HUDSON TUNNEL

FINAL ENVIRONMENTAL IMPACT STATEMENT AND FINAL SECTION 4(f) EVALUATION

APPENDIX 11

Natural Resources

11-1: Natural Resources: Agency Correspondence

11-2: Wetland Delineation Report

11-3: Essential Fish Habitat

11-4: Conceptual Compensatory Mitigation Plan

11-5: Information in Support of Section 404(b)(1) Guidelines Analysis

APPENDIX 11-1

Natural Resources: Agency Correspondence

Requests for Information

AKRF, Inc.
Environmental Planning Consultants
440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

October 7, 2016

New Jersey Department of Environmental Protection
Natural Heritage Data Request Form
The New Jersey Natural Heritage Program
DEP – Office of Natural Lands Management
Mail Code 501-04
P.O. Box 420
501 E. State Street
Station Plaza #5, 4th Floor
Trenton, NJ 08625-0420

Re: Hudson Tunnel Project: Request for Information on State or Federal Listed Endangered, Threatened, and Proposed Species

Dear Sir or Madam:

AKRF, Inc., on behalf of the Federal Railroad Administration (FRA) and NJ TRANSIT respectfully requests information regarding state-listed and/or federally listed rare, special concern, threatened, or endangered species, and significant habitat communities within a 0.5-mile radius of the proposed Hudson Tunnel Project ("Proposed Project"). The Proposed Project extends from Secaucus, NJ to Penn Station, New York City (**Figure 1**). A copy of the Natural Heritage Data Request Form is included with this letter. Specific information on the location of sensitive species or habitats provided by NJDEP will not be published in any document unless permission is granted by the agency.

The goal of the Proposed Project is to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012. While the tunnel was restored to service and is safe for travel, chlorides from the water that inundated the tunnel remain in the tunnel's concrete liner and bench walls, causing ongoing damage to the bench walls, imbedded steel, track, and signaling and electrical components. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service. Once the North River Tunnel rehabilitation is complete, both the old and new tunnel would be in service, providing redundant capacity and increased operational flexibility for Amtrak and NJ TRANSIT.

The Proposed Project would include the following major components:

- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin. These tracks would cross Penhorn Creek near Secaucus Road, just south of the existing tracks.

- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.
- Once the new tunnel is complete and in operation, the old tunnel would be rehabilitated one track at a time.

Please send the requested information to me by mail at the address above or by email to scollins@akrf.com. I can be reached by phone at 646-388-9657 if you have any questions regarding this request. Thank you for your time and assistance.

Sincerely,

Sandra L Collins

Sandy Collins
Vice President, AKRF

Enclosures: (2)

State of New Jersey
Mail Code 501-04
Department of Environmental Protection
Natural Heritage Data Request Form
The New Jersey Natural Heritage Program
DEP-Office of Natural Lands Management
P.O. Box 420, Trenton, New Jersey 08625-0420
(609) 984-1339
Fax No.: (609) 984-1427

PLEASE PRINT AND SUBMIT COMPLETED FORM WITH ATTACHMENTS TO THE ADDRESS ABOVE
(Fields shown in bold font must be completed in order for data request to be processed.)

1. **Name:** Sandy Collins Agency/Company: AKRF, Inc.

   Address: 7250 Parkway Drive **City:** Hanover

   State: MD **Zip:** 21076 **Daytime Phone:** 646-388-9657 Ext.: ____

   Cell Phone: ____ Email: ____

2. **Project Name:** Hudson Tunnel Project

   Municipality(ies): ____ County(ies): Hudson County, NJ; New York County, NY

   Block(s): ____ Lot(s): ____

   N.A.D. 1983 State Plane Coordinates (feet) 6 digits only: E (x): ____ N (y): ____

3. **Project Description:** New two-track rail tunnel under the Hudson River. Full project description provided in letter.

4. **USGS Quad:** ☑ A copy of a USGS quad map(s) that clearly indicates the site boundary is included with this form. Specify name of USGS quad(s): Weehawken Quad and Central Park Quad, USGS 7.5 Minute Topographic Map

   (USGS quad maps are required, unless prior arrangements have been made to submit site boundaries in an alternate format. Responses will be delayed if site locations are not delineated in a suitable format.)

5. **Flood Hazard Control Act Use:** **Is this request submitted as part of a Flood Hazard Area Control Act rule (N.J.A.C. 7:13) application? Yes** ○ **No** ◉

6. **Acknowledgement & Signature:** Any material supplied by the Office of Natural Lands Management will not be published without crediting the Natural Heritage Database as the source of the material. It is understood that there will be a charge of $70.00 per hour for the services requested. An invoice will be sent with the request response and payment should be made by check or money order payable to "Office of Natural Lands Management."

   Signed Sandra L Collins **Date** 10/12/2016

Time Frame for Response:
Data requests are processed in the order in which they are received; please allow 30 days for response. If you would like to send in your data request via email, you may do so by sending it to **Natlands@dep.nj.gov**. Due to the number of attachments, we cannot fax results. Unless you specifically request that your response be mailed or the response is unusually large, your response will be emailed to the address you provide.

FOR OFFICE USE ONLY

DATE RECEIVED ____

Item Code: REG ____ ST ____ RTC ____ NC ____ REGEO ____ STEO ____ RTCEO ____ NCEO ____

Hrs: ____

Project Code: ____ Inv. #: ____ ____

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Parks & Forestry
State Forestry Service
Mail Code 501-04
Office of Natural Lands Management – Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. (609) 984-1339 Fax. (609) 984-1427

BOB MARTIN
Commissioner

October 27, 2016

Sandy Collins
AKRF, Inc.
7250 Parkway Drive, Suite 210
Hanover, MD 21076

Re: Hudson Tunnel Project
Secaucus Town, Union City and North Bergen and Weehawken Townships, Hudson County

Dear Ms. Collins:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Natural Heritage Data Request Form into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

This report does not include information concerning known Northern Long-eared Bat hibernacula and maternity roost trees protected under the provisions of the U.S. Fish & Wildlife Service's 4(d) Rule. You must contact the U.S. Fish & Wildlife Service, New Jersey Field Office, for additional information concerning the location of these features, or visit their website at: http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the immediate vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 16-4007471-10778

Table 1: On Site Data Request Search Results (6 Possible Reports)

Report Name	Included	Number of Pages
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S1	Y - Yes	2006- -	2006: [redacted]

Total number of records: 1

Thursday, October 27, 2016

NHP File No.:16-4007471-10778

Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

Table 2: Vicinity Data Request Search Results (6 possible reports)

Report Name	Included	Number of Pages
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Immediate Vicinity of the Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S1	Y - Yes	2006- -	2006 [redacted]

Total number of records: 1

Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Barn Owl	Tyto alba	Non-breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

From: Hafstad, Jason <Jason.Hafstad@dep.nj.gov>
Sent: Thursday, January 02, 2020 1:47 PM
To: Folli, Michael
Cc: Torok, Larry; Resnick, Matthew; Hand, Timothy; Glenn, Steven; Rice, Philip; Bennett, Chris (New York); Albizati, Christina
Subject: RE: Penhorn Creek Floating Marsh-pennywort

Hi Michael,

I've reviewed your Rare Plant Species Reporting Form and it looks complete. The results of your surveys make clear that the population of *Hydrocotyle ranunculoides* is much larger than the proposed limit of disturbance for the Hudson Tunnel Project. It's my opinion that the proposed development will not adversely impact the local population due to the extent of suitable habitat and amount of plants and propagules left undisturbed. In addition, plants were collected from the limit of disturbance and deposited in local herbaria.

If the applicant again submits an application to the Division of Land Use without major changes to the size or extent of the limit of disturbance, you can consider the application compliant with Department rules with regard to T&E plant species.

Thanks,

Jason Hafstad
NJDEP – Division of Land Use Regulation | Bureau of Technical Services | Endangered & Threatened Species Unit
501 E. State Street, 2nd Floor, MC 501-02A
PO Box 420
Trenton, NJ 08625-0420
Jason.hafstad@dep.nj.gov
Office Phone: (609) 633 - 6515

From: Folli, Michael <Michael.Folli@aecom.com>
Sent: Thursday, November 21, 2019 11:20 AM
To: Hafstad, Jason <Jason.Hafstad@dep.nj.gov>
Cc: Torok, Larry <Larry.Torok@dep.nj.gov>; Resnick, Matthew <Matthew.Resnick@dep.nj.gov>; Hand, Timothy <Timothy.Hand@aecom.com>; Glenn, Steven <Steven.Glenn@aecom.com>; Rice, Philip <Phil.Rice@wsp.com>; Bennett, Chris (New York) <Chris.Bennett@aecom.com>; Albizati, Christina <Christina.Albizati@dep.nj.gov>
Subject: [EXTERNAL] RE: Penhorn Creek Floating Marsh-pennywort

Hi Jason…I just wanted to touch base if you had any comments to the below supplemental submission that we provided as per your request. We would like to discuss next steps with you regarding potential Floating Marsh-pennywort impacts and mitigation due to the Hudson Tunnel Project.

Please let me know at your earliest convenience.

Thank you,

Michael Folli **PWS, ENV SP**

AKRF

Environmental, Planning, and Engineering Consultants
7250 Parkway Drive
Suite 210
Hanover, MD 21076
tel: 410 712-4848
fax: 410 712-4966
www.akrf.com

March 17, 2021

New Jersey Department of Environmental Protection
Natural Heritage Data Request Form
The New Jersey Natural Heritage Program
DEP – Office of Natural Lands Management
Mail Code 501-04
P.O. Box 420
501 E. State Street
Station Plaza #5, 4th Floor
Trenton, NJ 08625-0420

Re: Hudson Tunnel Project: Updated Request for Information on State or Federal Listed Endangered, Threatened, and Proposed Species

Dear Madam or Sir:

AKRF, Inc., on behalf of the Federal Railroad Administration (FRA) and NJ TRANSIT respectfully requests an update to the previously submitted request for information regarding state-listed and/or federally listed rare, special concern, threatened, or endangered species, and significant habitat communities within a 0.5-mile radius of the proposed Hudson Tunnel Project ("Proposed Project"), sent October 7, 2016. The Proposed Project is in the same general location and extends from Secaucus, NJ to Penn Station, New York City (**Figure 1**). A copy of the Natural Heritage Data Request Form is included with this letter. Specific information on the location of sensitive species or habitats provided by NJDEP will not be published in any document unless permission is granted by the agency.

The goal of the Proposed Project remains the same: to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012.

The Proposed Project still includes the following major components:

- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin. These tracks would cross Penhorn Creek near Secaucus Road, just south of the existing tracks.
- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.

- Once the new tunnel is complete and in operation, the old tunnel would be rehabilitated one track at a time.

Please send the requested information to me by mail at the address above or by email to scollins@akrf.com. I can be reached by phone at 646-388-9657 if you have any questions regarding this request. Thank you for your time and assistance.

Sincerely,

Sandy Collins
Senior Vice President
AKRF, Inc.

Enclosures: 1. New Jersey Natural Heritage Program Form
2. Figure 1
3. Attachment 1 – Block and Lot Table

State of New Jersey
Department of Environmental Protection
Natural Heritage Data Request Form

The New Jersey Natural Heritage Program Office of Natural Lands Management
Mail Code 501-04, P.O. Box 420, Trenton, New Jersey 08625-0420
(609) 984-1339
Fax No.: (609) 984-1427

Please print clearly. All sections are required.

