres)	Temporary (acres)
Sand (saline)	0.00	0.00
Silt/Mud/Clay (saline)	0.00	0.00
Hard bottom (saline)	0.00	0.00
Submerged Aquatic Vegetation (SAV) (saline)	0.00	0.00
Sand (freshwater)	0.00	0.00
Silt/Mud/Clay (freshwater)	0.19	1.01
Hard bottom (freshwater)	0.00	0.00
Submerged Aquatic Vegetation (SAV) (freshwater)	0.00	0.00
Total amount of habitat alteration	1.20	
In-water Construction Impacts		
	Amount in meters	
Width of water body in action area (m)	125.0	
Stressor category that extends furthest distance into water body (e.g.; underwater noise, turbidity plume)	underwater noise	
Maximum extent of stressor into the water body (m)	125.0	

Project Design Criteria (PDC) Checklist
FHWA/DOT shall incorporate all general PDCs and all applicable PDCs in the appropriate stressor categories. For any PDCs that are not incorporated, additional justification is required for a project to be eligible for the NLAA Program. FHWA/DOT shall check the corresponding box for each PDC that is, or will be, incorporated into the project or indicate if not applicable.

GENERAL PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
☑	☐	2.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
☐	☑	3.	No portion of the proposed action that may affect the GOM DPS of Atlantic salmon will occur in the tidally influenced portion of rivers/streams where their presence is possible from April 10 through November 7. The range of the GOM DPS only occurs in Maine. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied. Please attach best available information (i.e. local fisheries biologist correspondence).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: Apr 1-Aug 31 ii. Southern New England/New York Bight: Mar 15-Aug 31 iii. Chesapeake Bay: Mar 15-Jul 1 and Sep 15-Nov 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	5.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds where dense aggregations are known to occur as follows: i. Gulf of Maine: Oct 15-Apr 30 ii. Southern New England/New York Bight: Nov 1-Mar 15 iii. Chesapeake Bay: Nov 1-Mar 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	6.	Within designated critical habitat for Atlantic sturgeon, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).
☑	☐	7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Yes	N/A	PDC #	PDC Description
☐	☐	8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☑	☐	9.	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
☑	☐	10.	No blasting or use of explosives will occur.
☑	☐	11.	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).

UNDERWATER NOISE PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* <u>For impact pile driving</u>: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. <u>For vibratory pile installation</u>: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.

Yes	N/A	PDC #	PDC Description
☐	☐	13.	If the project includes non-timber piles*, please attach your calculation to this verification form showing that the noise is below the injury thresholds of ESA-listed species in the action area. The GARFO Acoustic Tool can be used as a source, should you not have other information: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic. *Effects from timber and steel sheet piles were analyzed in the NLAA programmatic consultation, so no additional information is necessary.
☐	☐	14.	Any new pile-supported structure must involve the installation of no more than 50 piles (below MHW).

Pile material (e.g., steel pipe, concrete)	Pile diameter/ width (inches)	Number of piles	Installation method (e.g., impact hammer, vibratory start and then impact hammer to depth, drilling)
Steel H-pile	14	66	impact hammer
Steel sheet pile	36	152	vibratory hammer

IMPINGEMENT/ENTRAINMENT AND ENTANGLEMENT PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	15.	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. **Note**: We consider excavating a smaller scale form of mechanical dredging.
☑	☐	16.	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. **Note**: We consider excavating a smaller scale form of mechanical dredging.

Yes	N/A	PDC #	PDC Description
☑	☐	17.	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
☑	☐	18.	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
☑	☐	19.	No new permanent surface water withdrawal, water intakes, or water diversions.
☑	☐	20.	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
☑	☐	21.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.

WATER QUALITY/TURBIDITY PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	22.	In-water offshore disposal may only occur at designated disposal sites that have already been the subject of ESA section 7 consultation with NMFS and where a valid consultation is in place.
☑	☐	23.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☑	☐	24.	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
☑	☐	25.	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).

HABITAT ALTERATION PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	26.	Minimize all new waterward encroachment and permanent fill.
☐	☑	27.	In Atlantic salmon critical habitat, stream simulation design with a minimum span of 1.2 bankfull width will be used in areas with minimal tidal influence. In tidal areas, a design that allows for unimpeded flow will be used (no delay in water entering or exiting the area upstream of the crossing).
☐	☑	28.	In Atlantic salmon critical habitat, no culvert end extensions, invert line culvert rehabilitation, or slipline culvert rehabilitation may occur.

VESSEL TRAFFIC PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	29.	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
☐	☑	30.	Maintain a 1,500-foot buffer between project (i.e., construction) vessels and ESA-listed whales and a 300-foot buffer between project vessels and sea turtles. This also applies to dredge vessels.
☑	☐	31.	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☑	☐	32.	The project must not result in the permanent net increase of commercial vessels.

Justification for NLAA Determination if not Incorporating All PDC
If the project is not in compliance with all of the general and stressor-based PDCs, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using this verification form. Please identify which PDCs your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form. Project modifications must not result in different effects not already considered.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification
2	Noise impacts from the project may affect, but will not adversely affect ESA-listed species. The short duration of pile driving (90 minutes per pile), use of a soft start, vibratory driving of steel sheet piles, and production rate of only 2 piles per day will result in effects to Shortnose and Atlantic Sturgeon that will be insignificant (too small to be meaningfully measured, detected, or evaluated) or extremely unlikely to occur. In addition, pile driving will take place on the intertidal shoreline of the Christina River and noise will be attenuated by the shallow water or no water pile driving conditions. Also, in-water work will not take place from March 1 to June 30, which largely overlaps with the time of year when the most vulnerable early life stages of sturgeon could be present (likely in very small numbers as they are much more common in the mainstem Delaware River compared to the Christina River).
8	The NMFS Multi-species Pile Driving Calculator suggests that the noise levels resulting from the impact driving of 14" steel H-piles will be above 150 dB (the behavioral disturbance threshold for sturgeon) across the entire width of the Christina River. However, the short duration of pile driving and slow pile driving rate indicate that the waterway would be unaffected by noise for 85% of each day that pile driving occurs. In addition, in-water work will not take place from March 1 to June 30, which overlaps with the season of sturgeon spawning migrations in the nearby Delaware River. However, sturgeon may occur year-round in the action area. The width of the water body (125.0 meters) is much greater than the distance of peak injurious noise caused from impact pile driving of the 14" steel H piles (13 meters). The applicant will use a turbidity
13	The NMFS Multi-species Pile Driving Calculator suggests that the noise impact of 14" H-pile installation will be above 150 dB, which is the disturbance threshold for sturgeon. However, the short duration of pile driving, 90 minutes per pile, and the production rate of 2 piles per day, coupled with soft start would allow Shortnose and Atlantic Sturgeon to avoid adverse effects. In addition, pile driving will take place on the intertidal shoreline of the Christina River and noise may be attenuated by the shallow water, turbidity curtains, or no water pile driving conditions. In addition, in-water work will not take place from March 1 to June 30.
14	The 66 14" steel H-piles are proposed to be driven below MHW in the vicinity of the bulkhead. Please see the attached map. Two piles will be driven per work day and construction will span from March 2024 to June 2029. The 66 total H-piles are only a small amount above the PDC which requires no more than 50, and effects from those additional 16 piles are unlikely to be different from those already considered.

FHWA/DOT Verification of Determination (To be filled out by FHWA/DOT staff only)
By submitting this Verification Form, FHWA, or the state DOT as FHWA's designated non-federal representative, indicates that they determined that the proposed activity described above is not likely to adversely affect (NLAA) ESA-listed species or designated critical habitat under NMFS jurisdiction in accordance with the Program, and all effects (direct, indirect, interrelated, and interdependent) are either insignificant (so small they cannot meaningfully be measured, detected, or evaluated) or discountable (extremely unlikely to occur).

☐	In accordance with the FHWA GARFO NLAA Program, we have determined that the action complies with all applicable PDCs and is not likely to adversely affect listed species.
☑	In accordance with the FHWA GARFO NLAA Program, we have determined that the action is not likely to adversely affect listed species per the justifications and/or special conditions provided above.

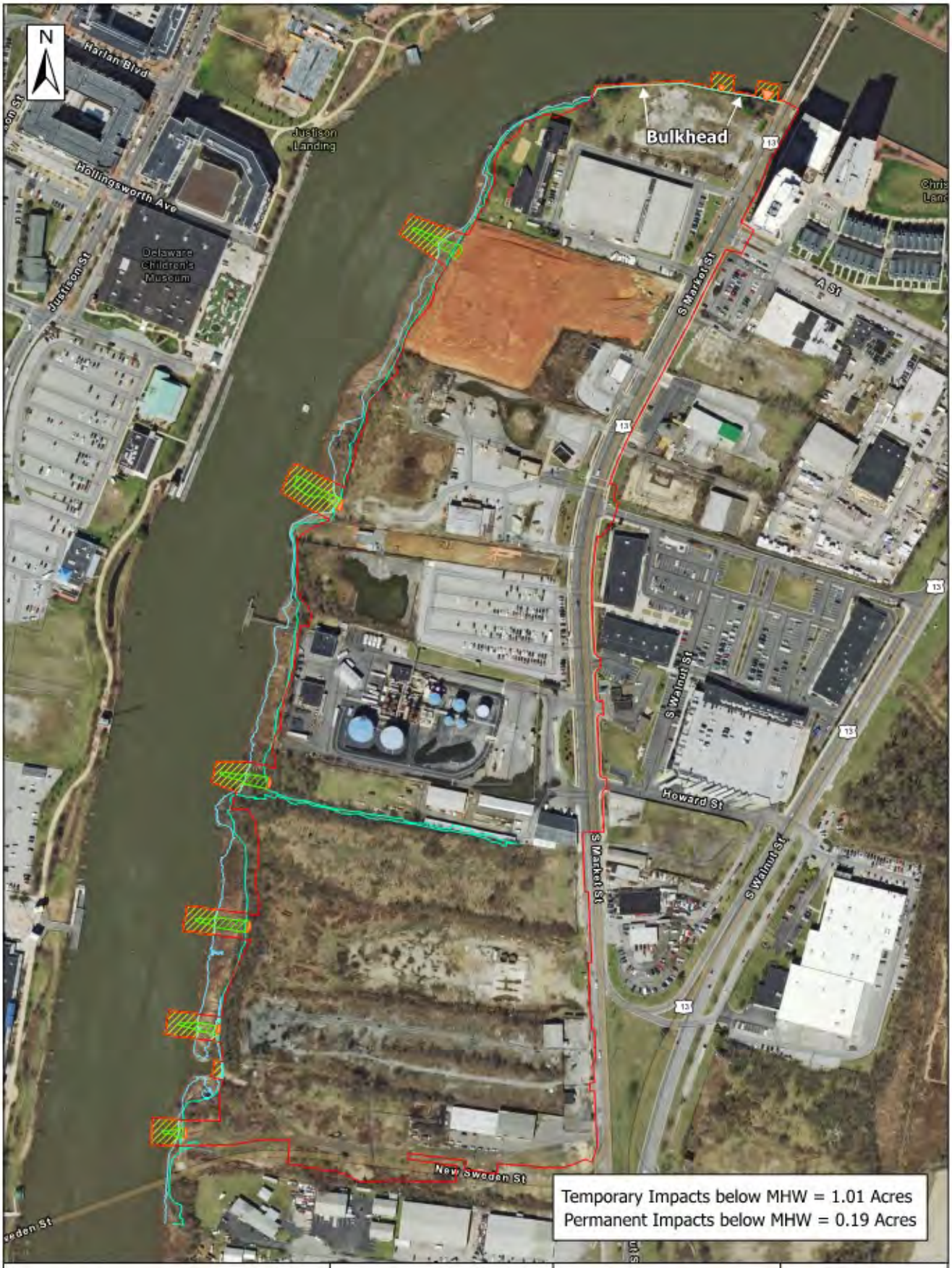
FHWA/DOT Signature:	Date:
REBECCA ELIZABETH-HOEFERT LEDEBOHM Digitally signed by REBECCA ELIZABETH-HOEFERT LEDEBOHM Date: 2023.07.17 10:24:59 -04'00'	07/17/2023

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative.

GARFO PRD Concurrence (To be filled out by GARFO PRD)
After receiving the Verification Form, GARFO PRD will contact FHWA/DOT with any concerns and indicate whether GARFO PRD concurs with FHWA/DOT's determination.

☐	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action complies with all applicable PDCs and is not likely to adversely affect listed species or critical habitat.
☑	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action is not likely to adversely affect listed species or critical habitat per the justifications and/or special conditions provided above.
☐	GARFO PRD does not concur with FHWA/DOT's determination that the action complies with the applicable PDCs (with or without justifications), and recommends an individual Section 7 consultation to be completed independent from the FHWA GARFO NLAA Program.

