Chapter IV.D: Water Resources – Fjord Trail South

A. INTRODUCTION

This chapter presents the existing conditions and assesses the Proposed Action's potential impacts on water resources, including groundwater, floodplains, wetlands, and surface waters, within Fjord Trail South. An evaluation of the proposed Fjord Trail North is provided in Chapter III.D, "Water Resources – Fjord Trail North."

METHODOLOGY

STUDY AREA AND EXISTING CONDITIONS

The study area for groundwater, floodplains, wetlands, and surface waters is the potential limit of disturbance for Fjord Trail South (also referred to as the Fjord Trail South Corridor), including the meanders at Little Stony Point and Dockside Park in Cold Spring. The study area for surface waters includes the Hudson River adjacent to the Fjord Trail South Corridor as well as smaller streams that pass through the limit of disturbance and any reservoirs connected to those streams.

The following data sources were used to identify the existing conditions for groundwater, floodplains, wetlands, and surface waters along the Fjord Trail South Corridor:

- U.S. Environmental Protection Agency (USEPA) Sole Source Aquifer maps;
- U.S. Geological Survey (USGS) groundwater mapping tools for upstate New York, including the Upstate New York Surficial Aquifer Viewer and Detailed Aquifer Mapping Program in Upstate New York;
- New York State Department of Environmental Conservation (NYSDEC) Primary and Principal Aquifer maps and databases for Water Wells and Water Withdrawals;
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs);
- NYSDEC projections of sea level rise at 6 NYCRR Part 490;
- NYSDEC Environmental Resource Mapper and Hudson Valley Natural Resource Mapper (layers for state regulated freshwater wetlands, waterbody classifications for rivers/streams, significant natural communities, and rare plants or animals);
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) wetland maps;
- Wetland delineations conducted for the project in June 2020;
- Surface water mapping data from Putnam County GIS and project team; and
- Stormwater management strategies prepared for the project.

REGULATORY CONTEXT

The Proposed Action must comply with federal and state legislation and regulatory programs that pertain to activities in and adjacent to coastal areas,[1] floodplains, wetlands, and surface waters. To the extent the project is located on privately owned lands, the Proposed Action may also be subject to local regulation of these water resources. The anticipated permits and approvals required for the project are listed in Table II-1 in Chapter II, "Project Description," along with the agencies responsible for authorization. This section provides a summary description of the federal and state legislation and regulatory programs that may apply to Fjord Trail South.

FEDERAL

Clean Water Act (33 USC §§ 1251 to 1387)

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, stormwater; the discharge of dredged or fill material into navigable waters and other waters of the U.S.; and non-point source pollution (i.e., runoff from streets, agricultural fields, construction sites, and mining) that enter waterbodies from sources other than the end of a pipe. Section 404 of the Clean Water Act requires authorization from the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE) for the discharge of dredged or fill material into waters of the U.S. Under Section 401 of the Act, any applicant for a federal permit or license for an activity that may result in a discharge to navigable waters must provide to the federal agency issuing a permit a certificate that the discharge would comply with other sections of the Clean Water Act. Applicants for discharges to navigable waters in New York must obtain a Water Quality Certification from NYSDEC, as discussed below.

Rivers and Harbors Act of 1899

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through USACE, for the construction of any structure in or over any navigable water of the United States, the excavation from or deposition of material in these waters, or any obstruction or alteration in navigable waters of the United States. The purpose of this act is to protect navigation and navigable channels. Any structures placed in or over navigable waters, such as pilings or bridge abutments, are regulated pursuant to this Act.

NEW YORK STATE

Protection of Waters (New York Environmental Conservation Law [ECL] Article 15, Title 5, Implementing Regulations 6 NYCRR Part 608)

NYSDEC is responsible for administering the Protection of Waters Act and regulations to govern activities on surface waters (rivers, streams, lakes, and ponds). The Protection of Waters Permit Program regulates five different categories of activities: disturbance of stream beds or banks of a protected stream or other watercourse; construction, reconstruction, or repair of dams and other impoundment structures; construction, reconstruction, or expansion of docking and mooring facilities; excavation or placement of fill in navigable waters and their adjacent and contiguous

[1] Chapter X, "Coastal Zone Management Program Consistency," evaluates the Proposed Action's consistency with the applicable policies of the New York State Coastal Management Program and the Local Waterfront Revitalization Program for the City of Beacon.

wetlands; and Water Quality Certification for placing fill or other activities that result in a discharge to waters of the United States in accordance with Section 401 of the Clean Water Act.

State Pollutant Discharge Elimination System (SPDES) (ECL Article 3, Title 3; Article 15; Article 17, Titles 3, 5, 7, 8; Article 21; Article 70, Title 1; Article 71, Title 19; Implementing Regulations 6 NYCRR Part 750)

Title 8 of Article 17, ECL, Water Pollution Control, authorized the creation of SPDES to regulate discharges to New York State's waters pursuant to a delegation by USEPA to New York State of permitting authority pursuant to the Clean Water Act. Activities requiring a SPDES permit, as authorized by NYSDEC, include point source discharges of wastewater into surface or groundwater of the state, constructing or operating a disposal system (sewage treatment plant), discharge of stormwater, and construction activities that disturb one or more acres.

Freshwater Wetlands Act (ECL Article 24, Implementing Regulations 6 NYCRR Parts 662, 663, and 664)

The Freshwater Wetlands Act, which seeks to preserve and protect the benefits that wetlands provide, requires NYSDEC to map freshwater wetlands in the State. Freshwater wetlands larger than 12.4 acres (5 hectares) in size, and certain smaller wetlands of unusual local importance, are protected under the Act along with a 100-foot adjacent area around the mapped wetland boundary. NYSDEC regulates these freshwater wetlands through its Freshwater Wetlands Regulatory Program. A permit is required for activities that would alter wetlands or land within the 100-foot wetland adjacent area.

In 2022, NYSDEC amended the Freshwater Wetlands Act to modify the way the program is administered and amended the regulations to include updated definitions and criteria for wetlands. As part of the statutory changes, on January 1, 2025, the NYSDEC freshwater wetland maps will become informational, and any wetlands that meet the applicable definition and criteria defined in the new rule will be regulated by NYSDEC and subject to permitting, regardless of whether they appear on the maps. Small wetlands of "unusual importance" will also be regulated if they meet certain criteria. In 2028, the Freshwater Wetlands Act will be further updated to decrease the size threshold for regulated wetlands from 12.4 acres to 7.4 acres. Until these updated regulations come into effect, NYSDEC continues to administer the Freshwater Wetlands Act as described above.

New York State Community Risk and Resiliency Act (6 NYCRR Part 490)

NYSDEC's Community Risk and Resiliency Act (CRRA) was enacted to establish projections of sea-level rise for New York's tidal coast, including the main stem of the Hudson River. CRRA established projected sea level rise levels for Long Island, New York City, the Lower Hudson River, and the Mid-Hudson River. Under this Part, the CRRA requires applicants for permits or funding to demonstrate that future physical climate risk due to sea level rise, storm surge, and flooding have been considered in the project design. NYSDEC and the New York State Department of State (NYSDOS) have prepared guidance documents (i.e., State Flood Risk Management Guidance, Using Natural Measures to Reduce the Risk of Flooding) recommending flood-risk management elevations and the use of natural resilience measures, or actions that conserve, restore, or mimic natural landforms and processes to reduce climatic risks. NYSDEC may apply these guidelines in consideration of permit issuance and development of permit conditions intended to reduce significant future risk due to sea level rise, storm surge, or flooding.

B. EXISTING CONDITIONS

GROUNDWATER

Groundwater is present in almost all bedrock and overburden (e.g., rock or soil overlying a mineral deposit) below the ground surface in the study area as a result of soil infiltration of precipitation and surface runoff to streams, and rivers during precipitation events. Geologic materials that can yield appreciable quantities of groundwater are referred to as aquifers. USEPA designates aquifers that supply at least 50 percent of the drinking water for the overlying area as Sole-Source Aquifers. NYSDEC identifies two categories of aquifers where groundwater resources are most productive and most vulnerable: 1) Primary Aquifers, which are "highly productive aquifers presently utilized as sources of water supply by major municipal water supply systems," and 2) Principal Aquifers, which are "aquifers known to be highly productive or whose geology suggests abundant potential water supply, but are not intensively used as sources of water supply by major municipal systems at the present time." There are no Sole-Source, Primary, or Principal Aquifers in the study area (USEPA 2024, NYSDEC 2024) (see **Figure IV.D-1**).