1. Mr. / Ms. Sandy Collins Agency/Company: AKRF, Inc.
Address: 7250 Parkway Drive Suite 210 City, State, Zip: Hanover, MD 21076
Phone: 646-388-9657 Ext: ________ E-mail: scollins@akrf.com

2. Project Name: Hudson Tunnel Project
Municipality(ies): Hoboken, Union City, Weehawken, Secaucus, North Bergen County(ies): Hudson
Block(s): See Attachment 1 Lot(s): See Attachment 1
Coordinates (NAD 1983 State Plane feet [6 digits] or Lat/Long):
E(x) / Longitude: ____________ N(y) / Latitude: ____________

3. Project Description: New two-track rail tunnel under the Hudson River. Full project description provided in letter.

4. Site Location Map A map showing the project boundary (e.g., aerial imagery, street map, tax or parcel map with block and lot). Responses will be delayed if site locations are not clearly delineated. Alternatively, you may submit GIS data (e.g., shapefile, geodatabase, *.kml/kmz) by attaching it to your email submittal. If doing so, please indicate here.
GIS data is attached: Yes ☐ No ☑

5. Riparian Zone Is this request submitted as part of a Riparian Zone width determination? Yes ☐ No ☑

6. Acknowledgement & Signature Any material supplied by the Office of Natural Lands Management will not be published without crediting the Natural Heritage Database as the source of the material. It is understood that there will be a charge of $70.00 per hour for the services requested. An invoice will be sent with the request response. **Please pay by check or money order (no credit card) payable to: "DEP – Office of Natural Lands Management" (please do not reference "NJ State Treasury").**

Signed: Sandy Collins Date: 3/17/2021

Time Frame for Response:
Data requests are processed in the order in which they are received; PLEASE ALLOW AT LEAST 30 DAYS FOR RESPONSE.
All responses will be emailed to the address provided above, unless other arrangements are specifically requested.

Submit Completed Form With Attachments To The Following Email Address: NATLANDS@DEP.NJ.GOV. You may also fax your data request to: (609) 984-1427. If you would like to send in your data request via regular mail, please use the following address:

NJDEP Office of Natural Lands Management
Mail Code 501-04
PO Box 420
Trenton, NJ 08625-0420

FOR OFFICE USE ONLY

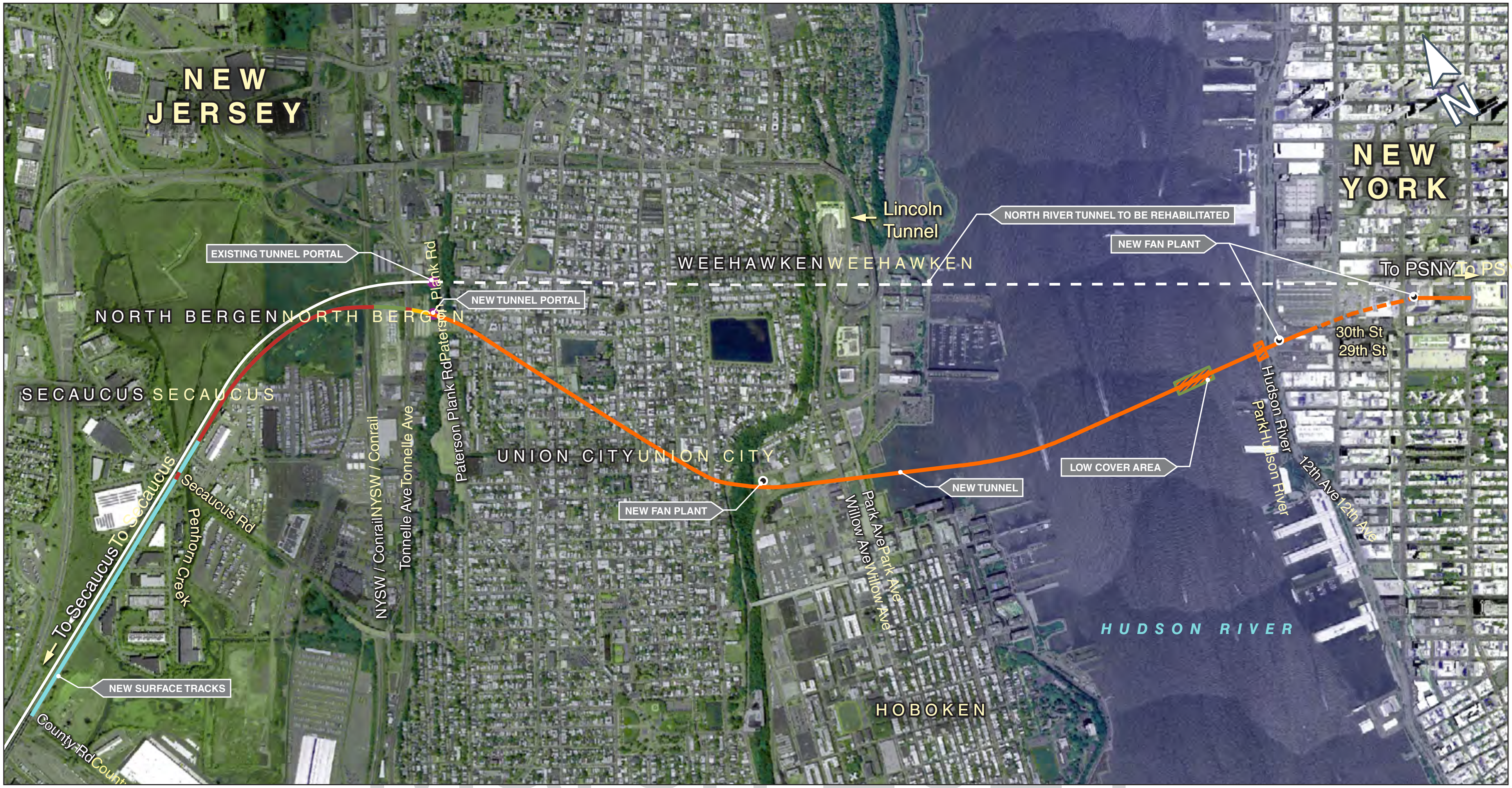
DATE RECEIVED________________________

Item Code: REG____ ST ____ NC ____ Hrs: ____________

Project Code: ____________________ Inv.#: ____________

Revised August 2019

11.7.17



Existing Northeast Corridor

North River Tunnel to be Rehabilitated

Hudson Yards Right-of-Way Preservation

Tunnel Alignment

Tunnel Portal

New Surface Tracks (Viaduct)

New Surface Tracks (Retained Fill)

New Surface Tracks (Embankment)

New Surface Tracks (Retained Cut)

Low Cover Area

New Fan Plants

HUDSON TUNNEL PROJECT

Preferred Alternative

Figure 1

ATTACHMENT 1:

Properties on the Project Site, County Road to Tonnelle Avenue

Address	Block/Lot
County Road, Secaucus	Block 44, Lot 2
801 Penhorn Avenue	Block 44, Lot 5.04
405 Penhorn Avenue	Block 44, Lot 4.08
301 Penhorn Avenue	Block 44, Lot 3.01
201 Penhorn Avenue	Block 44, Lot 2.01
2806 Secaucus Road, North Bergen	Block 449.01, Lot 1.02
2820 16th Street, North Bergen	Block 449.01, Lot 1
2400 16th Street, North Bergen	Block 449.01, Lot 4
NA	Block 442, Lot 1.01
NA	Block 442, Lot 1.09
NA	Block 485, Lot 1
NA	Block 486, Lot 1
Tonnelle Avenue	Block 35, Lot 6.01
2001 Tonnelle Avenue	Block 35, Lot 5.03
2126 Tonnelle Avenue	Block 27, Lots 29, 41, 39, 42, 43.01

Notes: NA = not applicable; PSE&G = Public Service Electric & Gas Company.

State of New Jersey
MAIL CODE 501-04
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF PARKS & FORESTRY
NEW JERSEY FOREST SERVICE
OFFICE OF NATURAL LANDS MANAGEMENT
P.O. BOX 420
TRENTON, NJ 08625-0420
Tel. (609) 984-1339 Fax (609) 984-0427

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

SHAWN M. LATOURETTE
Acting Commissioner

April 8, 2021

Sandy Collins
AKRF, Inc.
7250 Parkway Drive, Suite 210
Hanover, MD 21076

Re: Hudson Tunnel Project
Hoboken City, Union City, Secaucus Town, Weehawken and Norrh Bergen Townships, Hudson County

Dear Ms. Collins:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.3) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the map(s) submitted with the Natural Heritage Data Request Form into our GIS. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ½ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ½ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the immediate vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

Beginning May 9, 2017, the Natural Heritage Program reports for wildlife species will utilize data from Landscape Project Version 3.3. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive web application at the following URL, https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=0e6a44098c524ed99bf739953cb4d4c7, or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

For additional information regarding any Federally listed plant or animal species, please contact the U.S. Fish & Wildlife Service, New Jersey Field Office at http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 21-4007471-21779

Table 1: On Site Data Request Search Results (6 Possible Reports)

Report Name	Included	Number of Pages
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S3	Y	2016-11-01	[redacted]

Total number of records: 1

Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B,S4N
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Juvenile Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

Table 2: 0.5 Mile Vicinity Data Request Search Results (6 possible reports)

Report Name	Included	Number of Pages
1. 0.5 Mile Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites within the 0.5 Mile Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the 0.5 Mile Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the 0.5 Mile Vicinity of Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the 0.5 Mile Vicinity of the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species In the 0.5 Mile Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

0.5 Mile Vicinity of the Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S3	Y	2016-11-01	[redacted]

Total number of records: 1

Rare Wildlife Species or Wildlife Habitat Within the 0.5 Mile Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Barn Owl	Tyto alba	Non-breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B,S4N
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B,S4N
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Juvenile Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

AKRF, Inc.
Environmental Planning Consultants
440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

October 7, 2016

NY Natural Heritage Program - Information Services
NYSDEC
625 Broadway, 5th Floor
Albany, NY 12233-4757

Re: New York Natural Heritage Program Data Request, Hudson Tunnel Project, Manhattan, New York City

Dear Sir or Madam:

AKRF, Inc., on behalf of the Federal Railroad Administration (FRA) and NJ TRANSIT respectfully requests information regarding any federally listed or proposed species under the jurisdiction of NMFS that have been recorded in the vicinity of the proposed Hudson Tunnel Project (“Proposed Project”). The Proposed Project extends from Secaucus, NJ to Penn Station, New York City (**Figure 1**). FRA is the Responsible Entity for conducting an environmental review to satisfy the requirements of the National Environmental Policy Act. Specific information on the location of sensitive species or habitats provided by NY Natural Heritage Program will not be published in any document unless permission is granted by the agency.

The goal of the Proposed Project is to preserve the current functionality of the Northeast Corridor’s (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012. While the tunnel was restored to service and is safe for travel, chlorides from the water that inundated the tunnel remain in the tunnel’s concrete liner and bench walls, causing ongoing damage to the bench walls, imbedded steel, track, and signaling and electrical components. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service. Once the North River Tunnel rehabilitation is complete, both the old and new tunnel would be in service, providing redundant capacity and increased operational flexibility for Amtrak and NJ TRANSIT.