GARFO PRD Signature:	Date:
BARNHILL.WILLIAM.O.1385732348 Digitally signed by BARNHILL.WILLIAM.O.1385732348 Date: 2023.09.13 15:14:23 -04'00'	09/13/2023



High Tide Line
Mean High Water Line
Limit of Construction
Temporary Impact
Proposed Riprap - Permanent Impact
Proposed Grading - Permanent Impact

0 120 240 480 ft

1 inch = 240 feet

South Market Street Marine Impacts Map

July 2023

RK&K
Responsive People | Creative Solutions

Appendix B. Verification Form

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (state DOT) will email a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (GARFO HCD) at NMFS.GAR.EFH.Consultation@noaa.gov, upon obtaining sufficient information. FHWA/state DOT must receive a response from GARFO HCD or wait at least 30 calendar days to proceed under the programmatic EFH consultation. FHWA will compile the information from the completed Verification Forms for the purposes of tracking and annual monitoring. FHWA/state DOT must include the completed Verification Form as part of a permit application with any other federal agency, such as U.S. Army Corps of Engineers or U.S. Coast Guard, to confirm that EFH consultation is complete.

Project Activity Type

1. ☐Bridge repair, demolition, and replacement
2. ☐Culvert repair and replacement
3. ☐Docks, piers, and waterway access projects
4. ■Slope stabilization

Transportation Project Information

Project Name:	South Market Street Redevelopment Project	Project Number:	
Project Sponsor:	FHWA	Contact Person:	Becky Ledebohm
Email:	rebecca.ledebohm@dot.gov	Phone:	302-734-2378
Latitude (e.g., 42.625884):		39.736045	
Longitude (e.g., -70.646114):		-75.554423	
City/Town, State:	Wilmington, DE	Waterway:	Christina River
Project Description and Purpose:	The purpose of the South Market Street Redevelopment Project is to provide appropriate infrastructure for vehicles (including public transportation), pedestrians, and bicycles in support of the City of Wilmington Comprehensive Plan for redeveloping the South Market Street Riverfront East area. This Project would construct transportation infrastructure improvements for the South Market Street Riverfront East		
Anticipated Project Start Date:	3/1/24	Anticipated Project End Date:	6/1/29
Total area of impact to EFH (in acres): Include locus map with area of impact.		1.20	
Area of impacts to sensitive habitats (in square feet):		No impacts to submerged aquatic vegetation (SAV) or oyster reefs allowed.	
Natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel):		0	
Salt marsh:		0	
Areas containing shellfish (excluding oyster reefs):		0	
Intertidal mudflats:		0	
Area of impact to diadromous fish habitat:		0	

Potential Stressors Caused by the Activity (Check all that apply based on activity type)

☒ Underwater Noise
☐ Impingement/Entrainment and Entanglement
☒ Water Quality/Turbidity
☒ Habitat Alteration
☐ Vessel Traffic

EFH Conservation Recommendation Checklist

FHWA/state DOT will indicate how the project addresses each of the programmatic EFH conservation recommendations, by selecting the appropriate check box and providing a brief explanation where necessary. If the project is not in compliance with a particular programmatic EFH conservation recommendation and FHWA/state DOT has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the FHWA programmatic EFH consultation, provide justification below under the conservation recommendations that is not included.

Underwater Noise

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not create underwater noise as a stressor. Proceed to the next stressor.

1. Use a soft start each day of pile driving, after a break of 30 minutes or more, and if any increase in pile installation or removal intensity is required. Build up power slowly from a low energy start-up over a 20-minute period to warn fish to leave the vicinity. This buildup shall occur in uniform stages to provide a constant increase in output.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

2. Noise-generating work conducted in diadromous streams within the spring diadromous fish TOY restriction listed in Appendix D must be isolated behind sealed, dewatered cofferdams, to avoid impeding fish migration.

☒ Not met:
- ☒ Not applicable, provide reasoning: USACE Permit regional special conditions will prohibit in water work, including noise generating work, during the spring
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Impingement/Entrainment and Entanglement

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not lead to impingement/entrainment and entanglement as a stressor. Proceed to the next stressor.

3. Turbidity control measures must be properly secured and monitored to ensure aquatic species are not entangled or trapped in the project area.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

4. Temporary intakes related to construction must be equipped with mesh size screening and approach velocity appropriate for the species and life stage anticipated. Per the NMFS Anadromous Salmonid Passage Facility Design manual, screen openings must not exceed 3/32 inch and screen approach velocity must be less than .25 feet per second (ft/sec).
    - In New York, New Jersey, Delaware, Maryland, and Pennsylvania, 2 millimeter (mm) wedge wire screens must be used with a maximum intake velocity of 0.5 feet per second (ft/sec).
    - In Virginia, a 1 mm wedge wire with a maximum intake velocity of 0.25 ft/sec).

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

5. No new permanent surface water withdrawal, water intakes, or water diversions.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Water Quality/Turbidity

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not negatively affect water quality or create turbidity. Proceed to the next stressor.

6. Install soil erosion, sediment, and turbidity controls and maintain them in effective operating condition during construction. Remove controls upon completion of work, after all exposed soil and other fills, as well as any work waterward of ordinary high water or the high tide line, are permanently stabilized.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

7. Install and remove any in-water soil erosion, sediment, and turbidity controls outside the TOY restrictions in Appendix D.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

8. Work that produces greater than minimal turbidity or sedimentation in diadromous streams or EFH must not be done during the TOY restriction(s) in Appendix D.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

9. Prevent construction debris and sediment from entering aquatic areas and remove all construction debris and excess/deteriorated materials and dispose of in an upland area.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

10. Dredged and/or excavated materials, including any fine-grained materials removed from inside culverts, shall either be moved to an upland location and stabilized to prevent reentry into the waterway or disposed of at a previously approved disposal site.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

11. Completely remove and do not reuse existing creosote piles that are affected by project activities and do not install new creosote piles.

☒ Not met:
- ☒ Not applicable, provide reasoning: No Creosote piles will be affected by the project
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

12. Coat any chemically or pressure treated piles (CCA, ACQ, etc.) with an impact-resistant, biologically inert substance. Coat the piles at the point of manufacture, not on site.

☒ Not met:
- ☒ Not applicable, provide reasoning: No chemically or pressure treated piles will be used
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

13. Derelict, degraded, or abandoned piles, except for those inside of existing work footprints for piers, must be completely removed or cut and driven three feet below the surface.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

14. Ensure that raw concrete does not contact the water; wet pours of concrete must be confined within sealed forms until the concrete is set or pre-cast members installed.

☐ Not met:

☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

■ Met:
■ Shown on project plans
☐ Included in description, other terms and conditions

Habitat Alteration

☐Check here if the EFH conservation recommendations in this section are not applicable because the project will not cause habitat alteration. Proceed to the next stressor.

15. Remove temporary and/or obsolete structures and fills in their entirety. Use geotextile barriers prior to placement of temporary fill material to ensure complete removal.

☐ Not met:
☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

■ Met:
■ Shown on project plans
☐ Included in description, other terms and conditions

16. Install a riprap bedding layer (such as a gravel filter blanket or geotextile) prior to riprap placement to prevent underlying soils from washing through the riprap during high water.

☐ Not met:
☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

■ Met:
■ Shown on project plans
☐ Included in description, other terms and conditions

17. Return areas impacted by temporary activities, fills, or structures to pre-construction or better condition, including elevations and substrate, and replant with native species.

☐ Not met:
☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

■ Met:
■ Shown on project plans
☐ Included in description, other terms and conditions

18. Temporary monitoring devices shall be removed and the substrate restored to preconstruction elevations no later than 24 months from initial installation, or upon completion of data acquisition.

■ Not met:
  ■ Not applicable, provide reasoning: No temporary monitoring devices shall be installed
  ☐ Project is unable to accommodate, provide justification:

☐ Met:
  ☐ Shown on project plans
  ☐ Included in description, other terms and conditions

19. Pipelines and cables that cross a waterway must not rest on the substrate. They may be attached to an overwater structure or be buried to allow an area to return to preexisting conditions.

■ Not met:
  ■ Not applicable, provide reasoning: No pipelines of cables will cross the waterway
  ☐ Project is unable to accommodate, provide justification:

☐ Met:
  ☐ Shown on project plans
  ☐ Included in description, other terms and conditions

20. Any fill, including planting media and placement of any seed shellfish, spatted-shell, or cultch must be free of all non-native or invasive species and/or contaminants. An invasive species control plan must be part of the project if the transportation agency cannot guarantee this.

☐ Not met:
  ☐ Not applicable, provide reasoning:
  ☐ Project is unable to accommodate, provide justification:

■ Met:
  ■ Shown on project plans
  ☐ Included in description, other terms and conditions

21. Prevent dislodging of coir logs, mats, or native oyster shell.

■ Not met:
  ■ Not applicable, provide reasoning: No coir logs, mats, or native oyster shell exist or will be installed in the project area.
  ☐ Project is unable to accommodate, provide justification:

☐ Met:
  ☐ Shown on project plans
  ☐ Included in description, other terms and conditions

22. Incorporate measures to increase the ambient light transmission under overwater structures.

■ Not met:
  ■ Not applicable, provide reasoning: No overwater structures will be constructed

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

23. The lowermost part of floating docks must be ≥ 18 inches above the substrate at all times, to avoid grounding and propeller scour and to provide adequate circulation and flushing.

■ Not met:
- ■ Not applicable, provide reasoning: No floating docks will be constructed
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

24. Conduct and submit pre-dredge benthic biological surveys to determine benthic communities present and conduct post-dredge surveys to ensure targeted depths have been reached and to determine benthic recovery.

■ Not met:
- ■ Not applicable, provide reasoning: Project does not include dredging.
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

25. Grain size of any sediment used as part of habitat restoration must be the same size or larger than the native material at the site.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

■ Met:
- ■ Shown on project plans
- ☐ Included in description, other terms and conditions

26. If rock relocation is necessary, move them to an area of equivalent depth and substrate.

■ Not met:
- ■ Not applicable, provide reasoning: No rock relocation proposed for the project.
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans

☐ Included in description, other terms and conditions

27. Incorporate natural habitats (e.g., living shorelines) and soft approaches (e.g., vegetative plantings and large woody debris) into the stabilization design in addition to or instead of hardened structures. See NOAA's Guidance for Considering the Use of Living Shorelines for more information.

☒ Not met:
- ☐ Not applicable, provide reasoning:
- ☒ Project is unable to accommodate, provide justification: The proposed riprap is required for drainage purposes and bulkhead replacement is required to avoid encroachment into

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Sensitive Habitats (SAS, natural rocky habitats, intertidal areas, and areas containing shellfish)

28. Locate all temporary structures, construction, access, and dewatering actives outside of sensitive habitats.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

29. Prior to construction, identify and mark in the field any SAV at the project site. An SAV survey is required for activities adjacent to mapped or known SAV if a survey has not been conducted in three years.

☒ Not met:
- ☒ Not applicable, provide reasoning: No SAV in project area.
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

30. Provide compensatory mitigation for all permanent and temporary impacts to sensitive habitats. This could include a contribution to an existing in-lieu fee program. When impacts are unavoidable:
    - conduct a biological survey to map the coverage of the sensitive habitats;
    - develop a compensatory mitigation plan for biological resource losses, including success criteria, monitoring plan, and long-term maintenance plan;

- submit the results of the biological survey and the mitigation plan to GARFO HCD for review; and
- undertake compensatory mitigation prior to or concurrent with any impacts to sensitive habitat.

☐ Not met:
  ☐ Not applicable, provide reasoning:
  ☐ Project is unable to accommodate, provide justification:

☒ Met:
  ☐ Shown on project plans
  ☒ Included in description, other terms and conditions

31. Where construction requires heavy equipment operation in or across wetlands or mudflats, the equipment shall have low ground pressure (typically ≤ 3 pounds per square inch); be placed on construction timber mats that are adequate to support the equipment; or be operated on dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Construction mats must not be dragged into position.

☐ Not met:
  ☐ Not applicable, provide reasoning:
  ☐ Project is unable to accommodate, provide justification:

☒ Met:
  ☒ Shown on project plans
  ☐ Included in description, other terms and conditions

32. Habitat restoration or mitigation projects must not result in a permanent conversion or loss of sensitive habitats.

☒ Not met:
  ☒ Not applicable, provide reasoning: Project is not habitat restoration or mitigation project.
  ☐ Project is unable to accommodate, provide justification:

☐ Met:
  ☐ Shown on project plans
  ☐ Included in description, other terms and conditions

33. No dredging shall occur within:
- intertidal areas;
- 100 feet of SAV; or
- 25 feet of SAS, natural rocky habitats, or areas containing shellfish.

☒ Not met:
  ☒ Not applicable, provide reasoning: Dredging is not proposed with this project.
  ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

34. The height of docks and piers must be at least four feet above salt marsh substrate and must be greater than or equal to the width of the deck, to minimize shading impacts. The height must be measured from the marsh substrate to the bottom of the longitudinal support beam.