The primary source of groundwater within the study area is infiltration within recharge areas with groundwater flow toward the tributaries and the Hudson River, which is a regional groundwater discharge boundary. Depth to groundwater within the study area is variable depending on the proximity to a surface waterbody and the amount of rainfall, stormwater runoff, and other seasonal factors.

FLOODPLAINS

The Fjord Trail South Corridor is represented by three different FEMA floodplain maps (36079C0078E, 36079C0086E, and 36079C0087E updated 3/4/2013). The Fjord Trail South Corridor is mainly located within the 1-percent annual chance (100-year) floodplain in Zone AE, which includes the Hudson River and adjacent land generally west of NYS Route 9D (see **Figure IV.D-2**). Zone AE identifies the area subject to inundation by the 1-percent annual chance flood event and is considered to be a special flood hazard area. Based on the FEMA floodplain maps listed above, the base flood elevation (BFE) for the areas in Zone AE is about +7 feet NAVD88.[2] Smaller areas on the border of Zone AE, mainly those north of Little Stony Point, are within the 0.2 percent annual chance (500-year) floodplain (see **Figure IV.D-2**), which is not assigned a BFE.

Because the Hudson River is a tidal estuary in the study area, it is affected by sea level rise and its shores are vulnerable to coastal flooding. NYSDEC has developed sea level rise projections for the Lower Hudson-New York City Region (6 NYCRR Part 490).[3] Under the High Scenario projections, sea levels are likely to increase by up to 23 inches by the 2050s, 45 inches by the 2080s, and 65 inches by 2100 under the High Scenario projections (NPCC 2015). Under current conditions, the highest BFE in the study area is estimated at +7.3 feet NAVD88 for the Fjord Trail South corridor located in Zone AE, as described above. The existing mean higher high water (MHHW) elevation, a representation of high tide, is +2.06 feet NAVD88, as determined through a site-specific survey conducted by the design team for the project. Based on the NYSDEC High Scenario projections, the 1-percent annual chance flood elevation for the Fjord Trail South Corridor

[2] The Basis of Design for Fjord Trail South uses a base flood elevation of +7.3 feet NAVD88 for Putnam County (FEMA Flood Insurance Study #36079C0087E, effective March 4, 2013) and +7.2 feet NAVD88 for Dutchess County (FEMA Flood Insurance Study #36027C0463E, effective May 2, 2012).

[3] https://dec.ny.gov/sites/default/files/2024-02/part490expressterms2024pub.pdf

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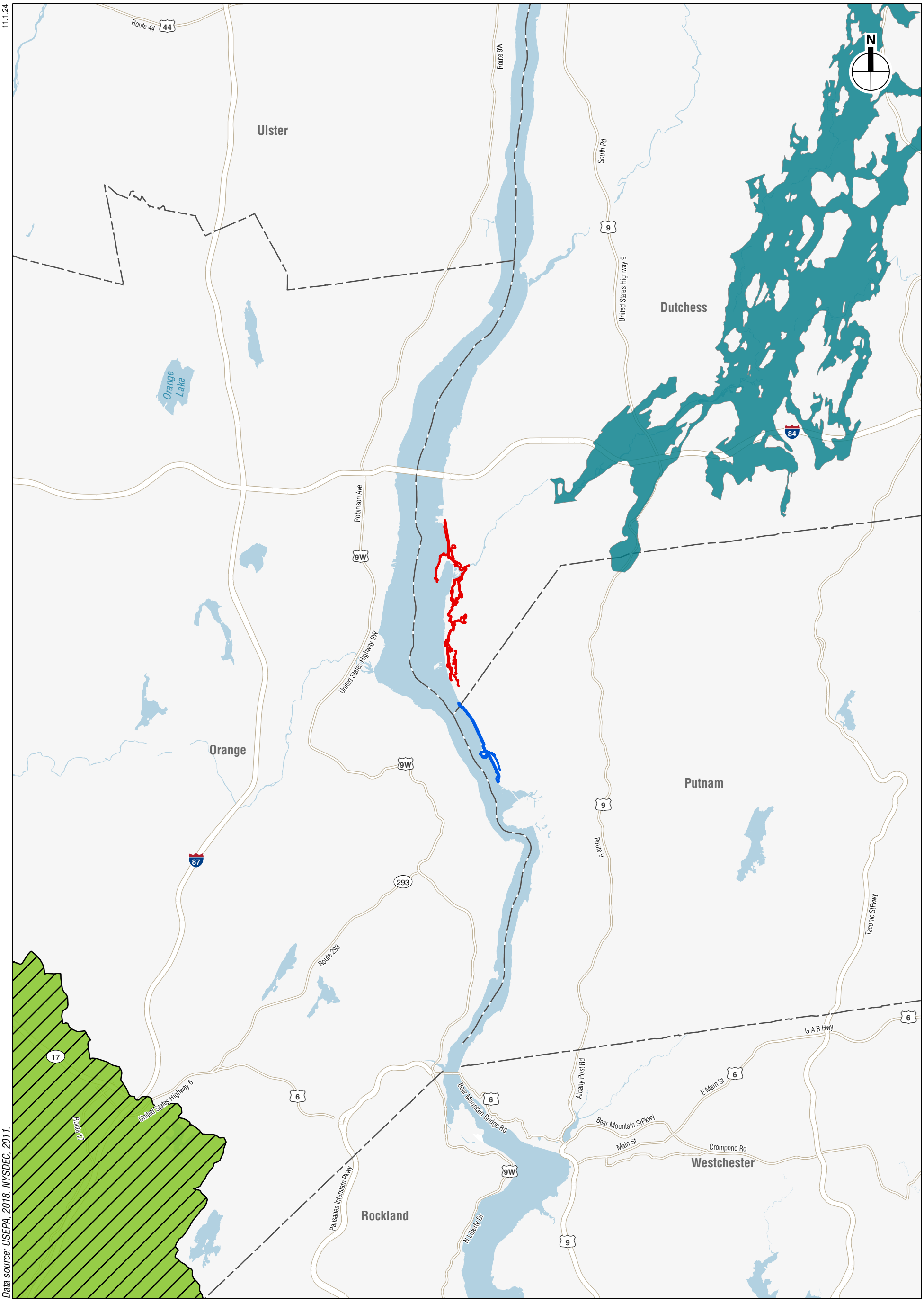