The Proposed Project would include the following major components:

- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin.
- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.

- Once the new tunnel is complete and in operation, the old tunnel would be rehabilitated one track at a time.

The Proposed Project would require in-water construction within the Hudson River to modify river bottom soils in order to construct a segment of the tunnel that must be relatively shallow beneath the Hudson River. These activities would occur in a small area of the Hudson River near the Manhattan shoreline. As currently envisioned, this would involve modifying river bottom soils by introducing grout to the river bottom. The work would be conducted within a work area contained by temporary cofferdams to protect water quality of the surrounding area. Following completion of the grouting, a protection cover (potentially precast concrete) would be placed above the treated area.

Please send the requested information to me by mail at the address above or by email to scollins@akrf.com. I can be reached by phone at 646-388-9657 if you have any questions regarding this request. Thank you for your time and assistance.

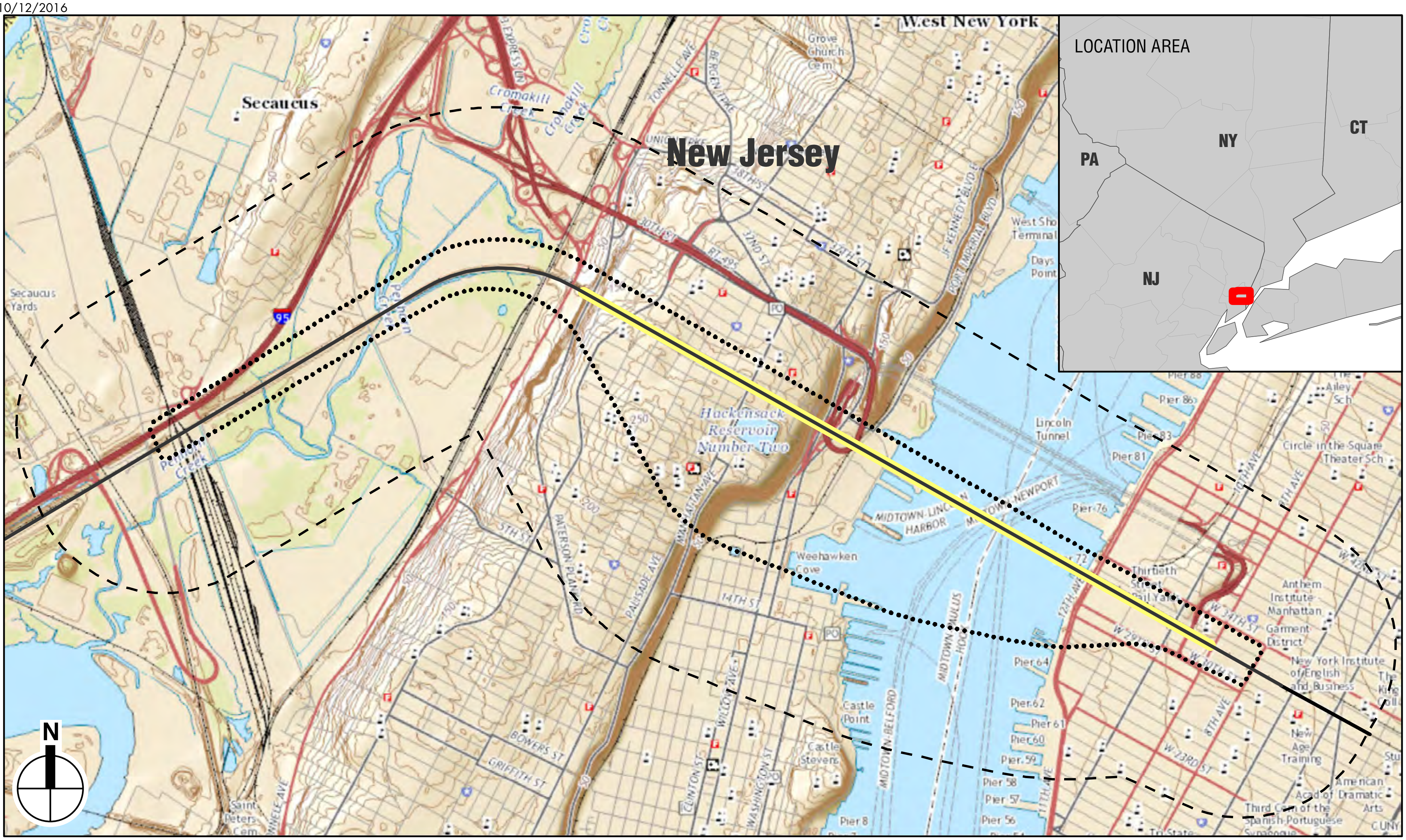
Sincerely,

Sandra L Collins

Sandy Collins
Vice President, AKRF

Enclosures: (1)

10/12/2016



Project Study Area

Half mile boundary

Existing North River Tunnel

Existing Northeast Corridor

Project Location

USGS 7.5 Minute Topographic Map

Weehawken Quad and Central Park Quad

Hudson Tunnel Project

Figure 1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

November 10, 2016

Sandy Collins
AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016

Re: Hudson Tunnel Project, from New Jersey to Penn Station
Town/City: City Of New York. County: New York.

Dear Ms. Collins:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities that our database indicates occur at the project site or in its immediate vicinity.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

Our database is continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the NYS DEC Region 2 Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Sincerely,

Nick Conrad

Nicholas Conrad
Information Resources Coordinator
New York Natural Heritage Program

1338

The following state-listed animals have been documented in the vicinity of the project site.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed or are candidates for federal listing. The list also contains unlisted rare animals found in the same vicinity.

For information about any permit considerations for your project, contact the Permits staff at the NYSDEC Region 2 Office. For information about potential impacts of your project on these species, and how to avoid, minimize, or mitigate any impacts, contact the Wildlife Manager.

A listing of Regional Offices is at http://www.dec.ny.gov/about/558.html.

The following state-listed species have been documented within .5 mile of the project site.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING	
Birds				
Peregrine Falcon *Breeding*	*Falco peregrinus*	Endangered		12410

The following state-listed species have been documented in the Hudson River at the project site.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING	
Fish				
Shortnose Sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	1091
Atlantic Sturgeon	*Acipenser oxyrinchus*	No Open Season	Endangered	11464

The following animals, while not listed by New York State as Endangered or Threatened, are of conservation concern to the state, and are considered rare by the New York Natural Heritage Program.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	HERITAGE CONSERVATION STATUS	
Bees				
Yellow Bumble Bee	*Bombus (Thoracobombus) fervidus*	Unlisted	Critically Imperiled in NYS	
High Line, Manhattan, 2009.				14800

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at www.dec.ny.gov/animals/7494.html.

Emma Powell <epowell@akrf.com>

Confirmation of your submitted request to New York Natural Heritage

1 message

naturalheritage@nynhp.org <naturalheritage@nynhp.org> Wed, Mar 17, 2021 at 10:03 AM
To: epowell@akrf.com

Submission ID: 5567
Submitted on Wednesday, March 17, 2021 - 10:03
Submitted values are:

Company, Organization, or Agency: AKRF, Inc.
Requestor Name: Emma Powell
Requestor Address (Street/PO Box): 7250 Parkway Drive, Suite 210
Requestor City: Hanover
Requestor State: Maryland
Requestor Zip Code: 21076
Requestor Telephone #: 6463889661
Requestor Email: epowell@akrf.com
Project Type: New rail tunnel
Project Name: Hudson Tunnel Project
Project Applicant: Federal Railroad Administration (FRA)
Project County: New York
Town (New York County): City Of New York|City Of New York
Project Summary:
A request for information was previously submitted on October 7, 2016 for the Proposed Project. AKRF, on behalf of FRA, is requesting an update to the previously submitted request for information regarding state-listed and/or federally listed rare, special concern, threatened, or endangered species, and significant habitat communities within a 0.5-mile radius of the Proposed Project. The goal of the Proposed Project remains the same: to preserve the current functionality of the Northeast Corridor’s (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012.
The Proposed Project includes the following major components:
- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin.
- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.
- Once the new tunnel is complete and in operation, the existing North River Tunnel would be rehabilitated one track at a time.

Current Land Use:
Land uses within the New York portion of the project area include: commercial and office buildings, transportation and utility, open space and outdoor recreation (Hudson River Park and the High Line), industrial and manufacturing, and areas under construction (Hudson Yards). See second attached map.

Tax parcel number:
Latitude:
Longitude:
Street Address of Project:
Project Notes:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Fish and Wildlife, New York Natural Heritage Program
625 Broadway, Fifth Floor, Albany, NY 12233-4757
P: (518) 402-8935 | F: (518) 402-8925
www.dec.ny.gov

May 4, 2021

Emma Powell
AKRF, Inc.
7250 Parkway Drive, Suite 210
Hanover, MD 21076

Re: Hudson Tunnel Project
County: New York Town/City: New York City

Dear Emma Powell:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the New York portion of the above project site.

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities that our database indicates occur in the vicinity of the project site.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the NYS DEC Region 2 Office, Division of Environmental Permits, at dep.r2@dec.ny.gov.

Sincerely,

Heidi J. Krahling

Heidi Krahling
Environmental Review Specialist
New York Natural Heritage Program

263

The following state-listed animals have been documented in the vicinity of the project site.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed.

For information about any permit considerations for your project, please contact the Permits staff at the NYSDEC Region 2 Office at dep.r2@dec.ny.gov, (718) 482-4997.

The following species has been documented within 0.5 mile of the project site.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING	
Birds				
Peregrine Falcon *Breeding*	*Falco peregrinus*	Endangered		12410

The following species have been documented in the Hudson River and so could occur at the project site.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING	
Fish				
Shortnose Sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	1091
Atlantic Sturgeon	*Acipenser oxyrinchus*	No Open Season	Endangered	11464

This report only includes records from the NY Natural Heritage database.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at www.dec.ny.gov/animals/7494.html.

The following rare plants, rare animals, and significant natural communities have been documented at the project site, or in its vicinity.

We recommend that potential impacts of the proposed project on these species or communities be addressed as part of any environmental assessment or review conducted as part of the planning, permitting and approval process, such as reviews conducted under SEQR. Field surveys of the project site may be necessary to determine the status of a species at the site, particularly for sites that are currently undeveloped and may still contain suitable habitat. Final requirements of the project to avoid, minimize, or mitigate potential impacts are determined by the lead permitting agency or the government body approving the project.