☒ Not met:
- ☒ Not applicable, provide reasoning: No salt marshes in the project area.
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

35. Outlets must not discharge directly into sensitive habitats.

☒ Not met:
- ☐ Not applicable, provide reasoning:
- ☒ Project is unable to accommodate, provide justification: All terrestrial stormwater in the area must discharge directly into the Christina River

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Fish Passage/Migration Habitat

36. Design replacement crossings to provide diadromous and resident fish and aquatic organism passage. Structures must:
    - provide sufficient water depth and maintain suitable water velocities during migration periods; and
    - maintain or replicate natural stream channel and flow conditions.

☒ Not met:
- ☒ Not applicable, provide reasoning: No replacement or new crossing will be constructed
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

37. Incorporate climate change projections into the project design. Use the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 8.5/high greenhouse gas emission scenario and RCP 4.5/intermediate greenhouse gas emission scenario (IPCC 2014) and the global mean and regional sea level rise projections for

intermediate-high and extreme scenarios referenced in Sweet *et al*. (2017) in design calculations for replacement structures.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

▣ Met:
- ☐ Shown on project plans
- ▣ Included in description, other terms and conditions

38. Replaced or upgraded crossings must be "in kind" or go up in order of preference set out in NMFS' Anadromous Salmonid Passage Facility Design:
    - Road abandonment and reclamation or road realignment to avoid crossing the stream.
    - Bridge or stream simulation spanning the stream flood plain, providing long-term dynamic channel stability, retention of existing spawning areas, maintenance of benthic invertebrate production, and minimized risk of failure. If a stream crossing is proposed in a segment of stream channel that includes a salmonid spawning area, only full-span stream simulation designs are acceptable.
    - Embedded pipe culvert, bottomless arch designs or non-floodplain spanning stream simulation.
    - Hydraulic design method, associated with more traditional culvert design approaches- limited to low stream gradients (0 to 1%) or for retrofits.
    - Culvert designed with an external fishway (including roughened channels) for steeper slopes.
    - Baffled culvert or internal weirs- to be used only for when other alternatives are infeasible.

▣ Not met:
- ▣ Not applicable, provide reasoning: Project does not include any crossings.
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

39. For activities that require soil erosion, sediment, and turbidity controls
    - in non-tidal streams containing diadromous fish:
        i. They must not encroach >25% of the stream width measured from ordinary high water during the diadromous TOY restriction; and
        ii. They must maintain safe, timely, and effective downstream fish passage throughout the project.
    - in tidal waters:
        i. They must not encroach >50% of a tidal stream's width as measured from mean high water.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☒ Shown on project plans
- ☐ Included in description, other terms and conditions

Vessel Traffic

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not use vessels.

40. Project vessels shall be operated in adequate water depths to avoid propeller scour and grounding at all tides. Shallow draft vessels will be used in shallow areas to maximize the navigational clearance between the vessel and the bottom substrate. Spuds may be used to elevate the vessel.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

41. Project vessels shall not be moored in or use spuds in SAV or be located in such a way that the vessel could shade SAV.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

NEW CLAUSE

Other Justification for Use of the Programmatic EFH Consultation

If the project is outside of the covered activities in the programmatic EFH consultation (i.e., is one of the actions described in the Excluded Activities list noted below) and FHWA/state DOT believes the effects are not any more significant and that the project should be eligible for programmatic EFH consultation, provide additional justification in the space below. FHWA/state DOT must provide appropriate rationale and GARFO HCD must review and approve it. The automatic concurrence period does not apply for transportation activities in this section that fall outside of the programmatic EFH consultation as described.

◉ The project is not listed as an excluded activity.

◯ The project is listed as an excluded activity.

Indicate the activity number from the list below (1 through 21):

Provide additional justification on why the activity should be eligible:

Activities that Require Individual Consultation

1. Any work (including anchoring) that results in impacts to:
   - existing or historically mapped submerged aquatic vegetation (SAV) beds or areas within 100 feet of existing or historically mapped SAV beds;
   - ≥ 1,000 square feet of salt marsh, areas containing shellfish, and intertidal areas;
   - ≥ 100 square feet of natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel);
2. Stream channelization.
3. Any temporary structures, construction access, and dewatering activities proposed to be in place for ≥ two years.
4. Slip-lining or invert lining existing culverts.
5. Any permanent structures longer than 150 linear feet over salt marsh.
6. Construction of new or expansion of existing boating facilities17 or ferry terminals.
7. Independent pedestrian trails or bridges located directly adjacent to an existing crossing.
8. New or improvement dredging.
9. Any nearshore disposal or beach nourishment activities.
10. New fill/stabilization placed below mean low water in excess of 200 linear feet (lf).
11. Replacement or maintenance of:
    - sloped stabilization structures > 200 lf and waterward of the existing toe, or
    - vertical structures > 18 inches waterward of the existing face and > 200 lf.
12. In-water utility lines ≥ 100 lf installed by trench excavation, or ≥ 200 lf installed by jetplow, fluidization or other direct burial methods.
13. Thin layer deposition as a part of wetland restoration.
14. Placement of any seed shellfish, spatted-shell, or cultch in SAS.
15. Any exploratory trenching or other similar survey activities.
16. Airgun seismic activities.
17. Any new permanent surface water withdrawal, water intakes, or water diversions.
18. Any blasting or use of explosives that affects EFH or diadromous species habitats.
19. Construction of new bridges or culverts, where no crossing existed previously.
20. Any new or replacement causeways (raised roadways across waters or wetlands).
21. Any in-water work on dams, tide gates, or breakwaters.

FHWA's Determination of Effects to Essential Fish Habitat and Signature
After reviewing the programmatic EFH conservation recommendations in Appendix A, FHWA/state DOT will select the appropriate determination:

○ The activity is in compliance with all programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and adverse effects to EFH will not be substantial.

◉ The activity is not in compliance with all of the programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation, however, the justification below demonstrates that the adverse effects to EFH are not substantial. This does not apply to EFH conservation recommendations that are not applicable to the project.

Use the electronic fillable fields to include the name and signature of the FHWA/state DOT preparing this Verification Form, along with the date.

Becky Ledebohm, FHWA DE Div

FHWA/state DOT Name

REBECCA ELIZABETH-HOEFERT LEDEBOHM Digitally signed by REBECCA ELIZABETH-HOEFERT LEDEBOHM Date: 2023.07.27 10:32:04 -04'00'

Signature

7/27/23

Date

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative. Do not lock the form when saving, as HCD will be unable to sign and finalize. Email this Verification Form as a fillable PDF to NMFS.GAR.EFH.Consultation@noaa.gov.

GARFO HCD Determination and Signature (To be filled out by NMFS)
After receiving the Verification Form, GARFO HCD will contact FHWA/state DOT with any concerns. HCD will email the completed form back to the FHWA/state DOT for record keeping.

○ GARFO HCD concurs with FHWA's determination that the proposed project is consistent with the programmatic EFH consultation (without the need for justification).

◉ GARFO HCD concurs with FHWA's determination that the proposed project is consistent with the programmatic EFH consultation, with justification described above.

○ GARFO HCD does not concur with FHWA's determination that the project is consistent with the programmatic EFH consultation. FHWA/state DOT must conduct additional coordination with GARFO HCD and a separate individual EFH consultation may be required.

Robert Bourdon

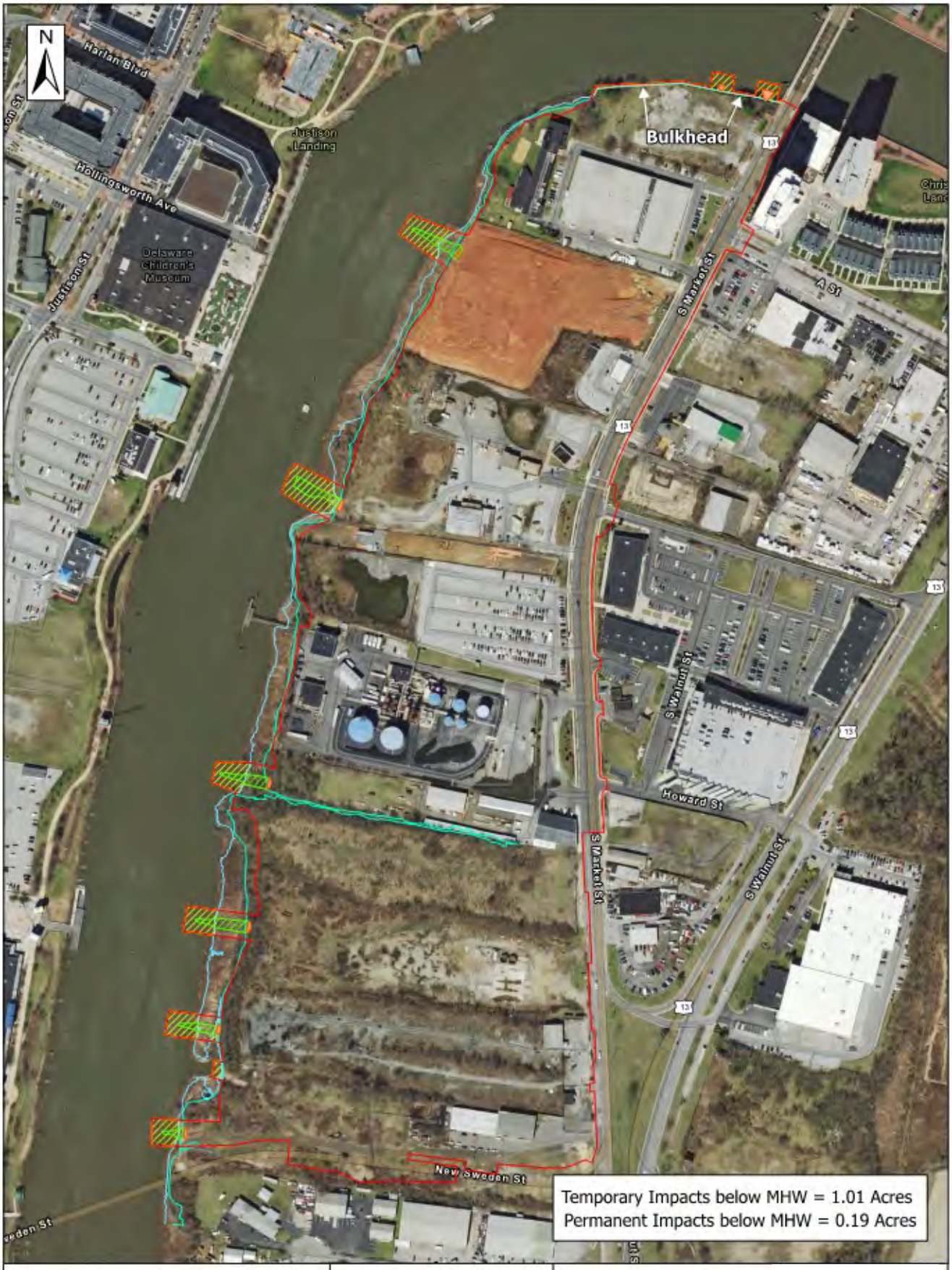
GARFO HCD Name

BOURDON.ROBERT.JOSEPH.1624296741 Digitally signed by BOURDON.ROBERT.JOSEPH.1624296741 Date: 2023.09.15 12:49:32 -04'00'

Signature

9/15/23

Date



High Tide Line
Mean High Water Line
Limit of Construction
Temporary Impact
Proposed Riprap - Permanent Impact
Proposed Grading - Permanent Impact