HUDSON HIGHLANDS FJORD TRAIL

Sole Source Aquifers

Figure IV.D-1

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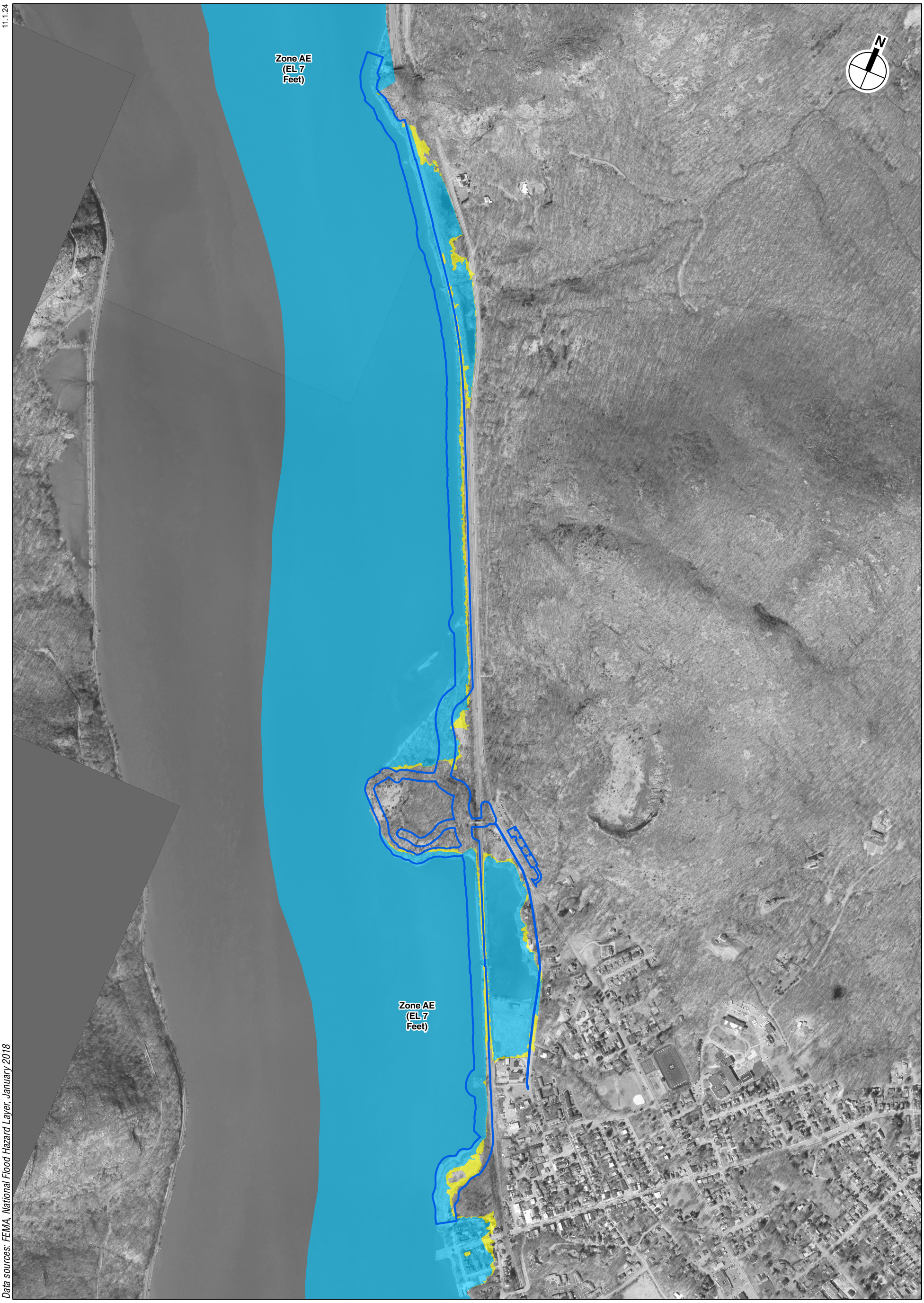

Data sources: FEMA, National Flood Hazard Layer, January 2018

Trail Corridor - Fjord Trail South

1% Annual Chance of Flooding

0.2% Annual Chance of Flooding

0 2,000 FEET

FEMA 100-year and 500-year Floodplains

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-2

could increase to +9.2 feet NAVD88 by the 2050s and +12.7 feet NAVD88 by 2100, and MHHW elevation could increase to +4.0 feet NAVD88 by the 2050s and +7.5 feet NAVD88 by 2100.

WETLANDS

NYSDEC WETLANDS

There are currently no NYSDEC-mapped freshwater wetlands in the study area for the Fjord Trail South Corridor (see **Figure IV.D-3**). There are no state-regulated tidal wetlands along the Fjord Trail South Corridor.

NWI WETLANDS

USFWS NWI wetland maps indicate that mapped tidal and freshwater wetlands occur along the Fjord Trail South Corridor (see **Figure IV.D-4** and **Table IV.D-1**). These wetlands have not been delineated by the project team. The NWI-mapped tidal wetlands include estuarine and marine deepwater (E1UBL6 and E1UBLh6), which comprises the Hudson River and tidal wetland on the east side of the Metro-North Railroad (MNR) railroad tracks and just north of Mayor's Park in Cold Spring. Freshwater wetland types present along the Fjord Trail South Corridor include forested/shrub (PSS1C and PFO1A) and freshwater ponds (PUBHx, PUBHh, and PUBFh) located on Little Stony Point and between NYS Route 9D and the MNR railroad tracks south of Breakneck Ridge.

Table IV.D-1
Federally Mapped Wetland Types within the Study Area

Wetland Code	Wetland Type	Description
PFO1A	Freshwater forested/shrub	Palustrine (P), forested (FO), broad-leaved deciduous (1), temporary flooded (A)
PSS1C	Freshwater forested/shrub	Palustrine (P), scrub/shrub (SS), broad-leaved deciduous (1), seasonally flooded (C)
PUBHx	Freshwater pond	Palustrine (P), unconsolidated bottom (UB), permanently flooded (H), excavated (x)
PUBHh	Freshwater pond	Palustrine (P), unconsolidated bottom (UB), permanently flooded (H), diked/impounded (h)
PUBFh	Freshwater pond	Palustrine (P), unconsolidated bottom (UB), semi-permanently flooded (F), diked/impounded (h)
E1UBL6	Estuarine and marine deepwater (Hudson River)	Estuarine (E), subtidal (1), unconsolidated bottom (UB), subtidal (L), oligohaline (6)
E1UBLh6	Estuarine and marine deepwater	Estuarine (E), subtidal (1), unconsolidated bottom (UB), subtidal (L), diked/impounded (h), oligohaline (6)

Source: USFWS National Wetlands Inventory mapper, 2024 (fws.gov/wetlands/data/mapper.html)

DELINEATED WETLANDS

The project team conducted a wetland delineation along the Fjord Trail South Corridor in June 2020 and identified three freshwater wetlands and one estuarine wetland (see **Figure IV.D-5**), as described below.

Wetland E

Wetland E is a 1.1-acre combination freshwater pond and freshwater forested/shrub wetland located at the northern end of the Fjord Trail South Corridor between the MNR railroad tracks and NYS Route 9D (see **Figure IV.D-5**). The wetland is hydrologically connected to surface water that enters the wetland through a culvert under NYS Route 9D, but field reconnaissance did not

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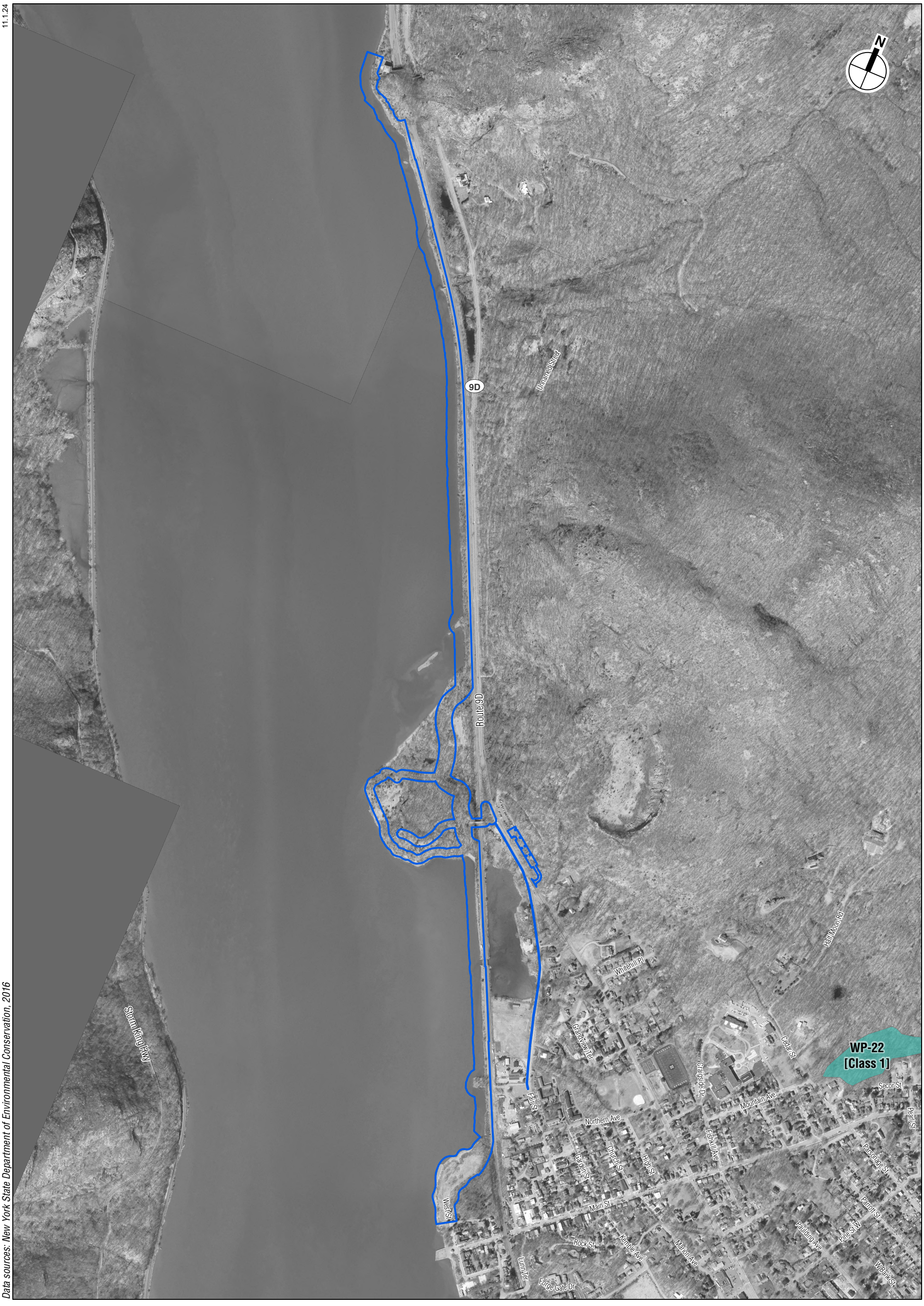