The following animal, while not listed by New York State as Endangered or Threatened, is rare in New York and is of conservation concern.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Bees			
Yellow Bumble Bee	*Bombus fervidus*	Unlisted	Critically Imperiled in NYS
[redacted]			14800

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the rare animals and plants in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, from NatureServe Explorer at www.natureserve.org/explorer, and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

Consultation with State and Federal Agencies

Consultation with State and Federal Agencies

National Marine Fisheries Service Essential Fish Habitat

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

May 11, 2017

Karen Greene
Mid-Atlantic Field Offices Supervisor
National Marine Fisheries Service
Habitat Conservation Division
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732

Re: Request for Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River

Dear Ms. Greene:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) are acting as joint lead agencies for the preparation of a Draft Environmental Impact Statement (EIS), in compliance with the National Environmental Policy Act of 1969 (NEPA), for the Hudson Tunnel Project (Project). FRA has prepared this request for Essential Fish Habitat (EFH) Consultation for the Preferred Alternative for the Project (Preferred Alternative). The Preferred Alternative comprises construction of a new two-track rail tunnel and rehabilitation of the existing passenger rail tunnel beneath the Hudson River between New Jersey and New York Penn Station. The existing passenger rail tunnel, the North River Tunnel, is currently used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service. Based on the analysis provided below and in the enclosed EFH Assessment Worksheet and attachments, FRA has determined that the adverse effect on EFH due to the Preferred Alternative is not substantial and is therefore requesting an abbreviated consultation.

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), FRA and NJ TRANSIT have conducted an EFH Assessment for the Project that will be included in the Draft EIS and in in the permit application to be submitted to the U.S. Army Corps of Engineers, New Jersey Department of Environmental Protection, and New York State Department of Environmental Conservation.

Proposed Project

The Project is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel under the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1** and **Attachment 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, which is used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Construction of the new tunnel will require some construction activity in the Hudson River. In-water activities associated with construction of the Hudson River Tunnel are expected to last approximately 15 months, beginning in late 2019 and ending in late 2020. There are no in-water activities associated with the rehabilitation of the North River Tunnel, as this work will take place within the existing tunnel structure. The Project will comply with all regulatory restrictions for in-water construction activities, including the restriction for pile driving between November 1 and April 30 within Hudson River Park to protect overwintering striped bass and winter flounder spawning.

Proposed In-Water Construction Activities

The Hudson River Tunnel will be constructed by tunnel boring machine (TBM) beneath the river bottom, but will require in-water work within a small section of the Hudson River. As the Hudson River Tunnel approaches Manhattan, it will be relatively shallow beneath the river bottom, which could cause difficulties during tunnel boring. Generally, tunnels that are bored through soft soils, like those in the Hudson River, should have soil above the tunnel equivalent to half the tunnel's diameter or greater to avoid these challenges. This would require at least 14 feet of cover over the 28-foot-diameter tunnel. For a 500-foot length of the alignment west of the New York pierhead line, the tunnel will have cover of less than 14 feet. To address the construction risks associated with shallow cover, the Project will include ground improvement in this portion of the river bottom before the TBM excavation occurs.

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative. Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an 18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3 to 4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

The jet grouting will be conducted within the cofferdams in waters ranging from 30 to 50 feet in depth, and grout will be injected into the soil to a depth of approximately 34 feet below the river bottom (the midpoint of the tunnel's height) and up to the surface of the river bottom sediment.

Jet grouting operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to low strength rock. The material used will have a consistency equivalent to hard clay and will be applied over 1.5 acres of the river bottom. Prior to removal of the cofferdam walls, all jet grout excess will be removed and any excess turbidity in pooled water will be brought down to be compliant with contract environmental requirements. Excess soil displaced by the jet grouting will be contained within the cofferdam and removed for off-site disposal by excavators stationed on the barges.

Construction personnel will travel to the in-water work area via tugboat or dinghy; two boats are likely necessary, one for the crew and the other for delivery of materials. The in-water work will be accomplished in two 8-hour shifts per day on weekdays. All construction material and equipment will be left on up to four barges at the work site, which will be moored-in-place for the duration of in-water construction at each cofferdam segment. The barges will be relatively small (approximately 30 feet wide by 90 feet long; total of up to 10,800 square feet for the four barges) and will be moored in deep water.

During rehabilitation of the existing North River tunnel, which will be conducted entirely within the existing structure, water in the tunnel will continue to be discharged to the North and South Tube Mid-river sump pumps, which empty into the Weehawken sump, and discharge to the Hudson River. This water is and will continue to be monitored and discharged in accordance with Amtrak's discharge permit NJPDES Permit No.

NJ0164640.

Compliance
The EFH Assessment worksheet and attachments are enclosed with this letter. The construction period for the Preferred Alternative will comply with in-water restrictions within Hudson River Park that prohibit pile driving between November 1 and April 30 to protect overwintering striped bass and winter flounder spawning. In summary, the Project will result in:

- Temporary increase in underwater noise from vibratory driving of the steel sheet pile cofferdams (3 to 4 weeks for each of the three cofferdams);
- Temporary increase in suspended sediment from installation (3 to 4 weeks per cofferdam) and removal (1 to 2 weeks per cofferdam) of the cofferdams;
- Temporary increase in vessel activity (40 weeks);
- Temporary loss of 24,000 square feet within the Stage 1 cofferdam (4.5 months);
- Temporary loss of 24,000 square feet within the Stage 2 cofferdam (4.5 months);
- Temporary loss of 18,000 square feet within the Stage 3 cofferdam (3.5 months); and
- Replacement of 1.5 acres of soft bottom habitat with 1.5 acres of soilcrete in the low-cover area.

As the in-water activities are carried out, EFH and prey species would be temporarily displaced to other suitable habitat in the area, but would be expected to return to the project site upon completion of the in-water ground improvement. The use of up to four barges and two small vessels during construction constitutes a very minimal increase in vessel traffic and shading in the project area, and this would not be outside the range of typical vessel activity within the lower Hudson River, which is already a region of high commercial vessel traffic. As the barges would be moored-in-place and smaller vessels would only be used to transport personnel and materials to the work site, the potential for project vessel interaction with EFH species is extremely limited. The effects of sediment resuspension and temporary increases in turbidity associated with sheet pile installation and removal would be minimal, as the Hudson River is strongly influenced by tidal currents, and any resuspended sediments would dissipate shortly after completion of sediment disturbing activities.

The effects of elevated underwater noise levels from installation and removal of the cofferdams would be minimized through the use of a vibratory hammer. Since the river is over 4,000 feet wide in the project location, EFH species will be able to move to a non-ensonified portion of the river during pile driving. Underwater noise levels associated with project vessel traffic during the 15-month in-water construction period is likely to have a minimal effect on ambient noise, as the lower Hudson River is already an area of heavy vessel traffic, to which fish are likely adapted.

During construction, the temporary loss of habitat within the cofferdams during each stage of jet grouting would not result in a substantial reduction in habitat for EFH species. Similar habitat would continue to be available in the vicinity of the Project, and the area within the cofferdams would once again be available to EFH species following the completion of the project. While the low-cover area, in which 1.5 acres of soft bottom will be replaced with 1.5 acres of soilcrete, will initially be unsuitable for burrowing organisms, over time sediments are expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that would provide forage for EFH species.

While construction of the Project has the potential to result in temporary effects on windowpane and winter flounder spawning and larvae, juvenile and adult windowpane, and foraging for windowpane, summer flounder, winter flounder, and skates, the effects would be temporary and bottom habitat will once again be available to these species when the Preferred Alternative is complete. Given that in-water construction will be timed to avoid the winter flounder spawning period, would implement measures to minimize sediment resuspension and underwater noise effects, and the temporary loss of habitat will be small when compared to the abundance of this type of habitat within the Hudson River and connected waterbodies, FRA has determined that the adverse effect on EFH due to the Preferred Alternative is not substantial and is therefore requesting an abbreviated EFH consultation.

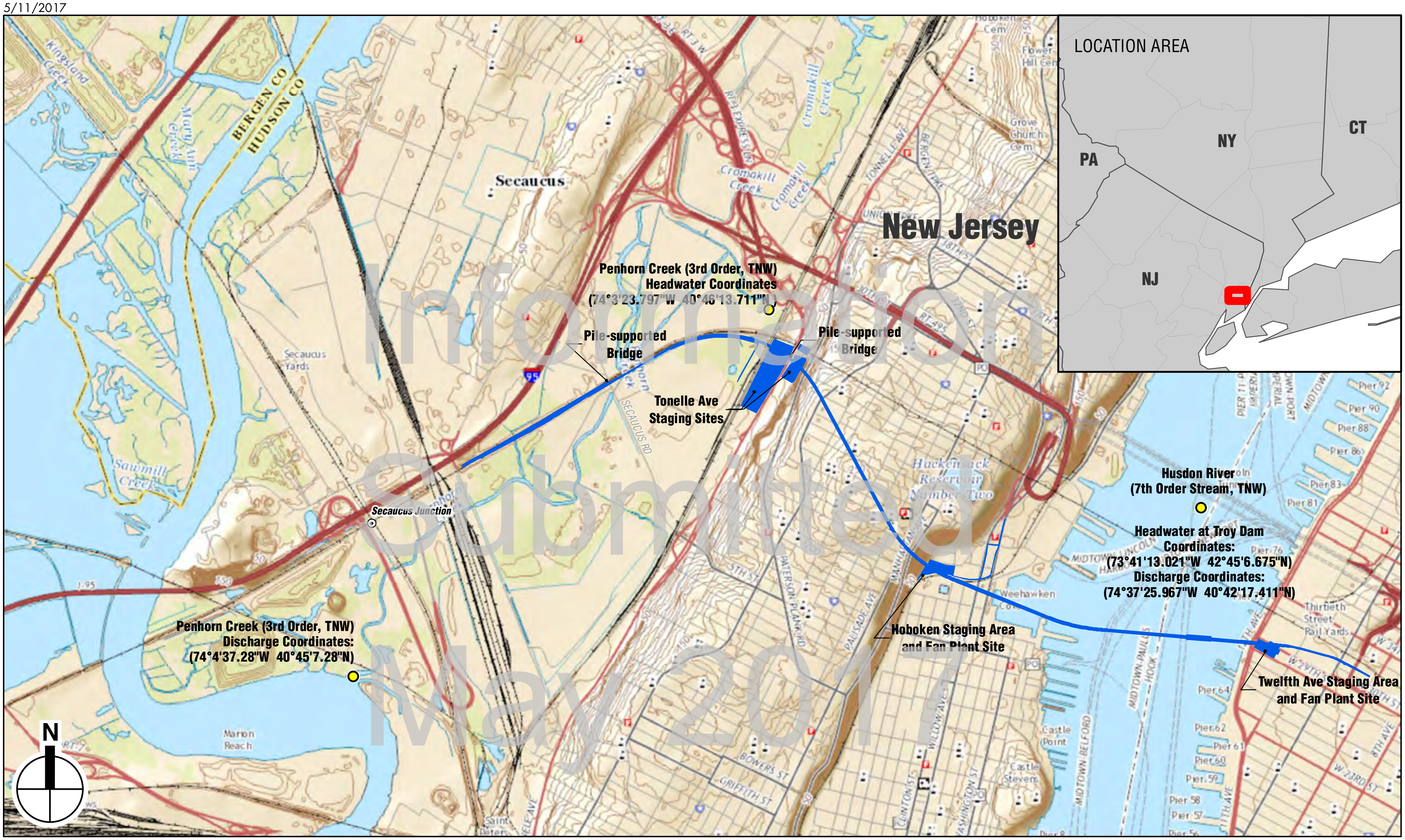
If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl (1)
cc: A. Castelli, FRA
cc. R. Palladino, NJ TRANSIT

5/11/2017



Project Construction and Staging Areas

0 5,000 FEET

HUDSON TUNNEL PROJECT

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged

aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD website (http://www.greateratlantic.fisheries.noaa.gov/habitat/) will assist you in completing this worksheet. The HCD website contains information regarding: the EFH consultation process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Our website also includes a link to the NOAA EFH Mapper (http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html). We would note that the EFH Mapper is currently being updated and revised. Should you use the EFH Mapper to identify federally managed species with designated EFH in your project area, we recommend checking this list against the Guide to Essential Fish Habitat Designations in the Northeast (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm) to ensure a complete and accurate list is provided.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: Hudson Tunnel Project

DATE: May 2017

PROJECT NO.:____________________

LOCATION (Water body, county, physical address):
Hudson River, between New York County, NY, and Hudson County, NJ

PREPARER: AKRF, Inc.