0 120 240 480 ft

1 inch = 240 feet

South Market Street Marine Impacts Map

July 2023

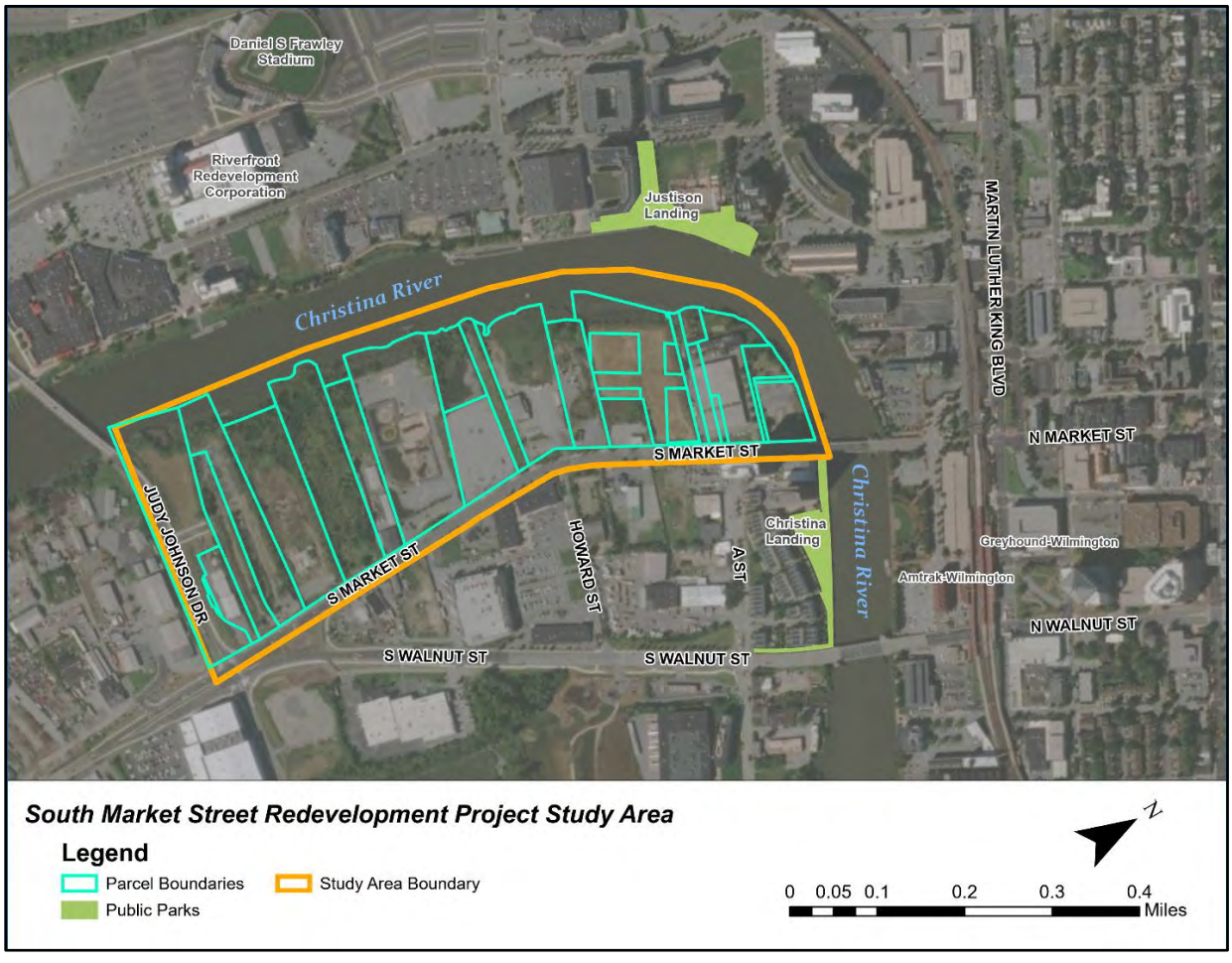
Appendix C – Wetland Delineation Technical Report

Date:	**September 20, 2023**
To:	**Federal Highway Administration**
From:	**City of Wilmington**
Re:	**South Market Street Redevelopment Project – Wetland Delineation Technical Memorandum**

I. Introduction

This Wetland Delineation Memo details the existing natural resource conditions in the Project study area including: site topography; vegetative cover; tidal and non-tidal waters and wetlands; 100-year floodplain; and hydric and highly erodible soils, as well as documents coordination regarding rare, threatened and endangered species. Refer to **Figure 1** for the Project Study Area Map.

Figure 1: South Market Steet Redevelopment Project Study Area Map



The existing conditions along North Market Street (north of the Christina River) are consistent with a typical urban core context grid, with two-way traffic (one lane in each direction), on-street parking, closely spaced signalized and stop-controlled intersections. South Market Street, south of Martin Luther King

Boulevard, is the main corridor exiting the City of Wilmington to the south (toward I-495 / I-95 / I-295). The existing condition along South Market Street (south of the Christina River) changes to a higher speed, one-way, multi-lane roadway with no on-street parking, and only two signalized intersections between the Christina River and I-495 (the Howard Street signalized T-intersection and the newly constructed New Sweden Street four-leg intersection). South Market Street is a one-way, four-lane arterial road that spans approximately 0.57 miles through the study area.

The Project study area land uses are shaped by its history of shipping and manufacturing. It features former industrial buildings and accessory structures, surface parking, former junkyards, miscellaneous uses, and brownfields. The Christina riverbank on the western and northern boundary of the study area is marshy and largely inaccessible. Significant differences of elevation between the high and low tide conditions have created a mud flat condition along the northern and eastern edge of the site. The vegetative species that grow along the riverbank are indicative of disturbed lands, a result from the site's industrial past.

The purpose of the South Market Street Redevelopment Project is to provide appropriate infrastructure for vehicles (including public transportation), pedestrians, and bicycles in support of the *City of Wilmington Comprehensive Plan* for redeveloping the South Market Street Riverfront East area. The need of the South Market Street Redevelopment Project is to improve infrastructure and access to underutilized properties east of the Christina River, as outlined in the *City of Wilmington Comprehensive Plan*[1] and *South Market Street Master Plan*[2].

This Project would construct transportation infrastructure improvements for the South Market Street Riverfront East area of the City, including a comprehensive network of bicycle and pedestrian linkages and safety improvements, that may expand the network of streets on site and may develop a comprehensive network of bicycle and pedestrian linkages and safety improvements. This South Market Street Redevelopment Project is a key component of a larger comprehensive plan, *The South Market Street Master Plan*, for the planned redevelopment of the eastern Christina riverfront corridor.

RK&K conducted a wetland delineation within the wetland investigation area (see **Appendix A, Figures 1 and 2**). This wetland delineation includes parcels west of South Market Street, north of New Sweden Street, and bound to the north and west by the Christina River in Wilmington, New Castle County, Delaware (**Appendix A, Figure 3**). Proposed impacts to wetlands, Waters of the U.S., and subaqueous lands will require coordination with the U.S. Army Corps of Engineers (USACE) Philadelphia District and Delaware Department of Natural Resources (DNREC) Wetlands and Subaqueous Lands Section.

Supplemental information is included in Appendices A through E, as follows:

- Appendix A: Figures
- Appendix B: High Tide Line Calculation (Referenced from South Market Street Master Plan –Area 1 Initial Implementation Phase Project)
- Appendix C: Field Data Sheets
- Appendix D: Photographic Documentation
- Appendix E: Agency Coordination

[1] https://www.wilmingtonde.gov/government/city-departments/planning-and-development/wilmington-2028
[2] https://riverfronteast.com/

II. Background Information

RK&K environmental scientists conducted a desktop investigation of mapped information prior to beginning the field investigation. The desktop investigation of the available mapped information identified site topography; vegetative cover; tidal and non-tidal waters and wetlands; 100-year floodplain; and hydric and highly erodible soils. Mapped resources reviewed for this project include:

- The United States Geologic Survey (USGS) Topographic Quadrangle Mapping
- The United States Department of Agriculture, Natural Resource Conservation Service (USDA-NRCS) *Web Soil Survey (WSS) for New Castle County, Delaware*
- US Fish and Wildlife Service, National Wetlands Inventory (NWI)
- Delaware State Wetlands Mapping Project (SWMP)
- Federal Emergency Management Agency (FEMA) 100-year Floodplain
- Delaware Coastal Programs – Sea Level Rise Inundation Mapping
- Delaware Department of Natural Resources and Environmental Control (DNREC) 1988 Tidal Wetlands Maps

Desktop investigation results are summarized below.

A. Geography and Topography

The South Market Street Redevelopment project area is in New Castle County, within the Atlantic Coastal Plain physiographic province. The Atlantic Coastal Plain is composed of unconsolidated sediments including gravel, sand, and silt. The wetland investigation area ranges from 0 to 12 feet above sea level **(Appendix A, Figure 4**).

B. Soils

The USDA-NRCS Web Soil Survey for New Castle County, Delaware identified one mapped soil unit and water within the wetland investigation area (**Appendix A, Figure 4**). The results are summarized in **Table 1**.

Table 1. South Market Street Redevelopment Project – Mapped Soils Within Investigation Area

Map Unit Symbol	Map Unit Name	K-factor[1]	Hydric Rating[2]	Description
VoB	Urban land-Othello complex, 0 to 5 percent slopes	-	30	-
W	Water	-	-	-

Notes: 1-*Erodibility Coefficient – Value assigned to soil types by NRCS. K > 0.35 are considered to be highly erodible soils*
2-Hydric Rating – Value is based on the percentage of hydric soils within the soil type. Non-hydric soils have a value of 0, predominantly non-hydric soils have a value between 0 and 33, partially hydric soils have a value between 33 and 66, predominantly hydric soils have a value between 66 and 99, and hydric soils have a value of 100.

C. Wetlands and Waters of the United States

The NWI identified the Christina River (E1UBL), four intertidal estuarine waters (mud flats) (E2USN), three palustrine forested/shrub wetlands (PSS1R, PSS1E, PFO1R), an intertidal estuarine emergent wetland (E2EM1P), two freshwater ponds (PUBHX), and three palustrine emergent wetlands (PEM1E) within the wetland investigation area (**Appendix A, Figure 5**).

D. 100-Year Floodplain

The wetland investigation area falls within the 100-year floodplain according to Federal Emergency Management Agency (FEMA) GIS data for New Castle County (**Appendix A, Figure 5**). The wetland investigation area is in Zone AE (Base Flood Elevations determined) and the base flood elevations in this area are 8 to 9 feet (NAVD88).

E. Delaware Coastal Projects – Sea Level Rise Inundation Mapping

Delaware Coastal Programs (DCP) sea level rise mapping for 1-foot, 2-foot, 3-foot, 4-foot and 5-foot sea level rise represents inundation based on local Mean Higher High Water (MHHW) plus sea level rise. Inundation is assumed to occur at a constant elevation and no other factors other than tidal elevation are used to determine water levels. The land surface elevations are based on data with an average accuracy of 6 inches.

The DCP sea level rise mapping indicates the majority of the wetland investigation area will receive inundation from a 1-foot sea level rise (**Appendix A, Figure 6**). The implications of sea level rise should be considered in the project design in compliance with the flooding and sea level rise provisions of Delaware's Executive Order 41 (EO41).

F. DNREC 1988 State Tidal Wetland Map

The DNREC 1988 State Tidal Wetland Mapping (DNR459 and DNR403) identified the Christina River as W – Waters and the remaining wetland investigation area to be T – Tidal Mudflats, M – Marsh, and O – Other (Upland or Non-tidal wetlands less than 400 acres) (**Appendix A, Figure 7**).

G. Rare, Threatened and Endangered Species

A letter requesting information on the presence of rare, threatened, and endangered (RTE) species RTE was sent to DNREC on August 16, 2023. A response from DNREC was received on September 6, 2023, indicating that there are no records of state-rare or federally listed plants, animals, or natural communities within the project area. The letter additionally states the project does not lie within a State Natural Heritage site, nor does it lie within a Delaware National Estuarine Research Reserve. The National Oceanic and Atmospheric Administration (NOAA) Section 7 mapper was queried on August 15, 2023, which indicated that the short nose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus*) may be present within the Christina River, adjacent to the wetland delineation area. The US Fish and Wildlife Service (USFWS) IPaC online database confirmed on July 17, 2023, that the federally listed candidate species, monarch butterfly (Danaus plexippus) may be present within the wetland investigation area. Further coordination on the monarch butterfly is not required at this time. Coordination with GARFO (Greater Atlantic Regional Fisheries Office) was required to determine if the project will affect ESA-listed species. GARFO responded on July 17, 2023, stating that the action is not likely to adversely affect listed species per the justifications provided. Essential Fish Habitat (EFH) was also identified within the project study area. Coordination with NOAA determined that the project is not in compliance with all of the programmatic EFH conservation requirements, however the adverse effects to EFH are not substantial. Approval was granted on July 27, 2023. Agency correspondence can be found in **Appendix B.**

III. Wetland Delineation – Field Investigation

A. Methods

RK&K environmental scientists conducted a wetland delineation to identify wetlands, other Waters of the U.S., and subaqueous lands within the wetland investigation area on November 16, 2018; November 30, 2018; November 12, 2019; July 23, 2019; February 16, 2021; April 6, 2022; and May 16, 2022. Wetlands were delineated in accordance with the following:

- USACE Wetlands Delineation Manual, Y-87-I (Environmental Laboratory, 1987); and
- USACE 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE, 2010).

A team of two environmental scientists delineated Waters of the U.S. and Subaqueous lands, including wetlands, within the wetland investigation area, and completed the applicable data form for each delineated feature. Each delineated feature was given a unique identifier and photographed. Boundary points were identified for each feature, marked with pink flagging, and numbered consecutively. Boundary point positions were located in the field using a sub-meter GPS unit.

Routine wetland determination methods with onsite inspection were used to determine the presence of wetlands in the wetland investigation area. The boundaries between tidal and non-tidal wetlands, regulated by the U.S. Army Corps of Engineers, were set at the high tide line (HTL) elevation. Wetlands above the HTL elevation are considered non-tidal and wetlands below the HTL elevation are considered tidal. The HTL elevation for the wetland investigation area is referenced from the South Market Street Master Plan – Area 1 Initial Phase project. The high tide line elevation for the wetland investigation area is 4.2 feet (**Appendix B**).

Waters of the U.S., other than wetlands, were delineated in accordance with the limits defined in 33 C.F.R. § 328. The boundaries of non-tidal waters are set at the ordinary high water mark (OHW). The OHW is determined in the field using physical characteristics established by the fluctuations of water (e.g., change in plant community, changes in the soil character, shelving), in accordance with U.S. Army Corps of Engineers Regulatory Guidance Letter No. 05-05. The boundaries of tidal waters of the U.S. were set at the HTL and boundaries of DNREC tidal waters were set at the mean high water (MHW). The MHW elevation was identified in the field based on physical markings or vegetation lines/ changes in vegetation types.