Data sources: New York State Department of Environmental Conservation, 2016

Trail Corridor - Fjord Trail South

NYSDEC Freshwater Wetlands

0 2,000 FEET

NYSDEC Regulated Wetlands

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-3

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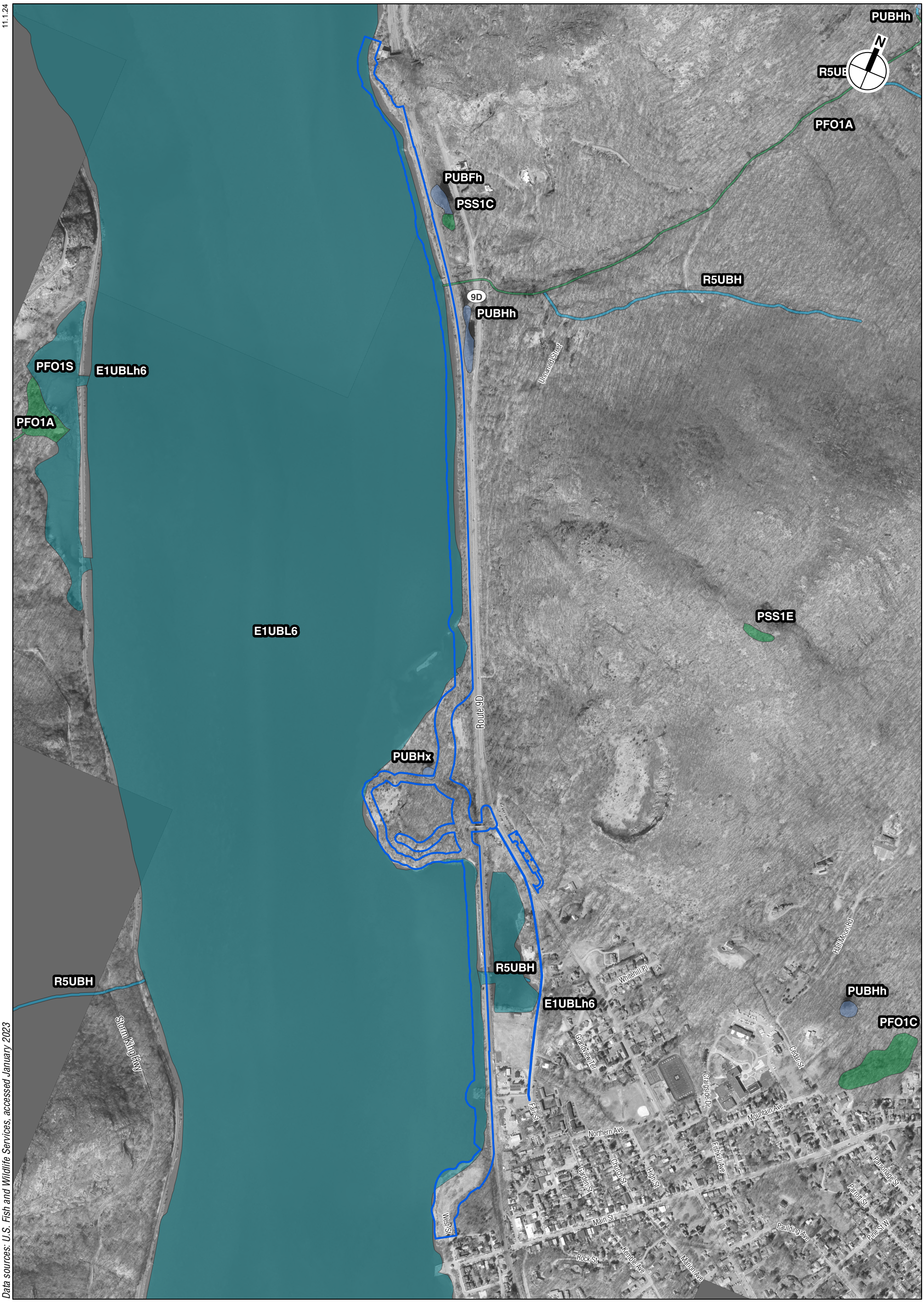

Data sources: U.S. Fish and Wildlife Services, accessed January 2023

Trail Corridor - Fjord Trail South

Estuarine and Marine Deepwater

Freshwater Forested/Shrub Wetland

Freshwater Pond

Riverine

0 2,000 FEET

NWI Wetlands

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-4

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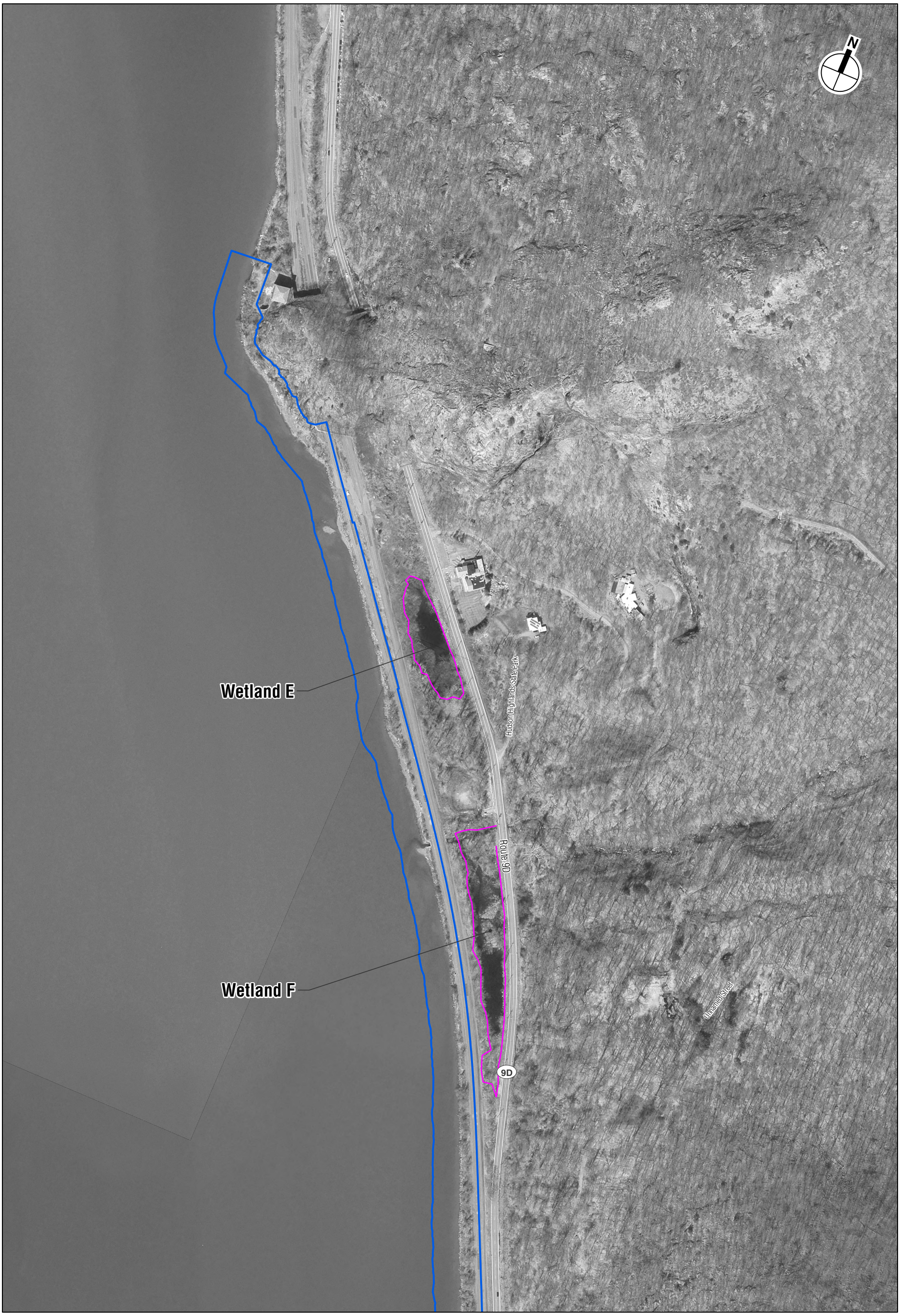