Step 1: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs? **List the species:** See Table 1	X	
Is the action located in or adjacent to EFH designated for larvae? **List the species:** See Table 1	X	
Is the action located in or adjacent to EFH designated for juveniles? **List the species:** See Table 1	X	

Is the action located in or adjacent to EFH designated for adults or spawning adults? **List the species:** See Table 1	X	
If you answered no to all questions above, then EFH consultation is not required - go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

<u>Step 2</u>: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Subtidal and water column habitats are present at the project site.
What are the sediment characteristics?	Sediments in the lower Hudson River are primarily composed of silt and clay with pockets of sand.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	There is no submerged aquatic vegetation at or adjacent to the project site.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	Mapped NYSDEC Littoral Zone wetlands and NWI Estuarine and Marine Deepwater wetlands (E1UBL) are present in the vicinity of the soil improvement area within the Hudson River. There is no vegetation associated with either wetland designation.
Is there shellfish present at or adjacent to the project site? If so, please describe	Hard clams (Mercenaria mercenaria) occur in soft substrates of the lower Hudson River year-round and could be present in the low-cover area. Soft-shell clams could also be found in the

the spatial extent and species present.	vicinity, although they would more likely occur in the shallower waters outside the low-cover area. There are no known oyster beds in the vicinity of the Project location.
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	There are no mudflats at or adjacent to the project site.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	No. Sediments are silt and clay with some pockets of sand.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	There are no HAPCs designated at or near the project site.
What is the typical salinity, depth and water temperature regime/range?	Based on NYCDEP water quality data from 2000-2015, salinity ranges from 0.3 to 30.5 ppt in the project area, depending on tidal direction and amount of freshwater inflow. Temperature typically ranges from 32 to 81 degrees Fahrenheit.
What is the normal frequency of site disturbance, both natural and man-made?	The existing underwater environment experiences disturbance from boat traffic, as well as natural disturbance from tidal action. Due to the level of existing shoreline development in the area, human activity along the shoreline is common. Major natural disturbances are infrequent, in the form of periodic extreme storm events.
What is the area of proposed impact (work footprint & far afield)?	See Attachment 1 (See Drawings ST-369 and ST-370). In-wate work comprises the 1.5-acre footprint of the low-cover area where soil will be stabilized via jet grouting.

<u>Step 3</u>: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			See Attachment 2 for a detailed description of the Preferred Alternative.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	X		There will be a permanent modification of soft bottom benthic habitat in the 1.5-acre footprint of the in-water soil improvement area. Jet grouting will combine cement grout with native soil, resulting in a hard bottom "soilcrete" substrate, which can eventually be colonized by encrusting organisms.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		X	There is no submerged aquatic vegetation in the study area.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		X	There is no salt marsh habitat in the study area.
Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		X	There is no mudflat habitat in the study area.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact?	X		Soft substrate suitable for hard and soft-shell clams, and any shellfish present at the time, will be modified within the 1.5-acre footprint of the in-water soil improvement area. Shellfish would continue colonizing soft bottom habitats in the vicinity of the soil improvement area. Shellfish habitat will not be adversely affected by the preferred alternative.

Provide details of any shellfish survey conducted at the site.			No shellfish surveys have been conducted within the project site.
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?		X	There is no hard bottom habitat at the site. The Preferred Alternative will result in the replacement of 1.5 acres of soft bottom habitat with a hard bottom soilcrete substrate.
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	X		Sedimentation rates will not change. Sediments will be altered from silt/clay to a mix of cement grout and native soil in the 1.5-acre area of ground improvement.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	X		There may be temporary localized increases in turbidity during installation and removal of the cofferdams. Any resuspended sediment will settle quickly following these activities. Subsequent in-water work will be conducted within the cofferdams and will not result in increased turbidity.
Will water depth change? What are the current and proposed depths?		X	The Preferred Alternative will not affect water depth.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.	X		There may be temporary resuspension of sediments and associated contaminants during installation and removal of the cofferdams. However, jet grouting will be performed within the cofferdams and will not release contaminants into the water column. Any resuspension will be minor and sediments will settle quickly after construction.
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.		X	The Preferred Alternative will not alter tidal flow, currents, or wave patterns.
Will ambient salinity or temperature regime change? If no, why not? If yes, describe in detail how and the effects of the change.		X	The Preferred Alternative will not affect ambient salinity or temperature regimes.

Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	X		Installation and removal of the cofferdams may result in temporary and localized increases in turbidity. Any resuspended sediments will settle quickly upon cessation of these activities. The jet grouting will be completed within the cofferdams and will not affect water quality. No permanent effects to water quality are expected as a result of the Preferred Alternative.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	X		The Preferred Alternative will result in a minimal temporary increase in underwater noise associated with the installation of the sheet pile cofferdams and increased vessel activity. See Attachment 2
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	X		The Preferred Alternative will result in the permanent modification to 1.5 acres of soft substrate, which may serve as habitat for prey species of benthic-feeding EFH species. See Attachment 2.

Step 4: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.greateratlantic.fisheries.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			
Spawning **If yes, describe in detail**	X		Spawning winter flounder may be present during Jan-Apr, and windowpane may be present in May. See Attachment 3.

how, and for which species. Describe how adverse effects will be avoided and minimized.			
<u>Nursery</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	X		Temporary effects on butterfish, windowpane, Atlantic herring, summer flounder, and smooth dogfish could occur. See Attachment 3.
<u>Forage</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	X		Temporary effects on juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate foraging could occur. See Attachment 3.
<u>Shelter</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**		X	The Preferred Alternative will not affect shelter habitat, as it is neither creating nor removing shelter for EFH species.
Will impacts be temporary or permanent? Describe the duration of the impacts.			The Preferred Alternative will have both temporary and permanent effects. See Attachment 3.
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.		X	While mapped NYSDEC littoral zone wetlands exist in the vicinity of the in-water soil improvement area the water is deeper than 6 feet at mean low water within the proposed cofferdam footprints and would not be regulated as tidal wetlands by the NYSDEC. None of the in-water construction activities will result in significant long-term adverse effects to EFH, and mitigation will not be required.

<u>Step 5</u>: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

	/	Federal Agency's EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**		**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required**
	X	**The adverse effect on EFH is not substantial.** **This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
		The adverse effect on EFH is substantial. **This is a request for an expanded EFH consultation**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	See Attachment 4
American eel	See Attachment 4
American shad	See Attachment 4
Atlantic menhaden	See Attachment 4
blue crab	See Attachment 4
blue mussel	See Attachment 4
blueback herring	See Attachment 4
Eastern oyster	See Attachment 4
horseshoe crab	See Attachment 4
quahog	See Attachment 4
soft-shell clams	See Attachment 4
striped bass	See Attachment 4
other species:	Impacts to sturgeon are included in Attachment 4

Useful Links

National Wetland Inventory Maps
http://www.fws.gov/wetlands/

EPA's National Estuaries Program
http://www.epa.gov/nep/information-about-local-estuary-programs

Northeast Regional Ocean Council (NROC) Data Portal
http://www.northeastoceandata.org/

Mid-Atlantic Regional Council on the Ocean (MARCO) Data Portal
http://portal.midatlanticocean.org/

Resources by State:

Maine
Eelgrass maps
http://www.maine.gov/dmr/rm/eelgrass/
Maine Office of GIS Data Catalog
http://www.maine.gov/megis/catalog/
Casco Bay Estuary Partnership
http://www.cascobayestuary.org/
Maine GIS Stream Habitat Viewer
http://mapserver.maine.gov/streamviewer/index.html

New Hampshire
New Hampshire's Statewide GIS Clearinghouse, NH GRANIT
http://www.granit.unh.edu/
New Hampshire Coastal Viewer
http://www.granit.unh.edu/nhcoastalviewer/

Massachusetts
Eelgrass maps
http://maps.massgis.state.ma.us/images/dep/eelgrass/eelgrass_map.htm
MADMF Recommended Time of Year Restrictions Document
http://www.mass.gov/eea/docs/dfg/dmf/publications/tr-47.pdf
Massachusetts Bays National Estuary Program
http://www.mass.gov/eea/agencies/mass-bays-program/
Buzzards Bay National Estuary Program
http://buzzardsbay.org/
Massachusetts Division of Marine Fisheries
http://www.mass.gov/eea/agencies/dfg/dmf/
Massachusetts Office of Coastal Zone Management
http://www.mass.gov/eea/agencies/czm/

Rhode Island
Eelgrass maps
http://www.savebay.org/file/2012_Mapping_Submerged_Aquatic_Vegetation_final_report_4_2013.pdf
Narraganset Bay Estuary Program

http://www.dem.ri.gov/programs/benviron/water/wetlands/wetldocs.htm
Rhode Island Division of Marine Fisheries
http://www.dem.ri.gov/
Rhode Island Coastal Resources Management Council
http://www.crmc.ri.gov/

Connecticut
Eelgrass Maps
https://www.fws.gov/northeast/ecologicalservices/pdf/wetlands/2012_CT_Eelgrass_Final_Report_11_26_2013.pdf
Long Island Sound Study
http://longislandsoundstudy.net/
CT GIS Resources
http://www.ct.gov/deep/cwp/view.asp?a=2698&q=323342&deepNav_GID=1707
CT DEEP Office of Long Island Sound Programs and Fisheries
http://www.ct.gov/deep/
CT Bureau of Aquaculture Shellfish Maps
http://www.ct.gov/doag/cwp/view.asp?a=3768&q=451508&doagNav=
CT River Watershed Council
http://www.ctriver.org/

New York
Eelgrass report
http://www.dec.ny.gov/docs/fish_marine_pdf/finalseagrassreport.pdf
Peconic Estuary Program
http://www.peconicestuary.org/
NY/NJ Harbor Estuary
http://www.harborestuary.org/

New Jersey
Submerged Aquatic Vegetation mapping
http://crssa.rutgers.edu/projects/coastal/sav/
Barnegat Bay Partnership
http://bbp.ocean.edu/pages/1.asp

Delaware
Partnership for the Delaware Estuary
http://www.delawareestuary.org/
Center for Delaware Inland Bays
http://www.inlandbays.org/

Maryland
Submerged Aquatic Vegetation mapping
http://data.imap.maryland.gov/datasets/da64df6bd4124ce9989e6c186a7906a7_0
MERLIN
http://geodata.md.gov/imaptemplate/?appid=a8ec7e2ff4c34a31bc1e9411ed8e7a7e
Maryland Coastal Bays Program
http://www.mdcoastalbays.org/