B. Results

Three tidal Waters of the U.S., one non-tidal, perennial Waters of the U.S., three subaqueous lands, one estuarine emergent wetland (EEM), two palustrine emergent wetlands (PEM), two DNREC state mapped tidal mudflat, and three DNREC state mapped tidal marsh were identified in the wetland investigation area (**Appendix A, Figure 7**). The waterway and wetland features are summarized in **Tables 2 and 3**, which include feature classifications, description, and agency jurisdiction. Field data sheets and photographs of the features identified are located in **Appendices C and D**, respectively.

The presence and boundaries of the 1988 mapped tidal mudflat and tidal marsh shown on maps DNR 459 and DNR 403 of the DNREC 1988 State Tidal Wetland mapping were confirmed. These boundaries have been georeferenced and are shown on **Figure 7** in **Appendix A**.

Table 2. Delineated Waterways and Subaqueous Lands within the South Market Street Redevelopment Wetland Investigation Area

FEATURE ID	CLASSIFICATION	FEATURE DESCRIPTION	HYDROLOGIC CLASS (Tidal or Non-Tidal)	AGENCY JURISDICTION	Width/Depth
Waters B_T	Tidal	Waters B_T is a tidal channel located in the central western portion of the investigation area, surrounded by Wetland A_T. Waters B_T originates at a culvert and flows west into the Christina River.	Tidal	USACE and DNREC	Depth: 6 in Width: 4 ft
Waters D	Perennial	Waters D is a perennial channel located in the central portion of the investigation area. Waters D receives hydrology from Wetland F and flows into Wetland A_T, which abuts the Christina River.	Non-Tidal	USACE and DNREC	Depth: 2-6” Width: 3-5’
Waters E_T	Tidal	Waters E_T is a tidal channel located in the south-central portion of the investigation area, south of Waters D and Wetland F. Waters E_T flows into Wetland A_T, which abuts the Christina River.	Tidal	USACE and DNREC	Depth: 1-3” Width: 4-8’
Christina River	Tidal	The Christina River is a traditional navigable water located in the western and northern portions of the investigation area. Wetland A_T abuts the Christina River, and Waters B_T flows directly into the Christina River.	Tidal	USACE and DNREC	Depth: 10 ft (average adjacent to study area) Width: 350 ft (average adjacent to study area)

Table 3. Delineated Wetlands within the South Market Street Redevelopment Wetland Investigation Area

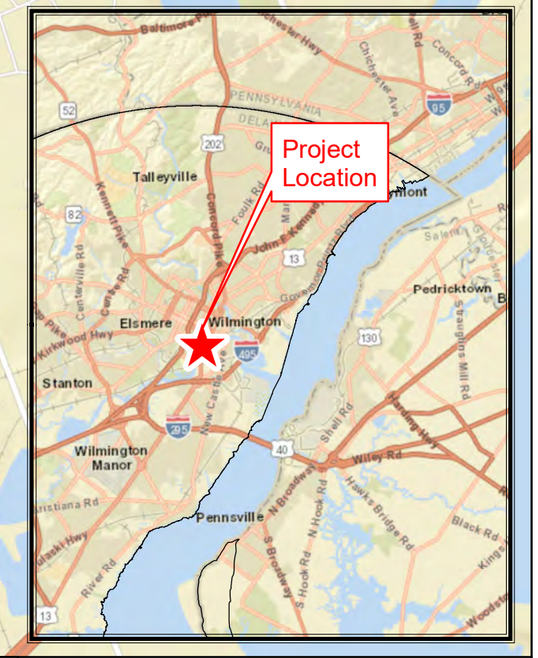
FEATURE ID	CLASSIFICATION*	FEATURE DESCRIPTION	HYDROLOGIC CLASS (Tidal or Non-Tidal)	AGENCY JURISDICTION	Area
Wetland A_T	EEM	Wetland A_T is an EEM located throughout the western portion of the investigation area. Wetland A_T abuts and receives tidal influence from the Christina River.	Tidal	USACE and DNREC	241,275.78 SF
Wetland F	PEM	Wetland F is a PEM located in the central portion of the investigation area. Wetland F receives hydrology from groundwater and the surrounding uplands and drains to Waters D.	Non-Tidal	USACE	3,213.92 SF

* PEM = Palustrine emergent, EEM = Estuarine Emergent

APPENDIX A

Figures

Project Location



South Market Street Redevelopment Project

Wilmington, DE

Figure 1: Vicinity Map

April 2023

LEGEND

Wetland Investigation Area

N

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Project Location

South Market Street Redevelopment Project

Wilmington, DE

Figure 2: USGS Topo Map

April 2023

LEGEND

Wetland Investigation Area

N

0 250 500 1,000 Feet

1 inch = 500 feet

South Market Street Redevelopment Project

Wilmington, DE

Figure 3: Location Map

April 2023

LEGEND

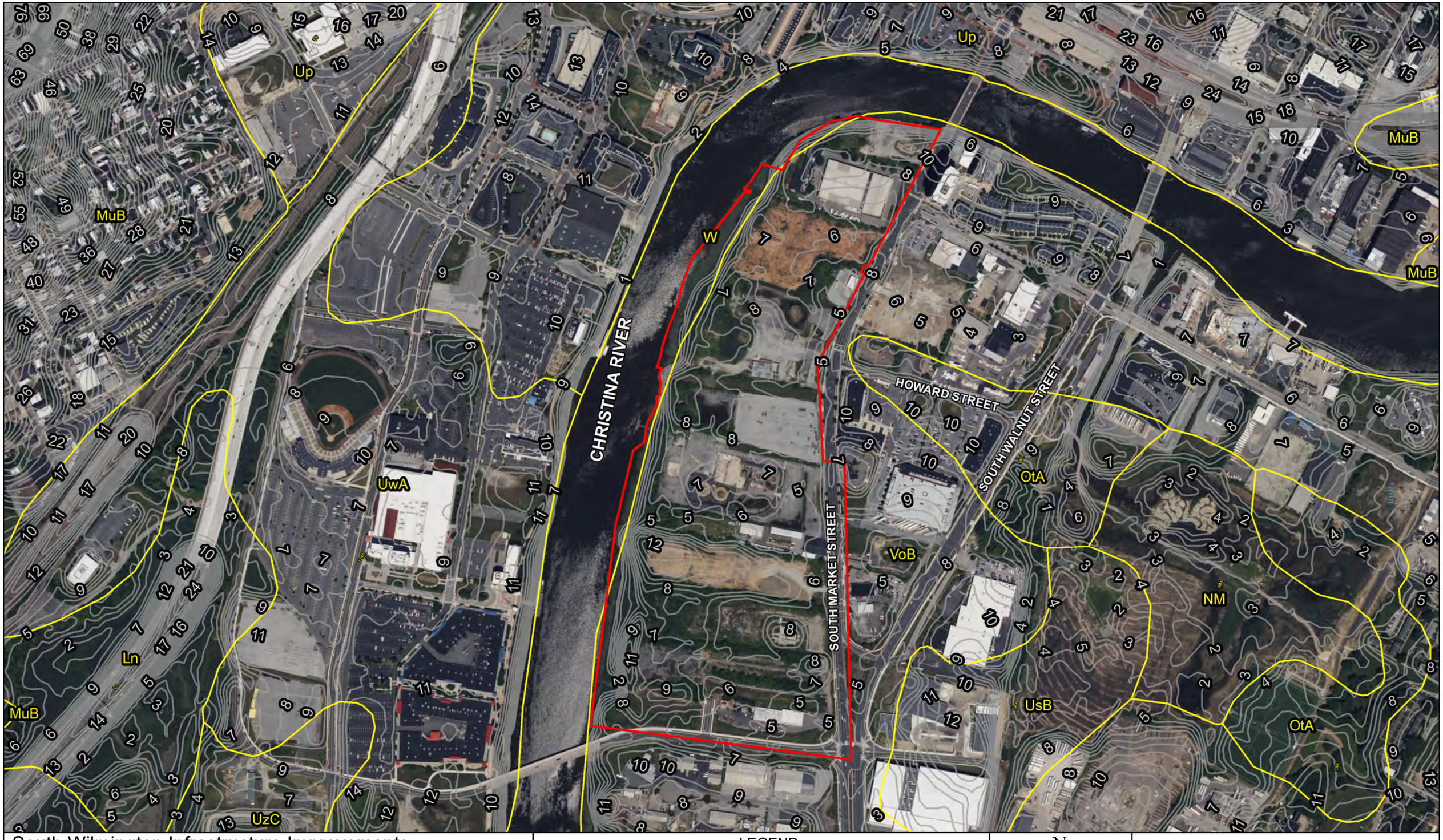
Wetland Investigation Area

Parcel Boundaries

N

0 200 400 800 Feet

1 inch = 400 feet



South Wilmington Infrastructure Improvements

Wilmington, DE

Figure 4: Soils and Contours Map

April 2023

LEGEND

Wetland Investigation Area

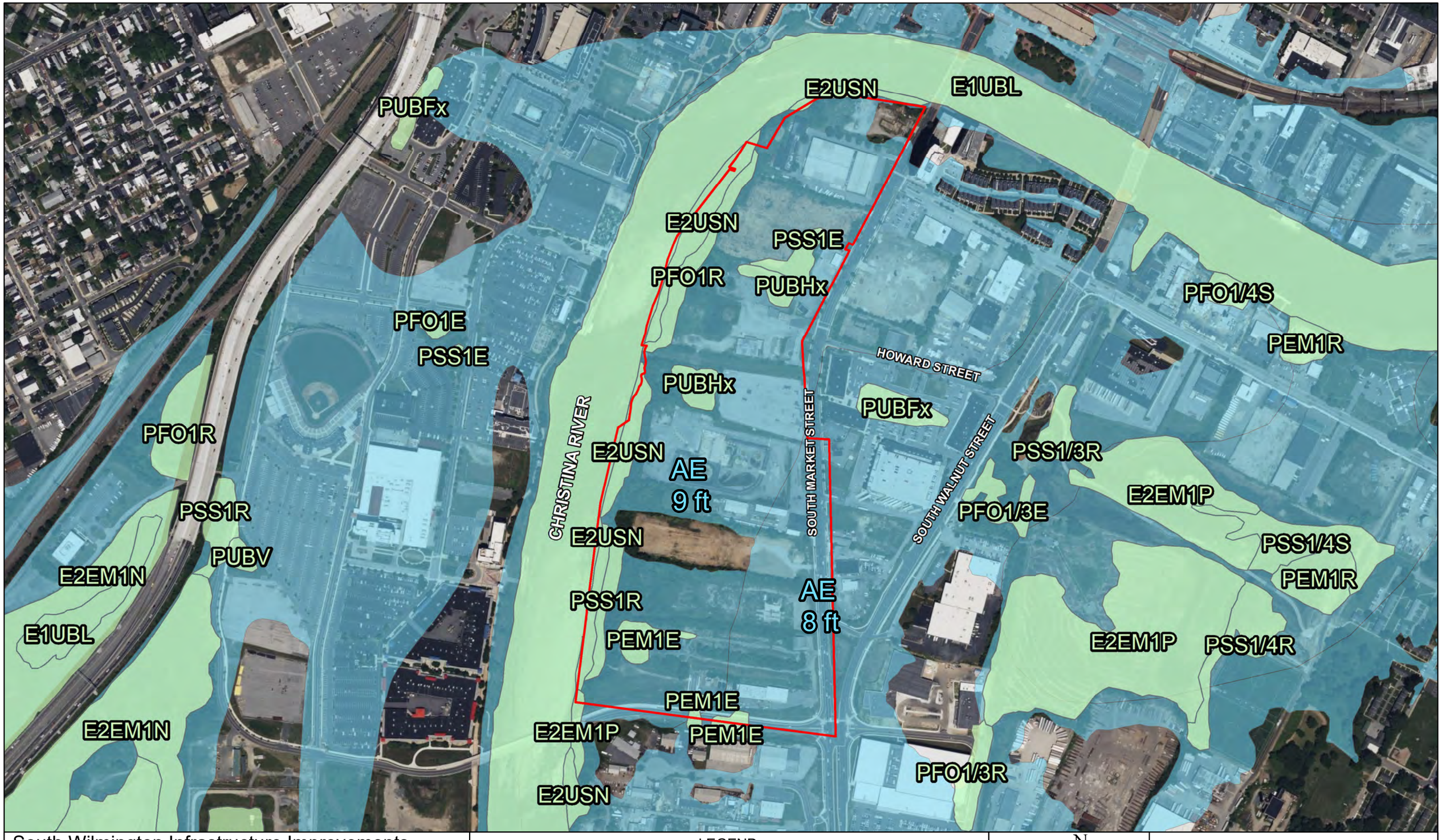
Soil Boundary

Contours (1')