Trail Corridor - Fjord Trail South

Delineated Wetlands

0 1,000 FEET

Delineated Wetlands

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-5a

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Trail Corridor - Fjord Trail South

Delineated Wetlands

0 1,000 FEET

Delineated Wetlands

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-5b

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Trail Corridor - Fjord Trail South

Delineated Wetlands

0 1,000 FEET

Delineated Wetlands

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-5c

identify an obvious outlet from this wetland to the Hudson River. The majority of Wetland E is open water with a fringe of vegetation dominated by red osier dogwood in the west and Phragmites and cattails in the southern portion outside the flooded area.

Wetland F

Wetland F is a 2-acre freshwater pond wetland located just south of Wetland E, between NYS Route 9D and the MNR railroad tracks near the Breakneck Brook culvert (see **Figure IV.D-5**). It receives runoff from four separate culverts that convey water beneath NYS Route 9D, including the largest culvert at the north end which conveys water to Breakneck Brook. The Brook is directed through the culvert under the railroad tracks to the Hudson River; this serves as the outlet for the wetland to the river. The northern portion of the wetland is dominated by emergent and submerged vegetation including cattails, sensitive fern, arrow arum, red osier dogwood, multiflora rose, and occasional Phragmites. The drier areas within this wetland support tearthumb, horsetail, multiflora rose, sassafras, curly leaf dock, and purple loosestrife. The southern portion of the delineated wetland comprises open water with an intermittent channel that flows through the center during storm events, and is dominated by arrow arum, blue flag iris, and jewelweed, as well as larger trees along its western boundary.

Wetland G

Wetland G is a 0.2-acre freshwater wetland located on Little Stony Point near the Fjord Trail South Corridor (see **Figure IV.D-5**). Wetland G is an isolated wetland with apparently seasonal hydrology and has the potential to support amphibian breeding. This feature is discussed in more detail in Chapter IV.E, "Biological Resources – Fjord Trail South."

Wetland H

Wetland H is a 9-acre estuarine and marine deepwater wetland located between the MNR railroad tracks and NYS Route 9D south of Little Stony Point (see **Figure IV.D-5**). This wetland is a large area of open water along the Hudson River shoreline that has a direct connection to the Hudson River by way of a relatively large box culvert under the railroad tracks. Its hydrology is influenced by the water level and tidal stages of the Hudson River. Likely due to the high level of human activity on Little Stony Point, the railroad tracks, and residential and Village park uses to the south and east, vegetation within the wetland boundary is almost entirely composed of non-native species.

SURFACE WATERS

The Fjord Trail South Corridor runs along the eastern shore of the Hudson River between the river and MNR railroad tracks west of NYS Route 9D. The Hudson River within the Fjord Trail South Corridor receives freshwater input from various tributaries that flow in a generally west or southwesterly direction through the project area. Surface water resources within the study area include the Hudson River and Breakneck Brook (see **Figure IV.D-6**), which are described further in the following sections.

WATERSHEDS

The Fjord Trail South Corridor is in the Lower Hudson River Watershed, which covers approximately 12,800 square miles and makes up about 40 percent of the larger Hudson/Mohawk River Basin. It covers the majority of Westchester, Putnam, Orange, Ulster, Columbia, and Albany Counties. The Lower Hudson River Watershed comprises the rivers and streams that flow to the Hudson River, including any ponds, lakes, and reservoirs in their path. The Fjord Trail South

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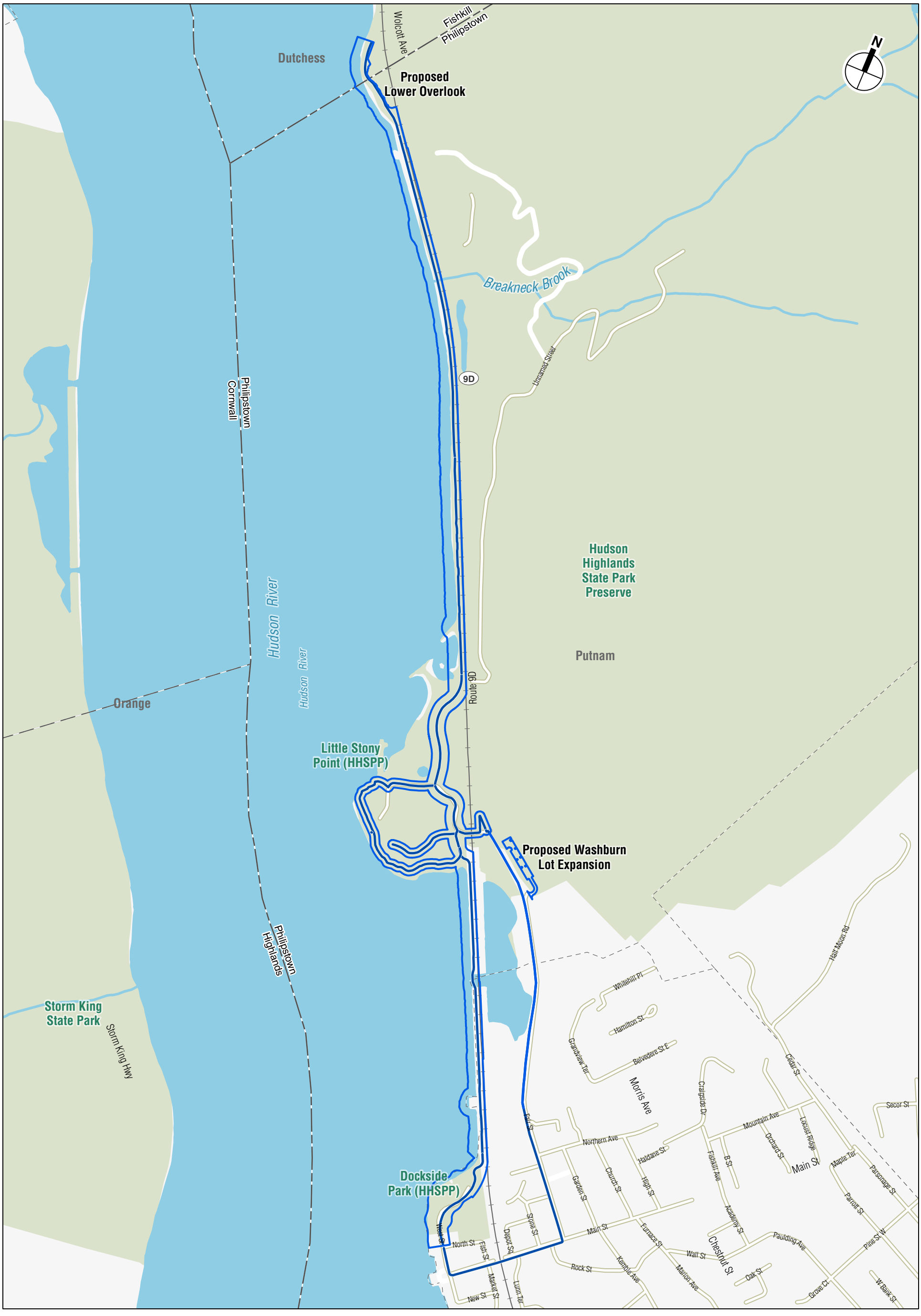

Trail Corridor - Fjord Trail South

Fjord Trail South

Surface Waters

0 2,000 FEET

Surface Waters

HUDSON HIGHLANDS FJORD TRAIL

Figure IV.D-6

Corridor is within the Breakneck Brook-Hudson River sub-watershed (see **Figure IV.D-7**), which drains 41.5 square miles and provides water for the City of Beacon through the Melzingah Reservoir located east of the study area. This sub-watershed is made up of three streams that directly discharge to the Hudson River (from south to north): Breakneck Brook, Wades Brook, and Gordons Brook. The Fjord Trail South Corridor crosses Breakneck Brook at its confluence with the Hudson River. Wades Brook and Gordons Brook are within the Fjord Trail North corridor and are discussed in Chapter III.D, "Water Resources – Fjord Trail North."