Virginia
Submerged Aquatic Vegetation mapping
http://web.vims.edu/bio/sav/maps.html

Table 1
Essential Fish Habitat Designated Species in the Vicinity of the Hudson Tunnel Project

Species	Eggs	Larvae	Juveniles	Adults
Red Hake (*Urophycis chuss)*		X	X	X
Redfish (*Sebastes fasciatus*)	n/a			
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane flounder (*Scophthalmus aquosus*)	X	X	X	X
Atlantic herring (*Clupea harengus*)		X	X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Long-finned squid (*Loligo pealeii*)	n/a	n/a		
Short-finned squid (*Illex illecebrosus*)	n/a	n/a		
Atlantic butterfish (*Peprilus triacanthus*)		X	X	X
Atlantic mackerel (*Scomber scombrus*)			X	X
Summer flounder (*Paralicthys dentatus*)		X	X	X
Scup (*Stenotomus chrysops*)	X	X	X	
Black sea bass (*Centropristis striata*)	n/a		X	X
Surf clam (*Spisula solidissima*)	n/a	n/a		
Ocean quahog (*Artica islandica*)	n/a	n/a		
Spiny dogfish (*Squalus acanthias*)	n/a	n/a		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Bluefin tuna (*Thunnus thynnus*)	X	X	X	X
Smooth dogfish (*Mustelus canis*)	X	X	X	X
Sand tiger shark (*Carcharias taurus*)		X(1)		X
Dusky shark (*Carcharinus obscurus*)		X(1)		
Sandbar shark (*Carcharinus plumbeus*)		X(1)		

Notes: n/a – insufficient data for this life stage exists and no EFH designation has been made.
(1) These species do not have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, "larvae" for sand tiger, dusky, and sandbar sharks refers to neonates and early juveniles.

Sources: National Marine Fisheries Service. "Summary of Essential Fish Habitat (EFH) Designation" posted on the Internet at http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40407400.html and http://www.nero.noaa.gov/hcd/skateefhmaps.htm National Marine Fisheries Service EFH Mapper accessed online at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html

PERMIT PLANS SUBMITTED WITH LETTER

Attachment 2 Description of Impacts – Additional Information

The following information is provided in response to certain questions listed under Step 3 "Description of Impacts" of the EFH Assessment Worksheet.

Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.

The Project is the construction of a new two-track rail tunnel running approximately parallel to the existing North River Tunnel, extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (**see Attachment 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, which is used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative. Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an

18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3-4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

The jet grouting will be conducted within the cofferdams in waters ranging from 30 to 50 feet in depth, and grout will be injected into the soil to a depth of approximately 34 feet below the river bottom (the midpoint of the tunnel's height) and up to the surface of the river bottom sediment.

Jet grouting operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to low strength rock. The material used will have a consistency equivalent to hard clay and will be applied over 1.5 acres of the river bottom. Prior to removal of the cofferdam walls, all jet grout excess will be removed and any excess turbidity in pooled water will be brought down to be compliant with contract environmental requirements. Excess soil displaced by the jet grouting will be contained within the cofferdam and removed for off-site disposal by excavators stationed on the barges.

Construction personnel will travel to the in-water work area via tugboat or dinghy; two boats are likely necessary, one for the crew and the other for delivery of materials. The in-water work will be accomplished in two 8-hour shifts per day on weekdays. All construction material and equipment will be left on up to four barges at the work site, which will be moored-in-place for the duration of in-water construction at each cofferdam segment. The barges will be relatively small (approximately 30 feet wide by 90 feet long; total of up to 10,800 square feet for the four barges) and will be moored in deep water.

During rehabilitation of the existing North River tunnel, which will be conducted entirely within the existing structure, water in the tunnel will continue to be discharged to the North and South Tube Mid-river sump pumps, which empty into the Weehawken sump, and discharge to the Hudson River. This water is and will continue to be monitored and discharged in accordance with Amtrak's discharge permit NJPDES Permit No. NJ0164640.

Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.

In-water construction will result in temporary increases in underwater noise from vessel activity and driving the sheet pile into the sediment for the cofferdams. During construction, there will be up to four barges moored-in-place in the work area from which cofferdam installation/removal and jet grouting activities will be conducted. Personnel will travel to the barges from an existing pier to the work area via tugboat or dingy, and construction materials will be delivered by a second small vessel. This very minimal increase in the number of vessels present in the area, and the associated underwater noise, would be well within the typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic. As such, aquatic organisms in the area are likely acclimated to ambient noise levels and will not be adversely affected by the slight, possibly undetectable, increase in vessel noise.

Installation and removal of steel sheet pile with a vibratory hammer will result in temporary increases in underwater noise during installation of each sheet pile section. The cofferdams will be installed in sections, with each section being completed within 3-4 weeks (8 hours of pile driving per day, for 5 days per week for each cofferdam; total of 15 weeks for all three cofferdams including time required for removal). Installation of the sheet pile for the cofferdam structures will result in temporary elevated underwater noise levels that are not expected to exceed the threshold for physiological injury to fishes.[1] Fish will likely avoid portions of the Hudson River in the vicinity of sheet pile installation above the behavioral threshold (150 dB SPLrms) that occur within 150 to 300 feet of the pile driving activity. Most of the river will be non-ensonified (<150 dB SPLrms) at any given time during sheet pile installation. Even when the deepest sheet piles are installed closest to the navigation channel, about 80% of the distance across the channel will likely be non-ensonified, leaving room for fish to avoid portions of the river in proximity to the cofferdam. Fish are expected to avoid the area of pile driving activity in favor of suitable habitat in the vicinity, and will return following construction. To further reduce the likelihood of impacts to EFH, sheet pile driving will not occur during the period of pile driving restriction within Hudson River Park of November 1 through April 30 to protect overwintering striped bass and winter flounder spawning.

Does the action have the potential to impact prey species of federally managed fish with EFH designations?

The Preferred Alternative will result in both temporary and permanent impacts to prey species of EFH fish. Construction activities have the potential to result in temporary impacts to fish and macroinvertebrates due to temporary increases in suspended sediment, movement of construction vessels through the water column, shading by the barges moored-in-place at the work site, and underwater noise associated with the sheet pile cofferdam installation/removal and vessel activity. Sediment disturbance associated with installation and removal of the cofferdams would result in minor, short-term increases in suspended sediment and re-deposition of contaminants. Fish and motile benthic macroinvertebrates will be able to avoid the project area during installation of the cofferdams and will not be affected by temporary increases in suspended sediment. Elevated suspended sediment concentrations will dissipate via dispersion by tidal currents of the lower Hudson River upon cessation of sediment disturbing activities. Similarly, any contaminants released to the water column as a result of sediment disturbance would dissipate quickly and would not result in significant adverse long-term impacts to water quality and prey species of EFH. The area shaded by the barges (up to approximately 10,800 square feet) represents a very small area within the lower Hudson River and will not have an adverse effect on prey species of EFH species. Increased vessel activity will be well within the typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic, and would not adversely affect prey species in the area.

Temporary increases in underwater noise from vessel activity and sheet pile installation and removal via vibratory hammer may cause motile prey species to avoid the area in favor of suitable habitat in the vicinity. Elevated underwater noise will be temporary, as the cofferdams will be installed in sections, with each section being completed within 3-4 weeks (8 hours of pile

[1] For vibratory driving of steel sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 SPLrms, and 160 dB for the 1-second SEL. These sound levels are continuous rather than percussive and would not exceed the threshold of 206 dB SPLpeak that is associated with the onset of recoverable physiological injury to fishes.

driving per day, for 5 days per week for each cofferdam; total of 15 weeks for all three cofferdams including time required for removal). Installation of the sheet pile for the cofferdam structures would result in temporary increased underwater noise levels that would not be expected to exceed the threshold for physiological injury to fishes.[2] These organisms are expected to return to the area following completion of pile driving. The use of a vibratory hammer and any permit conditions restricting the timing of pile driving (e.g., November 1 through April 30 for protection of striped bass) would minimize the effects of elevated noise levels on fish.

The Preferred Alternative will result in a permanent loss of non-motile benthic organisms, which may serve as prey for EFH species, within the 1.5-acre footprint of soil improvement. While burrowing macroinvertebrates will no longer be available to predators within this footprint, there is similar available habitat in the vicinity, and these organisms will continue to serve as prey to EFH species in these areas. It is expected that encrusting organisms tolerant of the soilcrete will colonize the soil improvement area following completion of construction activities and will likewise be available as prey to EFH species.

[2] For vibratory driving of sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 dB SPLrms, and 160 dB for the 1-second SEL.

Attachment 3 EFH Assessment – Additional Information

The following information is provided in response to certain questions listed under Step 4 "EFH Assessment" of the EFH Assessment Worksheet.

***Spawning*: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**

Spawning winter flounder may be present during January through April, and spawning windowpane may be present in May. The Preferred Alternative will comply with any in-water restrictions from NMFS to protect winter flounder spawning EFH at the site, which overlaps with windowpane spawning. The 1.5-acre footprint of the low-cover area represents a very small portion of the lower Hudson River, and suitable spawning habitat will be available to winter flounder and windowpane in the vicinity. The soil improvement via jet-grouting will be contained within three segments of cofferdams and is not likely to adversely affect water quality or spawning habitat for these species. During the in-water work, up to four construction barges will be moored-in-place for each cofferdam section and will result in shading of approximately 10,800 square feet of relatively deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect EFH spawning. Installation and removal of the cofferdams may result in temporary resuspension of sediment, but this effect will be minor, as suspended sediments will dissipate with the tidal currents upon cessation of sediment disturbing activities. Driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. At any given time during sheet pile installation, most of the width of the river would be non-ensonified, leaving room for fish to avoid portions of the Hudson River in proximity to the cofferdam while the sheet pile is driven. Fish will likely avoid portions of the Hudson River in the vicinity of sheet pile installation. Since the vibratory hammer will not reach levels that would exceed the threshold for physiological injury to fishes, and there will be available habitat outside the ensonified area, the temporarily elevated underwater noise levels will not have a significant adverse effect on spawning habitat for EFH.

***Nursery*: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**

Windowpane and winter flounder larvae are initially planktonic, but quickly become bottom-oriented and could be affected by installation and removal of the cofferdams if they are present at the project site. Any pelagic larvae that may occur in the study area will be less susceptible to effects from sediment-disturbing activities, as they are able to move away from the construction area to suitable habitat in the vicinity. Larvae in the study area could be temporarily impacted by minor increases in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. In-water construction activities will likely be restricted between early January and late May to protect spawning winter flounder, which will also protect any larvae present in the study area during that time. The permanent loss of 1.5 acres of soft bottom habitat where soilcrete will be added within the soil improvement area will not adversely affect nursery habitat for EFH species, as similar habitat is available in the vicinity. During the in-water work, up to four construction barges will be moored-in-place and will result in shading of approximately 10,800 square feet of deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect nursery habitat. As noted above, driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. Elevated noise levels during this time may lead to avoidance of the area by some fish, but will not have a significant adverse effect on larvae.