N

0 300 600 1,200 Feet

1 inch = 300 feet



South Wilmington Infrastructure Improvements

Wilmington, DE

Figure 5: Water Resources Map

April 2023

LEGEND

Wetland Investigation Area

DE NWI

FEMA 100-Year Floodplain

N

0 200 400 800 Feet

1 inch = 400 feet

South Wilmington Infrastructure Improvements
Wilmington, DE
Figure 6: Sea Level Rise Map
April 2023

LEGEND

- Wetland Investigation Area
- Coastal Inundation 1 ft
- Coastal Inundation 2 ft
- Coastal Inundation 3 ft
- Coastal Inundation 4 ft
- Coastal Inundation 5 ft

N

0 200 400 800 Feet

1 inch = 400 feet

South Wilmington Infrastructure Improvements

Wilmington, DE

Figure 7: DNREC 1988 State Tidal Wetland Boundary and Wetland Delineation Map

April 2023

LEGEND

- DNREC State Tidal Wetland Boundary
- Wetland Investigation Area
- High Tide Line
- Wetland Feature
- Waters Feature

N

0 120 240 480 Feet

1:3,000

APPENDIX B

Tide Elevation Data

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service

Station ID: 8551910 **PUBLICATION DATE: 09/27/2011**
Name: REEDY POINT, C&D CANAL DE
NOAA Chart: 12277 **Latitude: 39° 33.5' N (39.55831)**
USGS Quad: DELAWARE CITY **Longitude: 75° 34.4' W (-75.57331)**

T I D A L D A T U M S

Tidal datums at REEDY POINT, C&D CANAL based on:

LENGTH OF SERIES: 19 YEARS
TIME PERIOD: January 1983 - December 2001
TIDAL EPOCH: 1983-2001
CONTROL TIDE STATION:

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

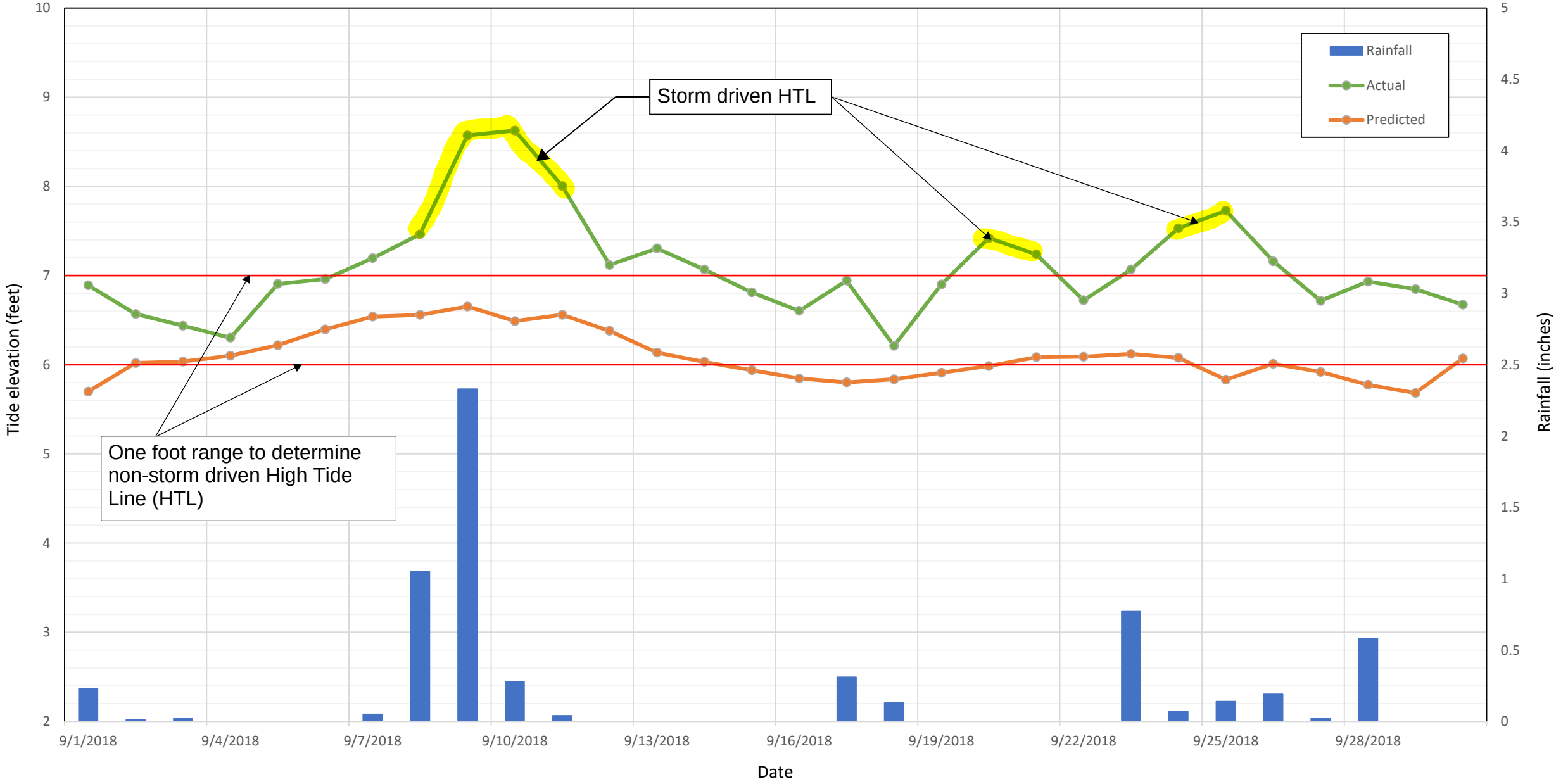
HIGHEST OBSERVED WATER LEVEL (04/17/2011)		= 2.816
MEAN HIGHER HIGH WATER	MHHW	= 1.780
MEAN HIGH WATER	MHW	= 1.683
North American Vertical Datum	NAVD88	= 0.905
MEAN SEA LEVEL	MSL	= 0.890
MEAN TIDE LEVEL	MTL	= 0.869
MEAN LOW WATER	MLW	= 0.055
MEAN LOWER LOW WATER	MLLW	= 0.000
LOWEST OBSERVED WATER LEVEL (04/07/1982)		= -1.222

North American Vertical Datum (NAVD88)

Bench Mark Elevation Information In METERS above:

Stamping or Designation	MLLW	MHW
R 41 1979	1.620	-0.063
1910 B 1979	3.268	1.585
1910 C 1979	3.148	1.465
1910 G 1982	2.390	0.707
RP 3 1975	1.875	0.192
RP 5 1975	2.325	0.642
R 72 W	5.904	4.221
1910 H 1997	1.784	0.101
1910 J 1997	2.467	0.784
1910 K 1997	2.534	0.851

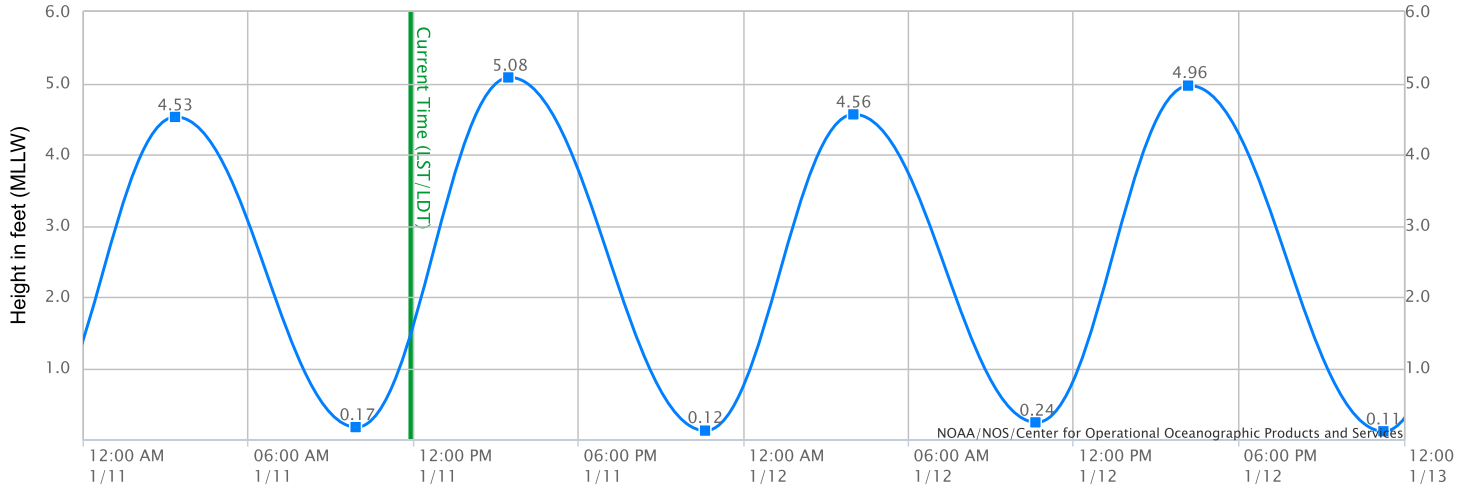
Figure 9. Actual Versus Predicted Tide Elevation at Reedy Point, DE



CHRISTINAR RR BRIDGE (D-218), DE 8550658 Tidal Data Print View

Help Print

NOAA/NOS/CO-OPS
Tide Predictions at 8550658, CHRISTINAR RR BRIDGE (D-218) DE
From 2019/01/11 12:00 AM LST/LDT to 2019/01/12 11:59 PM LST/LDT
Subordinate Station | Ref. Station (Reedy Point 8551910) Time offsets (high: 68 min. low: 79 min.) | Height offsets (high: *0.99 ft. low: *1.06 ft.)



Note: The interval is High/Low, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.
Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

High/Low Tide Prediction Data Listing

Station Name: CHRISTINAR RR BRIDGE (D-218), DE
Action: Daily
Product: Tide Predictions
Start Date & Time: 2019/1/11 12:00 AM
End Date & Time: 2019/1/12 11:59 PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Subordinate
Datum: MLLW
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2019/01/11	Fri	03:20 AM	4.53 H	09:55 AM	0.17 L	3:29 PM	5.08 H	10:36 PM	0.12 L
2019/01/12	Sat	04:00 AM	4.56 H	10:39 AM	0.24 L	4:12 PM	4.96 H	11:16 PM	0.11 L

South Market Street Master Plan
Area 1 Initial Implementation Phase
High Tide Line Calculation

Tidal Elevation Summary Table - Christina Rail Road Bridge, DE

By: EYG Date: 01/10/2019

Station ID: 8550658 Publication Date: 09/27/2011

Name: Christina Rail Road Bridge, DE

	Units		Meters	Feet	Feet	Feet	Feet
	Reference		MLLW	MLLW	Reedy Point to Christina Rail (MLLW*0.99)	MLW	NAVD88
Highest Observed Water Level				7.48	-	-	-
High Tide Line (average of highest monthly non-storm tides 09/2018 - 12/2018		=		7.294	7.221	7.042	**4.252**
MEAN HIGHWER HIGH WATER		=	1.780	5.840	5.782	5.661	2.871
MEAN HIGH WATER		=	1.683	5.522	5.467	5.343	2.553
NORTH AMERICAN VERTICAL DATUM (NAVD88)		=	0.905	2.969	2.940	2.790	0.000
MEAN SEA LEVEL		=	0.890	2.920	2.891	2.741	-0.049
MEAN TIDE LEVEL		=	0.869	2.851	2.823	2.672	-0.118
MEAN LOW WATER		=	0.055	0.180	0.179	0.001	-2.789
MEAN LOWER LOW WATER		=	0.000	0.000	0.000	-0.179	-2.969
LOWEST OBSERVED WATER LEVEL (01/24/1908)		=	-1.222	-4.009	-3.969	-4.188	-6.978

Bench Mark sheet for 8551910, Reedy Point, C&D Canal, DE available at:
https://tidesandcurrents.noaa.gov/benchmarks.html?id=8551910&type=

NOTE: Christina Rail Road Bridge tide values adjusted based off Reedy Point (8551910) tide values

APPENDIX C

Field Data Sheets

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: SMR Area 2 City/County: Wilmington Sampling Date: 11/12/19

Applicant/Owner: RDC State: DE Sampling Point: WA - WET

Investigator(s): KR, SJF, EVG Section, Township, Range:

Landform (hillslope, terrace, etc.): Shoreline Local relief (concave, convex, none): Concave Slope (%): 4/.