HUDSON RIVER

The Fjord Trail South Corridor generally parallels the Hudson River between Cold Spring and Breakneck Ridge. The Hudson River is tidally influenced from the Battery in Manhattan to the Federal Dam at Troy. The Fjord Trail South Corridor is near river mile 55, where the Hudson River is a freshwater tidal waterbody. NYSDEC classifies the Hudson River as a Class B surface water, which are best used for primary and secondary contact recreation and fishing, and water quality should be suitable for fish, shellfish, and wildlife propagation and survival. Along the Fjord Trail South Corridor, the river is about 3,300 feet wide and ranges from a few feet deep near the shoreline up to more than 60 feet deep in the navigation channel, with deeper waters near Little Stony Point. Much of the shoreline within the study area consists of steep riprap-armored embankments that follow the MNR corridor, including the causeway between Dockside Park and Little Stony Point.

Water temperatures are relatively uniform throughout the freshwater reach of the Hudson River and follow a similar cycle each year, ranging from close to 32°F in the winter to about 78°F in the summer. Vertical temperature differentials between surface waters and bottom waters are influenced mainly by the amount of freshwater input (e.g., precipitation) and the location of the salt front in the river. An influx of saline water in the bottom layers can result in stratification within the water column, often with much cooler waters near the bottom. The salt front, as defined by the USGS, is generally located between 15 and 75 miles upstream of the Battery, which includes the project area. The salt front extends farther upriver during the summer when there are low freshwater inflows, and farther downriver during the spring when freshwater inflow is greatest.

BREAKNECK BROOK

Breakneck Brook is also a NYSDEC Class B fresh surface water and it originates at Lake Surprise, approximately 1.7 miles upstream from its confluence with the Hudson River. From Lake Surprise, Breakneck Brook flows downstream in a general southwesterly direction toward the Hudson River through an almost entirely wooded area of the Hudson Highlands State Park Preserve (HHSPP). The brook is an NWI-mapped freshwater forested/shrub wetland (PFO1A). NYSDEC identifies Breakneck Brook as a High Condition stream, which indicates high quality based on calculated land cover, habitat, connectedness, and infrastructure indices. Along the Fjord Trail South Corridor, Breakneck Brook is routed through two culverts that allow it to flow beneath NYS Route 9D and the MNR tracks to the Hudson River.

STORMWATER

The area around the Fjord Trail South Corridor does not contain manmade stormwater management infrastructure except for culverts that allow stormwater to flow beneath the MNR tracks and NYS Route 9D. Since there is minimal stormwater infrastructure located along the Fjord Trail South Corridor, most runoff travels to existing wetlands and waterbodies via overland flow and through tributary streams, as well as to the Hudson River over a vegetated buffer and

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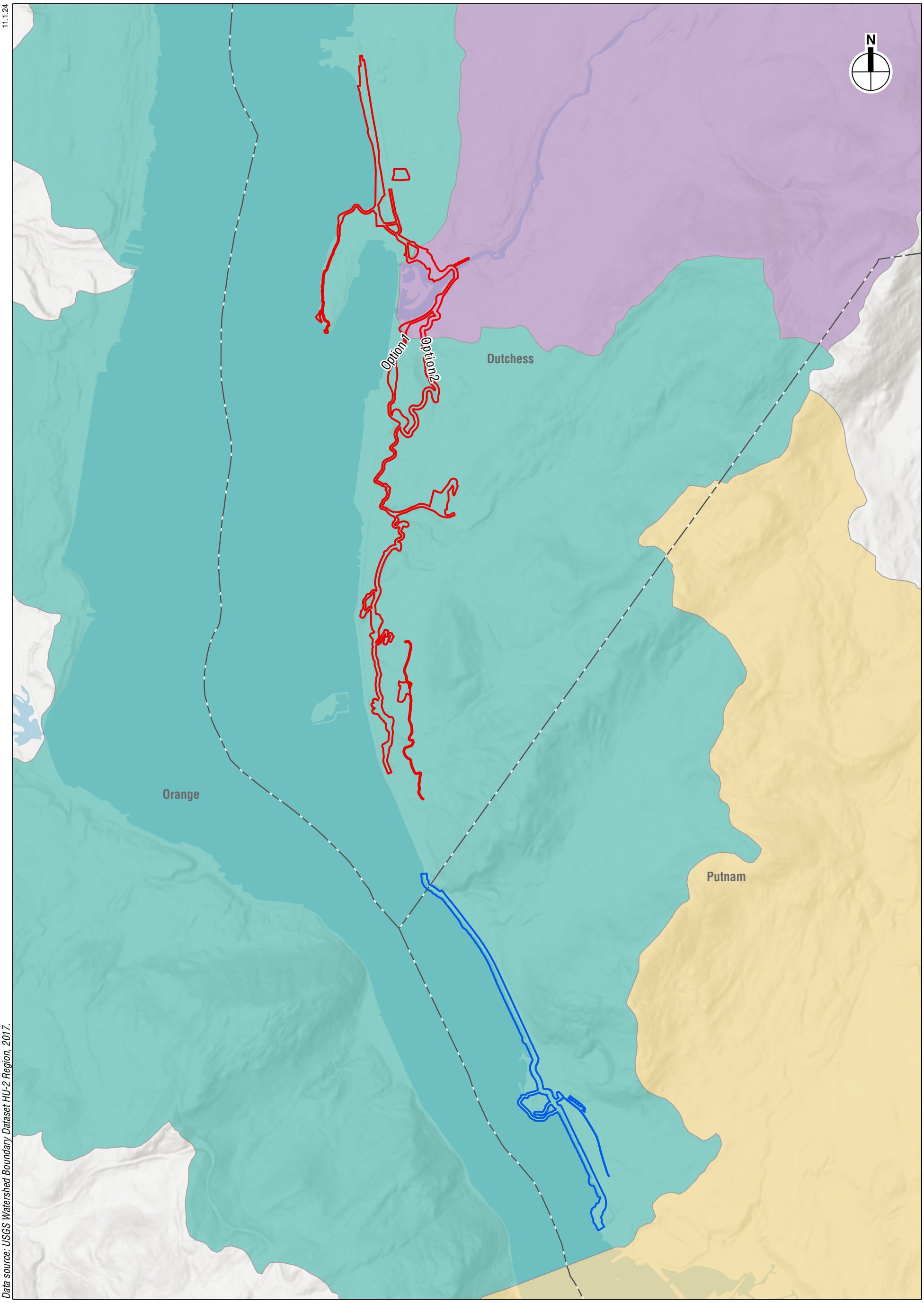

Data source: USGS Watershed Boundary Dataset HU-2 Region, 2017.

Trail Corridor - Fjord Trail North
Trail Corridor - Fjord Trail South
Breakneck Brook-Hudson River
Foundry Brook-Hudson River
Wiccopee Creek-Fishkill Creek

0 2,000 FEET

HUDSON HIGHLANDS FJORD TRAIL

Watersheds

Figure IV.D-7

stone revetement. Small culverts channel stormwater flows under the roadway and railroad tracks, and elevated crossings maintain hydrologic connections between Breakneck Brook and the Hudson River.

C. FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, Fjord Trail South would not be constructed and there would be no temporary effects on water resources from construction activities. The Hudson River Sustainable Shorelines Project (HRSSP), a long-term initiative dedicated to the use of nature-based management practices, would continue to engage communities and partners along the Hudson River to implement these practices where possible. In the future without Fjord Trail South, the Trail Corridor is expected to remain in its current condition with no substantial changes in water resources. The Fjord Trail South Corridor would be susceptible to projected sea level rise, as described under Existing Conditions. The HRSSP includes a demonstration site at Dockside Park that was completed in 2022. With or without Fjord Trail South, the HRSSP would continue to engage communities and partners along the Hudson River to implement natural shoreline stabilization practices where possible.