***Forage*: If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**

Juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate are benthic feeders. Other EFH species also feed on benthic organisms, although not exclusively. The Preferred Alternative will result in a minor temporary increase in suspended sediment and localized increases in turbidity during the installation and removal of the cofferdams, which could impact bottom dwelling forage species; any sediment disturbed during these activities will dissipate quickly with the tidal currents in the lower Hudson River upon completion of construction. Driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. The temporary loss of foraging habitat within and in the vicinity of the soil improvement area, when compared to the available suitable habitat that will still be available in the lower Hudson River, will not result in a significant adverse effect to foraging habitat for EFH species.

Will impacts be temporary or permanent? Describe the duration of the impacts.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. This effect will be minor, as any resuspended sediment will dissipate quickly with the tidal currents upon cessation of sediment disturbing activities. As the cofferdams are constructed over a 3-4 week period and removed over 1-2 weeks (per cofferdam), motile organisms will be temporarily displaced to other suitable habitat in the area. There will be a temporary increase in vessel traffic during the construction period, along with shading by the moored-in-place barges, but these actions will not be outside the range of typical vessel activity within the study area in the lower Hudson River, which is a region of high commercial vessel traffic. This temporary increase in vessel traffic will not result in significant adverse impacts to benthic invertebrates or fish communities in the project area. Temporary increases in underwater noise from driving the sheet pile cofferdam walls will be minimized through the use of a vibratory hammer, and will occur intermittently only during cofferdam installation. The elevated noise level will likely cause some fish to avoid the Hudson River in the proximity of pile driving, but they are expected to return to the area following completion of pile driving. In-water construction is expected to last approximately 40 weeks in total (3-4 weeks for installation of each cofferdam, 7-9 weeks for each section of jet grouting, and 1-2 weeks to remove each cofferdam).

Ground stabilization via jet grouting will result in the permanent loss of 1.5 acres of silt/clay bottom in the low-cover area, along with non-motile organisms within this footprint. The jet grouting will mix with the soft sediment within this footprint to form a hard bottom substrate of soilcrete. After ground stabilization activities are complete, encrusting organisms will be able to colonize the soil improvement area, and fish are expected to return to the area following construction. Soft sediment deposition may also occur over the soilcrete at sedimentation rates typical of the lower Hudson River.

The following information is provided in response to Step 6 "Other NOAA-Trust Resources Impact Assessment" of the EFH Assessment Worksheet.

Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.

Alewife

Alewife (*Alosa pseudoharengus*) is a pelagic species that can occur in the lower Hudson River from spring to fall. During the spring months, this species migrates through the New York Harbor to spawning grounds in the Hudson, Raritan, and Navesink Rivers, where eggs are deposited in slow-flowing water over a variety of substrates (Mackenzie 1990, Pardue 1983). Peak abundance of larval alewife in estuaries occurs in waters with salinities of 1-5 parts per thousand (ppt) at the surface and 1-15 ppt at the bottom (Locke and Courtenay 1995). Most juveniles emigrate from freshwater estuarine nursery habitats in the rivers where they were spawned between June and November of their first year (Pardue 1983). Adult alewife school in open waters and occupy a variety of inshore ocean, estuarine, and freshwater habitats depending on the season (Hildebrand 1963). They are only associated with bottom structure or substrate during spawning, which occurs in rivers and tributaries. Larval and juvenile alewife feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that alewife are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Any temporary increases in suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for alewife.

American Eel

American eel (*Anguilla rostrata*) can occur in the lower Hudson River year-round. This species is catadromous, spending most of its life in fresh water and spawning in salt water. They occur in streams and rivers with continuous flow over muddy or silty substrate (Scott and Scott 1988). During the day they tend to rest in undercut banks and deep pools near logs or boulders (Fischer 1978). At sexual maturity, adults migrate from the Hudson, Raritan, and Navesink Rivers and their tributaries to spawning grounds in the Sargasso Sea (Mackenzie 1990). American eels have several life stages: egg, glass, elver, yellow, and silver. Eggs hatch on the ocean surface in the Sargasso Sea and drift with currents for about a year as they develop into larvae before reaching the Atlantic coast (USFWS 2015). Glass eels, or larvae, are about 2-3 inches long by the time they reach the coast, and metamorphose into elvers, or juveniles, in nearshore areas of estuaries and tidal rivers (USFWS 2015, Fischer 1978). Elvers transform into yellow eels, which are sexually immature adults, and can spend up to 40 or more years living in freshwater habitats before they mature into silver eels and migrate to the Sargasso Sea to spawn; eels that remain in brackish waters tend to mature earlier than those in freshwater (USFWS 2015). American eels feed on a variety of things, including insects, fish, fish eggs, crabs, worms, clams, and frogs (USFWS 2011).

Given that neither spawning nor nursery habitat for American eel occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American eel.

American Shad

American shad (*Alosa sapidissima*) is a schooling pelagic species that can occur in the lower Hudson River year-round. This species migrates from offshore waters to spawning grounds in the freshwater tidal areas of the Hudson River; they can tolerate moderate salinity but spawn in lower salinity waters over sand and gravel (Leggett 1976, Walberg and Nichols 1967). Spawning occurs over a variety of substrates, but preferably over sand and gravel bottom with sufficient water movement to eliminate silt deposits (Stier and Crance 1985). Larvae prefer brackish waters with salinities of 7 ppt or less (Leim 1924). Larvae and juveniles start to migrate into the open ocean during the fall, and adults spend most of their lives in offshore ocean waters. Larval and juvenile shad feed mainly on aquatic insects and crustaceans, and adults are primarily plankton feeders (Stier and Crance 1985).

Given that American shad are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American shad.

Atlantic Menhaden

Atlantic menhaden (*Brevoortia tyrannus*) can occur in the lower Hudson River year-round. This species migrates seasonally along the Atlantic coast, moving north through the Mid-Atlantic Bight during spring, and south to Cape Hatteras during the fall (Able and Fahay 1998). Adults are found near surface waters, typically in shallow areas overlying the continental shelf, and they occur in greatest abundance adjacent to major estuaries (Jones et al. 1978). They move inshore during the summer and into deeper waters in the winter. Spawning occurs in continental shelf waters and in the lower reaches of estuaries and coastal bays in waters up to 10 meters deep (Dovel 1971, Rogers and Van Den Avyle 1989). Larvae and juveniles use estuaries during the summer before migrating offshore in the fall (Dovel 1971). Concentrations of young menhaden occur in inshore estuarine waters along the entire Atlantic coast (Rogers and Van Den Avyle 1989). Larvae feed on plankton, and juveniles and adults are filter feeders.

Given that Atlantic menhaden are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for Atlantic menhaden.

Blue Crab

Blue crab (*Callinectes sapidus*) can occur in the lower Hudson River year-round. Mating season occurs from May through October in the mid-Atlantic in the upper areas of estuaries and lower portions of rivers (Hill et al. 1989). Females generally spawn in high salinity waters between 2 and 9 months after mating (Hill et al. 1989). Eggs are deposited as a cohesive mass that remains attached to the female until larvae, called zoeae, emerge (Hill et al. 1989). Zoeae molt multiple times over the course of about 1-1.5 months, transforming into megalops, or the second larval stage, which is crablike in appearance; development into the juvenile "first crab" stage is characterized by adult proportions and appearance after 6-20 additional days (Hill et al. 1989). Areas of submerged aquatic vegetation in high salinity estuarine waters are used as nursery areas (Heck and Thoman 1984). Juveniles gradually migrate into shallower, less saline waters of upper estuaries and rivers, where they grow and mature into adults through a series of molt and intermolt phases over the course of about 12-18 months (Hill et al. 1989). Blue crabs move from shallow areas and tributaries in the summer to deeper waters in the fall (Mackenzie 1990). When not mating, small blue crabs prefer shallow, high salinity waters over substrates of soft detritus, mud, or mud-shell; larger crabs generally prefer deeper estuarine waters with hard bottom substrates (Hill et al. 1989). As detritivores and scavengers, blue crabs feed on a variety of phytoplankton, invertebrates, fish, and other crabs.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for blue crab. Blue crabs are motile and are not expected to be adversely impacted by project activities.

Blue Mussel

Blue mussel (*Mytilus edulis*) is a valuable commercial species and is widely distributed and locally abundant in the north and mid-Atlantic regions; it is most common in the littoral and sublittoral zones of oceanic and estuarine waters and can occur in the lower Hudson River year-round. This species is a bivalve mollusk that filter-feeds on phytoplankton and particulate detritus from the water (Rice 2010). Adult mussels typically reach shell lengths of about 4 inches and attach to hard surfaces, including large boulders, pebbles, and other mussels (Rice 2010, Newell 1989). Eggs are released into the water column for fertilization and hatch after about 5 hours (Newell 1989). Blue mussels go through several larval stages lasting between 15 days and 6 months after hatching. After about 6 months, the mussel temporarily attaches to filamentous substrates and develops as a juvenile for up to 2 years (Newell 1989). Juveniles grow to approximately 1.5 mm while attached to filamentous algae, and then are carried by currents until they reattach to a hard substrate (Newell and Moran 1989). Following the juvenile stage, adults live in habitats ranging from flat intertidal shores to vertical surfaces subject to wave splash (Newell 1989). They are typically found in subtidal and intertidal environments over a wide range of salinities (5-35 ppt) and depths ranging from 16 to 32 feet (Zagata et al. 2008).

The ground stabilization area is composed of soft silt and clay substrate that is not suitable for blue mussels; therefore, this species is not likely to occur within the 1.5-acre footprint of ground stabilization through jet grouting. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities and will not adversely impact blue mussel populations in the Hudson River.

Blueback Herring

Blueback herring (*Alosa aestivalis*) is a schooling pelagic species that can occur in the lower Hudson River. Blueback herring adults spend much of their lives in salt water and return to freshwater tributaries to spawn over gravel and sand substrates (Loesch 1969) and would likely only occur in the project area between April and June during migrations into freshwater spawning habitats and back into inland coastal waters post-spawn. Spawning occurs in swift-flowing, deeper stretches of rivers over hard substrate, and in slower-flowing tributaries and flooded areas with soft substrates (Pardue 1983). Eggs adhere to vegetation, rocks, and debris in fresh water where they are deposited. Blueback herring remain in freshwater habitats as larvae and migrate to low salinity estuarine water as juveniles, generally between June and November of their first year (Loesch 1969, Pardue 1983). Larval and juvenile blueback herring feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that blueback herring are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for blueback herring.

Eastern Oyster

Eastern oyster (*Crassostrea virginica*) can occur in the deeper waters of the Hudson River and New York Harbor year-round. Adult oysters are non-motile and typically live in clumps, or beds. In mid-Atlantic waters, they prefer water depths ranging from 2 to 16 feet (MacKenzie, Jr. 1996). Spawning occurs via release of eggs into the water, where they are fertilized; eggs and young larvae remain in the water column for 2-3 weeks (Stanley and Sellers 1986). Juveniles, or spat, develop in the water column and attach to hard surfaces such as stones or other oyster shells, usually in established oyster beds, about 2-3 weeks after spawning. This species tolerates a wide range of salinity, generally between 5 and 32 ppt. Sufficient water currents are necessary to flush suspended sediments, remove debris, and transport food over oyster beds. Oyster larvae feed largely on plankton, while adult oysters filter-feed on diatom plankton, dinoflagellates, ostracods, small eggs, and anything else in the water that is 3-4 micrometers in size, including bacteria (Stanley and Sellers 1986).