Subregion (LRR or MLRA): LRR S Lat: 39.734879 Long: -75.551882 Datum: NAD83

Soil Map Unit Name: VoB - Urban land-Othello, 0-5% Slopes NWI classification: EEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

Abutting Christina River

Reconfirmed date: 4/6/2022

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☒ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____ No X	Depth (inches): ____
Water Table Present?	Yes X No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X No ____	Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WA-WET

Tree Stratum (Plot size: 10'R)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 10'R)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 10' R)			
1. Phragmites australis	50	Y	FACW
2. Nuphar lutea	40	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size: 10'R)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WA-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	5Y 3/1	100						organic layer
2-18	5Y 3/1	98	2.5YR 5/6	2	C	M	silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Mari (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks:

Waters of the U.S. Data Sheet

Project: South Market St.		**Feature ID:** B	**Stream Order:**
Date: 11/16/18	**State:** DE	**Photos:** 1-5	
Crew: ICH SJF	**County:** New Castle	**Last Flag Number:** B-5A/B	

Feature Hydrologic Class (check one):

Tidal	Perennial	Intermittent	Ephemeral
⊗ TNW (Subject to ebb and flow)	○ TNW – Perennial (Flowing year round)	○ RPW – Seasonal (must flow at least 3 months a year)	○ Non-RPW draining uplands
	○ RPW – Perennial (Flowing year round)		○ Non-RPW erosional feature
			○ Non-RPW with abutting wetland
			○ Non-RPW with adjacent wetland
Describe rational for hydrologic class: flowing during visit			○ Non-RPW wetland adjacent or abutting upstream (outside of study area)

Hydrologic Connectivity –	Upstream:	Downstream: Christina River	Adjacent/Abutting: wetland A

Feature Description: ***(check all that apply)***

Shape (with respect to OHW)		Substrate			Vegetation Cover Type (MBSS)
☒ Natural Channel Shape	Width: 4 ft.	☒ Silts	☐ Sands	☐ Muck	RB: wetland A
☒ Artificial (man-made) outfall	Depth: 6 in.	☐ Cobbles	☐ Gravel	☐ Other:	
☐ Manipulated (man-altered)	Bank Erosion/stability:	☐ Bedrock	☐ Concrete		LB: wetland A
☐ Other:	stable	Side slope: ☐ ≥1:1 ☒ 2:1 ☒ 3:1 ☐ ≤4:1 (upstream / downstream)			
Notes:					

Weather/Precipitation Conditions:

During Field Visit		Inches of Rain Within Last Week		Monthly Drought Condition NCDC Regional PDSI http://www.ncdc.noaa.gov/temp-and-precip/climatological-rankings/index.php Month: Oct. Year: 2018												
⊗	No rain	○	0-0.5	○	○	○	○	○	○	○	○	○	⊗	○	○	○
○	Light rain	⊗	0.5-1	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
○	Heavy Rain	○	>1	Severe Drought			Moderate Drought		Normal			Moderately Wet		Severely Wet		

Non-tidal tributary has: ***(check all that apply; include photos for each & list photo #)***

Bed and Banks		Ordinary High Water Mark					
☒	Yes	☐	Clear, natural line impressed on the bank	☐	Sediment deposition	☐	Sediment sorting
☐	No	☐	Changes in the character of soil	☐	Water staining	☐	Scour
		☐	Shelving	☐	Presence of flood litter/debris	☐	Observed/predicted flow events
		☐	Vegetation matted down, bent, or absent	☐	Destruction of terrestrial veg.	☐	Abrupt change in plant community
		☐	Leaf litter disturbed	☐	Presence of wrack line	☐	Other:

Tidal tributary has: ***(check all that apply; include photos for each & list photo #)***

High Tide Line		Mean High Water Mark indicated by:		Chemical Characteristics	
☐	Oil or scum line along shore objects	☐	Survey to available datum	☐	Water is clear
☒	Fine shell or debris deposits (foreshore)	☐	Physical markings	☐	Water is discolored
☐	Physical markings/characteristics	☒	Vegetation lines/changes in types	☐	Oily film
☐	Tidal gauges			☐	Other:
Notes:					

RK&K Waters of the U.S. Data Sheet

Version 2.1 - August 2019

Project: SMR Area 2			**Feature ID:** WUS-D		**Use Class:**
Date: 02/16/21	**State:** DE		**Photos:** 2567 - 2569		
Crew: KR, AJN	**County:** New Castle		**Last Flag Number:** D - 2A/B		

Feature Hydrologic Class (check one):

Tidal	Perennial	Intermittent	Ephemeral	Other
☐ TNW	☐ TNW	☐ Tributary	☐ Tributary	☐ Impoundment
	☒ Tributary	☐ Ditch	☐ Ditch	☐ POW

Describe rationale for hydrologic class, including flow: small ditch along fence just upstream of B-T-WUS.

Hydrologic Connectivity –	Upstream: Outside SA	Downstream: WET A_T	Adjacent/Abutting:

Ditch Information:	Roadside Ditch	Direct Flow to TNW	Abutting a Wetland	Within a Wetland	Relocated Tributary
N/A ☒	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	Toe of slope	Symmetrical	Const. Uplands	Between Wetlands	*Documentation:*
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	

Feature Description: ***(check all that apply)***

Shape (with respect to OHW)		Substrate			Vegetation Cover Type (MBSS)
☐ Natural Channel Shape	Width: 3-5'	☐ Silts	☐ Sands	☒ Muck	RB: uplands / industrial
☐ Artificial (man-made)	Depth: 2-6"	☐ Cobbles	☐ Gravel	☐ Other:	LB: scrub shrub
☒ Manipulated (man-altered)	Bank Erosion/stability:	☐ Bedrock	☐ Concrete		*Notes:*
☐ Other:	moderate				
		Side slope: ☐ ≥1:1 ☐ 2:1 ☒ 3:1 ☐ ≤4:1			

General Notes:

Weather/Precipitation Conditions:

Rain			Monthly Drought Condition NCDC Regional PDSI http://www.ncdc.noaa.gov/temp-and-precip/climatological-rankings/index.php **Month:** Jan **Year:** 2021												
During visit	Last 48hrs	Last week										☒			
☒ No rain	☒ 0-0.1	☐ 0-0.5													
☐ Light rain	☐ 0.1-0.5	☒ 0.5-1	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
☐ Heavy Rain	☐ > 0.5	☐ >1	Severe Drought			Moderate Drought		Normal			Moderately Wet		Severely Wet		

Non-tidal tributary has: ***(check all that apply)***

Ordinary High Water Mark							
☒ Clear, natural line impressed on the bank	☐	Sediment deposition	☐	Water staining	☐	Abrupt change in plant community
☐ Changes in the character of soil	☐	Presence of wrack line	☐	Shelving	☐	Destruction of terrestrial veg.
☒ Presence of flood litter/debris	☐	Leaf litter disturbed	☐	Sediment sorting	☒	Observed/predicted flow events
☐ Vegetation matted down, bent, or absent	☐	Scour	☐	Other:		

Tidal tributary has: ***(check all that apply)***

High Tide Line	Mean High Water Mark indicated by:	Chemical Characteristics
☐ Oil or scum line along shore objects	☐ Survey to available datum	☐ Water is clear
☐ Fine shell or debris deposits (foreshore)	☐ Physical markings	☐ Water is discolored
☐ Physical markings/characteristics	☐ Vegetation lines/changes in types	☐ Oily film
☐ Tidal gauges		☐ Other:

Waters of the U.S. Data Sheet

Project:	SMR Area 2		**Feature ID:**	WUS-E_T	**Stream Order:** 1
Date:	02/16/21	**State:** DE	**Photos:**	2570 - 73	
Crew:	KR, AJN	**County:** New Castle	**Last Flag Number:**	E_T 15 A/B	

Feature Hydrologic Class (check one):

Tidal	Perennial	Intermittent	Ephemeral
☑ TNW (Subject to ebb and flow) low flow → wet to a channel.	☐ TNW – Perennial (Flowing year round)	☐ RPW – Seasonal (must flow at least 3 months a year)	☐ Non-RPW draining uplands
	☐ RPW – Perennial (Flowing year round)		☐ Non-RPW erosional feature
			☐ Non-RPW with abutting wetland
			☐ Non-RPW with adjacent wetland
Describe rational for hydrologic class:			☐ Non-RPW wetland adjacent or abutting upstream (outside of study area)

Hydrologic Connectivity –	Upstream: outside SA	Downstream: WET A_T	Adjacent/Abutting:

Feature Description: ***(check all that apply)***

Shape (with respect to OHW)		Substrate			Vegetation Cover Type (MBSS)
☐ Natural Channel Shape	Width: 4-8'	☒ Silts	☐ Sands	☒ Muck	RB: scrub shrub
☐ Artificial (man-made)	Depth: 1-3"	☐ Cobbles	☐ Gravel	☒ Other: rocks	
☒ Manipulated (man-altered)	Bank Erosion/stability: stable	☐ Bedrock	☐ Concrete		LB: scrub shrub
☐ Other:		Side slope: ☐ ≥1:1 ☐ 2:1 ☐ 3:1 ☒ ≤4:1			
Notes:					

Weather/Precipitation Conditions:

Rain in AM/ previous night During Field Visit		Inches of Rain Within Last Week		Monthly Drought Condition NCDC Regional PDSI http://www.ncdc.noaa.gov/temp-and-precip/climatological-rankings/index.php Month: Jan Year: 2021												
☒	No rain	☐	0-0.5	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
☐	Light rain	☒	0.5-1	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
☐	Heavy Rain	☐	>1	Severe Drought			Moderate Drought		Normal			Moderately Wet		Severely Wet		

Non-tidal tributary has: ***(check all that apply; include photos for each & list photo #)***

Bed and Banks	Ordinary High Water Mark			
☐ Yes	☐ Clear, natural line impressed on the bank	☐ Sediment deposition	☐ Sediment sorting	
☐ No	☐ Changes in the character of soil	☐ Water staining	☐ Scour	
	☐ Shelving	☐ Presence of flood litter/debris	☐ Observed/predicted flow events	
	☐ Vegetation matted down, bent, or absent	☐ Destruction of terrestrial veg.	☐ Abrupt change in plant community	
	☐ Leaf litter disturbed	☐ Presence of wrack line	☐ Other:	

Tidal tributary has: ***(check all that apply; include photos for each & list photo #)***

High Tide Line	Mean High Water Mark indicated by:	Chemical Characteristics
☐ Oil or scum line along shore objects	☐ Survey to available datum	☒ Water is clear – light tea
☐ Fine shell or debris deposits (foreshore)	☐ Physical markings	☐ Water is discolored
☐ Physical markings/characteristics	☑ Vegetation lines/changes in types	☐ Oily film
☒ Tidal gauges		☐ Other:
Notes:		

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: South Market St. Area 2 City/County: Wilmington Sampling Date: 5/16/22

Applicant/Owner: RDC State: DE Sampling Point: WF-WET

Investigator(s): KR / ASN Section, Township, Range:

Landform (hillslope, terrace, etc.): Toe of slope swale Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR or MLRA): LRR S Lat: 39.731091 Long: -75.558039 Datum: NAD83

Soil Map Unit Name: VoB Urban Land-Othello Complex 0-5% slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks:

Swale wetland draining into perennial channel

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ✓ No ____ Depth (inches): 2"

Water Table Present? Yes ✓ No ____ Depth (inches): 0"

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 0"

Wetland Hydrology Present? Yes ____ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Sampling Point: WF-WET

VEGETATION (Four Strata) – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 10x10)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 10x10)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 10x10)			
1. Phragmites australis	40	Y	FACW
2. Juncus effusus, Lythrum salicaria	10	N	FAC
3. Leersia oryzoides	45	Y	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No __

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WF-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100					S.H loam	
2-8	2.5Y 3/1	90	7.5YR 6/8	10	C	M	Silty Clay loam	
8+								Unconsolidated Soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

APPENDIX D

Photographic Documentation

Wetland A_T Estuarine Emergent Wetland

Wetland A_T Estuarine Emergent Wetland

Waters B Tidal Tributary

Waters B Tidal Tributary

Waters D Perennial Tributary

Waters E_T Tidal Tributary

Wetland F Palustrine Emergent Wetland

Wetland F Palustrine Emergent Wetland

Christina River Tidal Waterway

Appendix D – Bioassessment Datasheets

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME WATERS B		LOCATION WILMINGTON, DE	
STATION # _____ RIVERMILE _____		STREAM CLASS TIDAL	
LAT _____ LONG _____		RIVER BASIN CHRISTINA RIVER	
STORET #		AGENCY CITY OF WILMINGTON	
INVESTIGATORS MBS/JTR			
FORM COMPLETED BY MBS	DATE 10-3-2023 TIME 10:15 (AM) PM	REASON FOR SURVEY MEPA	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

42

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 92

50

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME WATERS D	LOCATION WILMINGTON, DE	
STATION # _____ RIVERMILE _____	STREAM CLASS PERENNIAL	
LAT _____ LONG _____	RIVER BASIN CHRISTINA RIVER	
STORET #	AGENCY CITY OF WILMINGTON	
INVESTIGATORS MBS/JTR		
FORM COMPLETED BY MBS	DATE 10-3-2023 TIME 10:00 (AM) PM	REASON FOR SURVEY NEPA

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 0 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)

Total Score 101

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME WATERS E	LOCATION WILMINGTON, DE	
STATION # _____ RIVERMILE _____	STREAM CLASS TIDAL	
LAT _____ LONG _____	RIVER BASIN CHRISTINA RIVER	
STORET #	AGENCY CITY of WILMINGTON	
INVESTIGATORS MBS/JTR		
FORM COMPLETED BY MBS	DATE 10-3-2023 TIME 10:30 (AM) PM	REASON FOR SURVEY NEPA

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

55

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 **(13)** 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 **(0)**
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	**(8)** 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	**(8)** 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	**(5)** 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	**(5)** 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank **(10)** 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	**(2)** 1 0

Total Score 106

51

Mid-Atlantic Tidal Wetland Rapid Assessment Method V4.1

Site # Wetland A Site Name South Market Street Date 10/03/2023

Time of Start& Finish____:____ ____:____ Crew Initials JTR/MBS

Watershed Christina River Sub-Watershed_____

lat/long _____ AA shape: circle or rectangle or entire wetland polygon (circle)

AA moved from original location? Yes or No (circle one) If yes: distance, direction, reason _____

Classification: (circle one)

Marine Tidal
Fringing Estuarine Tidal
Expansive Estuarine Tidal
Back Barrier Estuarine Tidal
Fringing Palustrine Tidal
Expansive Palustrine Tidal

Reference or Assessment (circle one)

Natural, Re-establishment, establishment
Enhancement, Impoundment (circle one)

What best describes the tidal stage over the course of the time spent in the field? (circle one)

Note: It is recommended that the assessment be conducted at low tide.