D. FUTURE WITH THE PROPOSED ACTION

This section considers the effects of the proposed Fjord Trail South on water resources. The assessment of impacts considers the existing characteristics of water resources in the area, and the potential for upland, shoreline, or in-water construction to result in temporary or permanent impacts to water resources. Potential impacts would primarily be associated with in-water activities for the elevated trail section along the Hudson River shoreline and upland ground disturbance, which are described in detail in Chapter II, "Project Description," (see Section C). Construction of Fjord Trail South is proposed to generally occur in three sections involving three separate construction methods:

- Waterside construction: Construction of a pile-supported elevated structure along the Hudson River shoreline from the Lower Overlook below Breakneck Ridge to about midway to Little Stony Point. Construction would be facilitated from barges beginning with mobilization of a construction barge and a materials barge. Barge-based equipment would be used to selectively clear boulders along the shoreline, install piles, fill piles with flowable concrete, and assemble the superstructure (support beams, deck planks, fencing, and railings). A total of 149 piles would be installed within the Hudson River along this portion of the trail. All waterside construction work would occur during six-month windows (July 1 to December 31) in accordance with time-of-year restrictions to protect aquatic species.
- On-grade construction: Construction of an on-grade trail at the proposed Lower Overlook, from midway between the Lower Overlook and Little Stony Point south to Little Stony Point (0.5-mile portion of the trail), and within Little Stony Point. The trail in Little Stony Point would also include a section of lightweight boardwalk structure with helical piles or micropile foundations to preserve existing drainage patterns. Construction would begin with establishment of land access and a laydown area for storage of materials and equipment at Little Stony Point. Access to the Lower Overlook would be from the water using a temporary floating platform to deliver materials and equipment to on-land work areas. Tree clearing would occur during the winter hibernation period for bats (November 1 through March 31) to avoid potential direct impacts to these species.

- Top-down construction: Construction of a pile-supported elevated structure along the Hudson River shoreline between Little Stony Point and Dockside Park, where construction is conducted from the structure itself as it is built using a multi-tool excavator and crane. This portion of the trail would be constructed from the north and south simultaneously. Temporary vehicle access would be provided through Little Stony Point at the northern end and Dockside Park at the southern end. The excavator would be used to selectively clear riprap in pile locations and would use drill and hammer attachments to install the piles. The excavator and crane would be used to lift structural components into place, and cast-in-place concrete would be delivered from a hopper barge. A total of 284 piles would be installed within the Hudson River along this portion of the trail. Top-down work would occur during six-month windows (July 1 to December 31) in accordance with time-of-year restrictions to protect aquatic species.

In summary, in-water activities would include pile installation, use of barges and barge-based equipment, repairs to the existing riprap, and movement of riprap stones to place trail elements. These activities would result in the following potential impacts:

- Permanent long-term loss of 365 square feet and net placement of 375 cubic yards of flowable concrete fill below mean higher high water (MHHW) in the footprint of piles supporting the elevated trail section over the Hudson River;
- Permanent long-term placement of approximately 1,920 cubic yards of fill below MHHW comprising riprap repairs and additional slope stabilization;
- Permanent long-term increase in overwater coverage of 23,000 square feet (0.53 acres) from the elevated trail sections over the Hudson River;
- Temporary short-term use of barges for equipment and materials during construction;
- Temporary short-term increase in underwater noise and sediment resuspension during in-water construction activities, including pile installation, barge use, riprap repairs, and movement of riprap; and
- Short-term temporary impacts associated with landside activities such as land clearing and grading, and long-term permanent impacts associated with changes to ground elevation or surface type.

The overall construction duration for Fjord Trail South would be about five to six years. Within this time period, in-water construction activities would be completed mainly using barge-based equipment over a non-continuous period of approximately 12 to 18 months. Pile installation would take about 3.5 months within this period. All in-water construction activities would be completed in accordance with any timing restrictions included in permits for the project issued by NYSDEC and/or USACE to protect aquatic resources. During construction, the barges would maintain separation from the river bottom to minimize sediment disturbance, and landside activities would be completed with the implementation of erosion and sediment control measures such as straw bales and silt fencing.

GROUNDWATER

Fjord Trail South would not have the potential to affect any sources of recharge for aquifers. The proposed restroom buildings at Dockside Park and Little Stony Point could potentially connect to water supply and sanitary sewers in the Village of Cold Spring, if available and pending coordination with the Village and utility service providers, which would not result in new groundwater withdrawals. If municipal water and sewer services are not available, the proposed restroom buildings would utilize composting toilets, which may be supplied by a well. The

estimated water demand per composting toilet would be less than 20 gallons per day, as described in Chapter IV.M, "Infrastructure – Fjord Trail South," which would be a minimal withdrawal and would not adversely affect the quantity or quality of groundwater resources. In the event that a well is infeasible due to proximity to the Hudson River, the restroom building may be limited to hand sanitizer stations, with no groundwater withdrawal. Otherwise, construction and operation of Fjord Trail South would not result in groundwater withdrawals and would not introduce contaminants to the groundwater. Fjord Trail South would not include significant excavation or installation of subsurface components, and pile installation would not result in alterations of groundwater flow paths or quantities. Therefore, Fjord Trail South would not be expected to result in significant adverse impacts to groundwater resources.

FLOODPLAINS

As discussed under Existing Conditions and shown on **Figure IV.D-2**, the proposed Fjord Trail South alignment would be located within the 1-percent and 0.2 percent annual chance floodplains. The Hudson River is tidal, and its water level is controlled mainly by tidal conditions rather than freshwater inflow from upriver or from tributaries. Because the floodplain within and adjacent to the proposed Fjord Trail South is affected by coastal flooding rather than fluvial flooding, the project's presence in the floodplain would not be expected to result in adverse impacts with respect to flooding. Construction of Fjord Trail South would require minimal grading primarily within previously disturbed areas and would not exacerbate flooding conditions in adjacent areas. Fjord Trail South would result in minimal occupation of the floodplain and would not exacerbate flooding conditions in adjacent areas, including the MNR tracks.

As noted above, the 1-percent annual chance flood elevation for the Fjord Trail South Corridor could increase to +9.2 feet NAVD88 by the 2050s and +12.7 feet NAVD88 by 2100, and MHHW elevation could increase to +4.0 feet NAVD88 by the 2050s and +7.5 feet NAVD88 by 2100. Fjord Trail South would be constructed at elevations ranging from +8.3 feet NAVD88 for the at-grade sections to +11.3 feet NAVD88 for the elevated structures (see **Appendix III/IV.D**). The elevated portions would be supported by piles installed either upland of MHHW or within the Hudson River and would be located approximately four feet above the current BFE of +7.3 feet NAVD88. The elevated trail would remain above the projected floodplain and MHHW elevations throughout the 50-year lifespan of the materials used. Portions of the at-grade trail sections would be located within the floodplain under future conditions but would remain above the projected MHHW elevation throughout the trail materials' 50-year lifespan. At-grade sections of the trail would incorporate grading and drainage infrastructure designed to convey stormwater and floodwaters to strategic crossing locations along the trail with the goal of minimizing ponding and promoting existing flow patterns to the extent practicable. These sections of the trail would be at a lower elevation than the MNR tracks and would not affect existing drainage along the tracks.

Due to its location along the river's edge, portions of the trail would be susceptible to flooding under current and projected future conditions. Therefore, in accordance with NYSDEC's CRRA as summarized under Regulatory Context above, Fjord Trail South has been designed with consideration of 10-year, 50-year, and 100-year storm return periods. Portions of the trail would also be subject to growing sunny day high tide flooding due to sea level rise, as the Hudson River is tidally influenced. The proposed minimum elevation of the on-grade trail is designed to exceed the present-day spring tide plus 50 inches of sea level rise projected for 2100, thereby minimizing the potential impacts of sunny day tidal flooding on the trail. The on-grade trail has been designed to exceed the 100-year storm elevation projected for 2060 and would be reassessed and rehabilitated as needed in 2060. The proposed minimum elevation of the on-structure trail has

been designed to exceed 100-year storm elevations projected for 2100 to extend the expected useful life of these trail sections.

In addition to the drainage design described above, the trail would include the following resiliency measures to reduce the risk of damage during flood events:

- Materials used for the pathway would be designed to be floodable and easily repaired when the flood water recedes.
- All exterior materials used for construction of Fjord Trail South would be designed or selected to last a minimum of 50 years.
- Structural materials would be chosen or protected such that they are not susceptible to rot or corrosion.
- At-grade sections would be designed to prevent the foundation from being inundated more than three or four times per year to minimize the amount of maintenance required to replace finer materials used along the trail.
- At-grade sections would be planted with stabilizing vegetation and supported by boulder edges along the river side to minimize potential damage to the trail resulting from flood waters or associated shoreline erosion.

WETLANDS

CONSTRUCTION

Any potential temporary impacts to wetlands during construction would occur at the edges of the limit of disturbance (see **Figures IV.D-3, IV.D-4, and IV.D-5a, IV.D-5b, and IV.D-5c**) due to access or staging along the Fjord Trail South. Any areas temporarily disturbed during construction would be restored to existing conditions through planting of native vegetation and grading to existing surface grades, if necessary, and no permanent adverse effects to these areas would result. Erosion and sediment control measures (e.g., silt fencing and straw bales) would be implemented in accordance with the SPDES General Permit GP-0-20-001 for Stormwater Discharges from Construction Activity (General Permit), in coordination with NYSDEC, and would minimize potential impacts to wetlands associated with the discharge of sediment during construction.

OPERATION

Fjord Trail South would be designed to avoid wetlands to the extent possible to limit the potential for permanent impacts to wetlands. Fjord Trail South would be located on the west side of the causeway south of Little Stony Point and would not have the potential to result in permanent impacts to Wetland H, which is located on the east side of the causeway. HHFT, Inc. would seek a permit from the appropriate regulatory agency(ies) for any activities affecting wetlands, and if required, appropriate compensatory mitigation to offset any permanent loss of wetland habitat would be determined in coordination with NYSDEC and/or USACE.

SURFACE WATERS

CONSTRUCTION

About one mile of the proposed Fjord Trail South's two-mile extent would be elevated over the Hudson River shoreline, with piles installed within the water. This includes an approximately one-half mile section southward from Breakneck Ridge and the half-mile section between Little Stony Point and Dockside Park. In-water construction activities would have the potential to result in temporary impacts in the Hudson River from sediment resuspension during pile installation and

movement of construction vessels. Piles would be installed via drilling, or augering, and would not require the use of a vibratory or impact hammer. Subsurface sediments drawn up during drilling for pile installation would be removed through a vacuum extraction process, placed on a hopper barge, and transported offsite for disposal at a licensed facility. The vacuum extraction would be localized to the drilled hole and would not disturb the river bottom outside the immediate location where the pile is being installed. Several spud barges would be used for equipment and material delivery or disposal along portions of Fjord Trail South during construction. To minimize resuspension of bottom sediment, spud barges would maintain sufficient clearance between the vessel and river bottom. Use of the spud piles to anchor the barges and the movement of riprap armor stones to facilitate pile installation would result in minor sediment disturbance during construction. Turbidity would be temporarily elevated in areas close to these activities, but these effects would be localized to the immediate location of the spud pile being placed or removed and sediments would dissipate quickly with the tidal currents such that these activities would not result in long-term effects on water quality. There would be no in-water construction within Breakneck Brook, since the brook is conveyed to the Hudson River through an existing culvert that would not be altered.

Erosion and sediment control measures (e.g., straw bales or silt fences) implemented in accordance with the Stormwater Pollution Prevention Plan (SWPPP) being prepared for Fjord Trail South, for review and approval in accordance with the requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities, would minimize the potential impacts of any discharge of materials into the Hudson River or Breakneck Brook during upland construction. Additionally, vegetation and large trees around the pile locations would be preserved to the extent possible to maintain shoreline stabilization, limiting the potential for erosion and subsequent sediment discharge.

OPERATION

Fjord Trail South would result in approximately 19,500 square feet (0.4 acres) of overwater coverage along the Hudson River shoreline from the elevated sections of the trail, including the section of the trail that is proposed along the MNR causeway north of Dockside Park. The sections of the trail over the river are designed to accommodate the MNR-required minimum 25-foot setback from the centerline of the MNR tracks and cannot be placed entirely over land in these locations. However, the resulting overwater coverage has been minimized to the extent practicable while meeting the setback requirement by limiting the width of the trail to 10 feet and siting it as close to the shoreline as possible. The elevated trail along the causeway would also incorporate grated deck surfaces to allow sunlight to reach the water and minimize the potential effects of shading. For these sections, a total of 118 18-inch diameter piles and 31 36-inch diameter piles would be located below mean higher high water (MHHW), comprising an in-water footprint of approximately 365 square feet and 375 cubic yards of flowable concrete within the piles. Portions of the shoreline beneath the elevated trail would be stabilized using riprap armor stone interspersed with milled stone tide pools and, at various locations, planted shelves, comprising about 1,920 cubic yards of fill below MHHW. There would be no structure added within Breakneck Brook, as the existing culvert that facilitates its flow into the Hudson River would not be altered and Fjord Trail South would pass over the existing culvert. Drainage infrastructure included in the trail design would convey stormwater downstream such that ponding does not occur upstream of existing culverts. This would ensure that the culverts continue to function as designed and water does not back up onto existing infrastructure, including the MNR tracks. Fjord Trail South has been designed to minimize in-water impacts along the Hudson River, limiting the placement of

structural elements below MHHW to specific areas where the trail must avoid upland utilities or infrastructure.

STORMWATER

Fjord Trail South would incorporate a series of drainage swales to minimize the need for storm sewers, and the existing stormwater culverts under NYS Route 9D and the MNR tracks would remain in place. Fjord Trail South would result in an approximately 1.5-acre increase in impervious surface from the materials used to develop the at-grade portions of the trail (e.g., crushed stone with limited permeability) and the Washburn Lot expansion. While Fjord Trail South would be exempt from post-construction stormwater quality controls due to its proposed use as a linear pathway and not part of a residential, commercial, or institutional development, stormwater runoff associated with the new impervious surface would be captured and treated onsite prior to discharge into surface waters where possible. The drainage design for the trail would maintain existing flow patterns and would not add new culverts or point source discharges. Where appropriate, the project design would incorporate best management practices such as vegetated dry swales and infiltration trenches to capture runoff and promote infiltration. It would also use pervious trail materials (e.g., grasscrete pavers, pervious concrete) throughout the at-grade portion of the alignment, where feasible, to reduce the potential impact of stormwater runoff, and the elevated portions of the trail would include slats to allow stormwater drainage to pervious surfaces beneath the trail.

E. MITIGATION

As set forth above, measures would be incorporated into Fjord Trail South's final design to avoid, minimize, or mitigate impacts to water resources. These measures include the following:

- Erosion and sediment control measures (e.g., silt fencing and straw bales) would be implemented in accordance with the SPDES General Permit and would minimize discharge of sediment to water resources during construction.
- All construction activities for Fjord Trail South would be conducted in accordance with permit conditions implemented by NYSDEC and/or USACE to avoid or minimize potential construction impacts to water resources.
- Any wetland areas temporarily disturbed during construction would be restored to existing conditions through grading to existing surface grades and planting of native vegetation.
- Fjord Trail South would be designed to avoid wetlands and regulated adjacent areas, thereby preventing permanent impacts to these wetlands.
- The proposed Meanders in Little Stony Point would improve existing trails and would be designed to avoid the delineated wetland at Little Stony Point, avoiding any potential impacts to that wetland.
- Spud barges would maintain sufficient clearance between the vessel and river bottom to avoid sediment disturbance.
- Subsurface sediments drawn up during drilling for pile installation would be removed through a vacuum extraction process, placed on a hopper barge, and transported offsite for disposal at a licensed facility, thereby minimizing potential effects to water quality.
- Fjord Trail South has been designed to limit the placement of structural elements below MHHW to specific areas where the trail must avoid upland utilities or infrastructure to minimize in-water impacts in the Hudson River.

- Fjord Trail South would use pervious materials (e.g., grasscrete pavers, pervious concrete) to the extent possible, minimizing the increase in impervious surface area resulting from the project.

If required, compensatory mitigation for unavoidable impacts to surface waters or wetlands resulting from the project would be determined in coordination with NYSDEC and/or USACE. Mitigation may comprise restoration or enhancement of similar surface water or wetland habitats in the area, as applicable based on the Fjord Trail South alignment, but specific requirements would be determined in coordination with the regulatory agencies during the permitting process.

F. REFERENCES

New York State Department of Environmental Conservation (NYSDEC). 2024. Aquifers in New York State. Available dec.ny.gov/lands/36119.html. Accessed March 2024.

United States Environmental Protection Agency (USEPA). 2024. Map of Sole Source Aquifer Locations. Available https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b. Accessed March 2024. ✷