Tide Stage

H <----------M----------> L

5 4 3 2 1

Range of Photo Identification Numbers:

Stressor Photo Description:

Assessment Area Sketch

Entire wetland see wetland figure

low marsh or high marsh or fresh (circle one)

Distance to Upland 1 **meters**

Distance to Open Water 1 **meters**

Stability of AA (check one)
___Healthy & Stable
X Beginning to deteriorate and/or some fragmentation
___Severe deterioration and/or substantial fragmentation

Soils

Depth of organic layer (cm): 5

Comments on soil sample: Silty Loam

Salinity 4 **ppt**

Vegetation Communities and Features

Enter midpoint for each species/combination present using the cover class chart below

_____Spartina alterniflora	100 Phragmites australis	_____root mat
_____Spartina patens	_____pannes, pools, creeks	_____unvegetated, mud or sand
_____Spart. alterniflora/Spart. cynosuroides	_____open water	___unhealthy marsh-SWD, deterioration
_____Spartina patens-Distichlis spicata	_____ditches	100 other 1 *Nuphar lutea*

Cover Classes	MidPt	Cover Classes	MidPt	Cover Classes	MidPt
0	0	6-25%	15.5	76-99%	88.5
<1%	0.5	26-50%	38	100%	100
1-5%	2.5	51-75%	63		

Comments:

Qualitative Disturbance Rating

1	2	3	4	5	6

(circle one)

Low <----------Disturbace----------> High

Assessment Complete: Yes No (circle one)

Mid-Atlantic Tidal Wetland Rapid Assessment Method V.4.1

Site # _____ Date ____/_____/_____

Attribute 1: Buffer/Landscape (All W/in 250m)

B1. Percent of Assessment Area Perimeter with 10m-Buffer

Percent 30 %	Max: 3,456m²
Alternative States(not including open-water areas)	**Rating**
Buffer is 100% of AA perimeter.	**12**
Buffer is 94-99.9% of AA perimeter.	**9**
Buffer is 80-93.9% of AA perimeter.	**6**
Buffer is <79.9% of AA perimeter.	**3**

B2. Natural Land Use in Buffer (excluding AA)

% Natural Land Use 20	Max: 274,890m²
Alternative States	**Rating**
100% natural land use buffer	**12**
75-99.9% natural land use buffer	**9**
55-74.9% natural land use buffer	**6**
<54.9% natural land use buffer	**3**

B3. Altered and High Impact Land Use in Buffer (excluding AA)

Un-Natural Land Use 4 **%** **High Impact Land Use** 76 **% (250m buffer = 274,890m²)**

Alternative States	Rating
No Un-Natural Landuses	**12**
0-20% Un-Natural Land Use and <5% High Impact Land Use	**9**
20-50% Un-Natural Land Use and/or 5-20% High Impact Land Use	**6**
>50% Un-Natural Land Use or >20% High Impact Land Use	**3**

B4. Buffer Landscape Condition

Alternative States	Rating
AA's surrounding landscape is comprised of only native vegetation, has undisturbed soils, no point source discharges, and there is no evidence of human disturbance.	**12**
AA's surrounding landscape is dominated by native vegetation, has undisturbed soils, receives water from a stormwater pond drain, and there is to little or no evidence of human visitation.	**9**
AA's surrounding landscape is characterized by an intermediate mix of native and non-native vegetation, and/or a moderate degree of soil disturbance/compaction, and/or receives water from one or more agricultural field ditch(es), and/or there is evidence of moderate human visitation.	**6**
AA's surrounding landscape is characterized by barren ground and/or dominated by invasive species and/or highly compacted or otherwise disturbed soils, and/or receives discharge directly from a polluted source, and/or there is evidence of very intensive human visitation.	**3**

B5. Barriers to Landward Migration

% Perimeter Obstructed 100 **%**

Dist. From Center of AA 16 **m**

Alternative States	Rating
Absent: no barriers	**12**
Low: <10% of perimeter obstructed	**9**
Moderate: 10-25% of perimeter obstructed	**6**
High: 26-100% of perimeter obstructed	**3**

Attribute 3: Habitat (All W/in AA)

HAB1a. Bearing Capacity (Hummocks) *

% Hummocks _____%	Mark Depth (cm)							
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
Water Depth (cm)								
Initial depth								
Blow 1								
Blow 2								
Blow 3								
Blow 4								
Blow 5 (Final)								
Blow 5 - Initial								

Hummocks average = _____

*** if hummocks are present >10% use this workspace**

____ % of AA in hummocks x ____ hummocks avg (HAB1a)= _____
_____ % of AA in hollows x ____ hollows average (HAB1b) = _____
Sum of two weighted averages = _____

Tidal Salt **Tidal Fresh**

Av. of Final - Initial for the 8 Sub-plots	Rating (circle one)	Av. of Final - Initial for the 8 Sub-plots	Rating (circle one)
≤ 1.80	**12**	≤ 4.40	**12**
1.81-4.00	**9**	4.41-6.70	**9**
4.01-6.20	**6**	6.71-11.40	**6**
> 6.21	**3**	> 11.41	**3**

Average Final-Initial =_____cm

HAB1b. Bearing Capacity (Unvegetated Hollows) if applicable*

% Hollows _____%	Mark Depth (cm)							
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
Water depth (cm)								
Initial depth								
Blow 1								
Blow 2								
Blow 3								
Blow 4								
Blow 5								
Blow 5 - Initial								

Hollows average = _____

HAB2. Horizontal Vegetative Obstruction

Sub-plot	1	3	5	7
0.25m	10	10	10	10
0.50m	10	10	10	10
0.75m	10	10	10	10
1.00m	10	10	10	10
1.25m	x	x	10	10
Sum	40	40	50	50
Dominant Veg. Type	Nuphar	Nuphar	Phrag	Phrag

Out of: 18
% unobstructed: 0
100-% unobstructed= % obstructed: 100

Tidal Salt	Tidal Fresh	Rating
≥60%		**12**
45%-59.9		**9**
30%-44.9%		**6**
≤29.9%		**3**

HAB3. # of Plant Layers (covers ≥ 10% of AA)

Floating/ Aquatic Species	____
Short <0.3m	____
Medium 0.3m- 0.75m	____
Tall 0.75m- 1.5m	X
Very Tall > 1.5m	X

Number of Plant Layers: 2

Scoring Plant Layers		Rating
4-5 layers		**12**
2-3 layers		**9**
1 layer		**6**
0 layer		**3**

HAB4. Species Richness (covers > 10% of AA)

Amaranthus cannabinus	____	*Polygonum arifolium*	____
Asclepias incarnata	____	*Polygonum punctatum*	____
Atriplex prostrata	____	*Polygonum ramosissimum*	____
Baccharis halimifolia	____	*Pontederia cordata*	____
Boehmeria cylindrica	____	*Sagittaria latifolia*	____
Bolboschoenus robustus	____	*Salicornia virginica*	____
Clethra alnifolia	____	*Saururus cernuus*	____
Distichlis spicata	____	*Schoenoplectus americanus*	____
Echinochloa walteri	____	*Scirpus taberaemontani*	____
Hibiscus moscheutos	____	*Solidago sempervirens*	____
Impatiens capensis	____	*Spartina alterniflora*	____
Iva frutescens	____	*Spartina cynosuroides*	____
Juncus effusus	____	*Spartina patens*	____
Juncus gerardii	____	*Symplocarpus foetidus*	____
Kosteletzkya virginica (pentacarpos)	____	*Typha angustifolia*	____
Leersia oryzoides	____	*Typha latifolia*	____
Limonium carolinianum	____	*Zizania aquatica*	____
Nuphar luteum	X		____
Panicum virgatum	____		____
Peltandra virginica	____		____
Phragmites australis	X		____
Pluchea odorata	____		____

HAB4. Species Richness

Alternative States	Rating
≥ 6 species	12
4 or 5 species	9
2 or 3 species	6
1 species	3

HAB5. % Invasive Cover in AA

Alternative States	Rating
0%	12
>0-25%	9
26-50%	6
>50%	3

Invasive Species Present: Phrag

Attribute 2: Hydrology

H1a. Ditching/Excavation (OMWM) (AA only) (Salt)

% of AA Ditched or Excavated	Rating
No Ditching	12
0-2.5%	9
2.6-5%	6
>5%	3

OR

H1b. Point Source (250m) (Fresh)

Alternative States	Rating
Absent, No Discharge	12
Low: 1 small discharge from a natural area	9
Moderate: 1 discharge from a developed area or 2 discharges from a natural area	6
High: ≥ 2 discharges from a developed area or ≥ 3 from a natural area	3

	Ditch 1	Ditch 2	Ditch 3
Width 1			
Width 2			
Width 3			
Length			
Total			

H2. Fill (AA only)

% of AA Filled	Rating
No Fill	12
0.1-5%	9
5.1 - 10%	6
≥10.1%	3

Estimate Amount of Fill: _____ **% of AA**

Dimensions of Fill Pile: _____ _____ _____ _____

H3. Diking & Tidal Restriction (250m)

Alternative States	Rating
Absent: no restriction, free flow	12
Elevated Path	9
Dike, Levee Bridge, Berm	6
Undersized Culvert or Bridge	3

Description of Restriction: _____

	AA=7,854m²	
1%	78m²	9m x 9m
5%	393m²	20m x 20m
10%	785m²	28m x 28m

Mid-Atlantic Tidal Wetland Rapid Assessment Method V.4.1

Site Number:	Site Name:		Date:_____/____/____
Attributes and Metrics	**Raw Value**	**Scores**	**Comments**
Buffer/Landscape			
B1. % of AA Perimeter with 10m Buffer		3	
B2. Natural Land Use		3	
B3. Surrounding Land Use		3	
B4. 250 Landscape Condition		3	
B5. Barriers to Landward Migration		3	
((((∑(B1,B2,B3,B4,B5))/60)*100)-25)/75)*100 = **Buffer Attribute Score**		0	
Hydrology			
H1 Ditching & Excavating (OMWM) or Point Sources		12	
H2. Fill		12	
H3. Diking/Restriction		12	
((((∑(H1,H2,H3))/36)*100)-25)/75)*100 = **Hydrology Attribute Score**		100	
Habitat			
HAB1. Bearing Capacity		3	
HAB2. Horizontal Vegetative Obstruction		12	
HAB3. Number of Plant Layers		9	
HAB4. Species Richness		6	
HAB5. Percent Invasives		3	
((((∑(HAB1,HAB2,HAB3,HAB4,HAB5))/60)*100)-25)/75)*100 = **Habitat Attribute Score**		40	

((Buf/Land + Hydrology + Habitat Attribute Scores)/3)= Final Score

Final Score = 46.67

Wetland Function-Value Evaluation Form

Total area of wetland 3,213.92 SF Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? Yes

Adjacent land use Industrial Distance to nearest roadway or other development 3 feet

Dominant wetland systems present PEM Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Drains to Waters D, which in-turn drains to the Christina River

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. F

Latitude 39.731088 Longitude -75.557973

Prepared by: JTR/MBS Date 10/03/2023

Wetland Impact:
Type _____ Area 3,213.92 SF

Evaluation based on:
Office X Field _____

Corps manual wetland delineation completed? Y X N _____

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge		X			
Floodflow Alteration	X		4,5,9,12,18		
Fish and Shellfish Habitat		X			
Sediment/Toxicant Retention	X		2,3,4	X	
Nutrient Removal	X		3,4,5,7,8,9,10,		
Production Export		X			
Sediment/Shoreline Stabilization		X			
Wildlife Habitat		X			
Recreation		X			
Educational/Scientific Value		X			
Uniqueness/Heritage		X			
Visual Quality/Aesthetics		X			
ES Endangered Species Habitat		X			
Other					

Notes:

* Refer to backup list of numbered considerations.