There are no known natural or man-made oyster beds in the vicinity of the ground stabilization area. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate quickly upon the cessation of sediment disturbing activities and will not adversely affect oysters that may be present in the lower Hudson River either upstream or downstream of the ground stabilization area. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for oysters.

Horseshoe Crab

Horseshoe crab (*Limulus polyphemus*) can occur in the lower Hudson River. Adult horseshoe crabs migrate from deep offshore waters from April to July to spawn. Eggs are deposited on beaches in the upper portion of the intertidal zone and below the feeding zone of shorebirds (USACE 2009). Spawning habitat depends on ready access to open and undisturbed sandy beaches in relatively calm waters, with a portion of the beach at or above Mean High Water where eggs are laid and larvae develop (Baine et al. 2007). Beach quality, including slope, width, and sediment grain size, can influence spawning activity (Baine et al. 2007); beach slope between 7 and 10° is thought to be optimal for horseshoe crab spawning habitat (USACE 2009). Females make several nests during one beach trip and often return on successive tides to lay more eggs (MDNR 2016). After about one month, the eggs hatch and larvae remain in the intertidal flats or shoal waters where they were spawned until settling to the bottom to molt (USACE 2009, MDNR 2016). During its first 2-3 years, the horseshoe crab molts several times per year, and then about once annually until it reaches sexual maturity around 9-11 years in age (MDNR 2016). Adults remain in deep offshore habitats during most of the year, except during the spawning season. Horseshoe crabs feed mainly on marine worms and shellfish, and serve as an important food source to shorebirds and juvenile sea turtles. Migratory shorebirds rely on horseshoe crab eggs to survive their journey to breeding grounds (MDNR 2016). Horseshoe crab eggs and larvae are also a food source for a variety of species including crabs, whelks, striped bass, white perch, American eel, killifish, silver perch, weakfish, kingfish, silversides, summer flounder, and winter flounder (MDNR 2016).

There are no beaches near the ground stabilization area, therefore, horseshoe crab spawning will not be adversely affected by the Preferred Alternative. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for horseshoe crabs.

Quahog

Northern quahog (*Mercenaria mercenaria*), also known as hard clams, can occur in the lower Hudson River year-round. Hard clams are found in the intertidal and subtidal zones of bays and estuaries in waters up to 15 meters deep, most often in higher salinity waters (Stanley and DeWitt 1983). They can be found in all sediment types, but prefer sediments that are a mixture of sand and mud with some coarse material. Adults burrow an average of 2 centimeters into sand, and an average of just one centimeter into softer substrates; adults can escape 10-50 cm of overburden if buried and can re-burrow if removed from the substrate (Stanley and DeWitt 1983). Eggs are released into the water column for fertilization and are carried by tidal and coastal currents for about 10 hours before hatching. Larvae develop 12-14 hours after hatching and drift up and down through the water column until they reach about 2-3 millimeters in length. At this time, the shell begins to thicken and larvae transform into seed clams, which begin a final migration to their ultimate habitat, settling as adults in their second summer (Stanley and De Witt 1983). Adult clams filter plankton and microorganisms from the water that are carried close to the bottom by currents.

Any hard clams present in the 1.5-acre footprint of ground stabilization with jet grouting, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, hard clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for hard clams.

Soft-shell Clams

Soft-shell clams (*Mya arenaria*) can occur in the lower Hudson River year-round. This species inhabits sandy, sand-mud, or sandy clay bottoms of inlets and bays, typically at water depths of 3-4 meters and salinities no less than 4-5 ppt (Abraham and Dillon 1986). Adults burrow up to 30 centimeters into the substrate, with siphons extending to the sediment surface to feed on detritus and plankton suspended in the water (Abraham and Dillon 1986). Soft-shell clams spawn biannually based on water temperatures, once in spring at 10-20°C and once in fall when temperature falls to 20°C. Eggs are broadcast into the water and develop into planktonic larvae about 12 hours after fertilization; after about 4-6 weeks, larvae settle to the bottom (Abraham and Dillon 1986). Juveniles are able to move to more favorable locations, usually sandy bottoms with less than 50% silt content, before burrowing into the substrate as adults (Abraham and Dillon 1986).

Any soft-shell clams present in the 1.5-acre footprint of ground stabilization with jet grouting, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, soft-shell clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for soft-shell clams.

Striped Bass

Striped bass (*Morone saxatillis*) can occur in the lower Hudson River from spring to fall. Striped bass can be found in the lower Hudson River during spawning migrations from coastal waters into freshwater spawning grounds between May and June, and back to coastal waters post-spawn in the fall (CHG&E et al. 1999). Larvae drift with the current, but remain in low salinity river waters; juveniles begin to move into higher salinity waters as they grow. Juveniles could be found in the New York Harbor by late summer (CHG&E et al. 1999, Dunning et al. 2009). Outside of spawning periods, adult striped bass migrate along the Atlantic coast and would not likely be found in the lower Hudson River. When they are present, they generally occur in open water, inter-pier, and semi-enclosed basin areas, especially offshore from sandy beaches or rocky shores where prey species are most abundant. Larvae feed mainly on copepods and chironomid larvae, adding larger aquatic invertebrates and small fishes to their diet as they grow (Fay et al. 1983). Larger striped bass begin to school while foraging and feed primarily on clupeids, including bay anchovy and Atlantic menhaden, but also continue to feed on invertebrates (Fay et al. 1983).

Given that striped bass are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for striped bass.

Atlantic and Shortnose Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). The full length of the tidal Hudson River has been proposed as Critical Habitat for Atlantic sturgeon (NMFS 2016b). Atlantic sturgeon is a bottom-dwelling fish that inhabits large freshwater rivers when spawning and primarily marine waters when not breeding. They can also be found in bays, river mouths, and estuaries. Atlantic sturgeon spend most of their lives in marine waters along the Atlantic coast, and return to the freshwater portions of the Hudson River to spawn from late May through mid-July. Adults are more often found in deeper offshore waters, and early life stages are relatively intolerant of salinity. Primary spawning habitat has been identified in Hyde Park, New York at river mile 83 (Bain et al. 2000), well upstream of the project location. Atlantic sturgeon prefer waters between 10 and 15 meters (32 and 49 feet) in depth (Dunton et al. 2010), and no Atlantic sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1995, Able et al. 1998, Bain et al. 2006).

Shortnose sturgeon (*Acipenser brevirostrum*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). Shortnose sturgeon are bottom-dwellers that spawn, develop, and overwinter in the Hudson River in its freshwater and brackish reaches, and occasionally use areas of the lower Hudson River downstream of the George Washington Bridge. Shortnose sturgeon prefer the deeper, colder waters of the river channel, and occur in greatest abundance north of river mile 46. Spawning in the Hudson River occurs between March and May in fresh waters over rock or gravel substrate well upstream of the project location (NMFS 1998). Although larvae can be found in brackish areas of the river, juveniles are predominately confined to freshwater areas upstream from the saline area of the lower Hudson River and New York Harbor. Older juveniles, or sub-adults, tend to move downstream in fall and winter and upstream in the spring, and feed mostly in freshwater reaches during the summer. No shortnose sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1998, Bain et al. 2006).

While they are not expected to occur in significant numbers in the study area, as they move through shallower marine waters along the Atlantic coast, transient Atlantic sturgeon adults and sub-adults have the potential to occur within the 1.5-acre area of the lower Hudson River that would receive soil improvement under the Preferred Alternative. While shortnose sturgeon do not undertake the significant marine migrations seen in Atlantic sturgeon, they do make localized coastal migrations and could be found in the New York Harbor and lower Hudson River near the project location. Transient individuals of both sturgeon species would be more likely to occur in the deeper waters of the River along the margins of the deep navigation channel than in shallower waters. Since any impacts to water or sediment quality associated with the Preferred Alternative's in-water construction activities associated with soil improvement would be localized and temporary, the deep channel habitat is unlikely to be adversely affected during construction. Adult and sub-adult sturgeon are benthic feeders, and soil improvement through jet grouting in the 1.5-acre low-cover area has the potential to temporarily disturb foraging habitat. However, when compared to the available suitable habitat that will still be available within the lower Hudson River, this temporary loss of foraging habitat that would only be used during migration will not have the potential to result in significant adverse effects to sturgeon. Increased underwater noise during installation and removal of each cofferdam will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with physical injury. Sturgeon are expected to return to the area of soil improvement within the Hudson River following the cessation of in-water construction acticities. While the 1.5-acre soil improvement area will no longer be suitable for burrowing organisms, once ground stabilization activities are complete and the cofferdams are removed, encrusting organisms tolerant of soilcrete are expected to colonize the low-cover area, and sturgeon will be able to forage for benthic fish and invertebrates in the area.

References

Able, K.W., A.L. Studholme, and J.P. Manderson. 1995. Habitat quality in the New York/New Jersey Harbor Estuary: An evaluation of pier effects on fishes. Final Report. Hudson River Foundation, New York, NY.

Able, K.W., and F.P. Fahay. 1998. The first year in the life of estuarine fishes in the Middle Atlantic Bight. Rutgers University Press, New Brunswick, New Jersey. 400 pp.

Able, K.W., J.P. Manderson, and A.L. Studholme. 1998. The distribution of shallow water juvenile fishes in an urban estuary: The effects of manmade structures in the lower Hudson River. Estuaries 21: 731-744.

Abraham, B.J., and P.L. Dillon. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic) – softshell clam. U.S. Fish and Wildlife Service Biological Report 82(11.68); U.S. Army Corps of Engineers TR EL-82-4. 18 pp.

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological status of sanctuary waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bain, M.B., N. Haley, D. Peterson, J.R. Waldman, and K. Arend. 2000. Harvest and habitats of Atlantic sturgeon *Acipenser oxyrinchus* Mitchill, 1815, in the Hudson River Estuary: Lessons for sturgeon conservation. Instituto Espanol de Oceanografia. Boletin 16: 43-53.

Baine, M., J. Lodge, D.J. Suszkowski, D.B. Botkin, R.J. Diaz, K. Farley, J.S. Levinton, F. Steimle, and P. Wilber. 2007. Target ecosystem characteristics for the Hudson Raritan Estuary: technical guidance for developing a comprehensive ecosystem restoration plan. A report to the Port Authority of NY/NJ, pp. 1-112.

Central Hudson Electric and Gas Corp. (CHG&E), Consolidated Edison Company of New York Inc., New York Power Authority, and Southern Energy New York. 1999. Draft Environmental Impact Statement for State Pollution Discharge Elimination System Permits for Bowline Point, Indian Point 2&4, and Roseton Steam Electric Generating Stations.

Dovel, W.L. 1971. Fish eggs and larvae of the upper Chesapeake Bay. University of Maryland. Natural Resources Institute Special Report 4:1-71.

Dunning, D.J., Q.E. Ross, K.A. McKown, and J.B. Socrates. 2009. Effect of striped bass larvae transported from the Hudson River on juvenile abundance in Western Long Island Sound. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1:343-353.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fisheries Bulletin 108:450-465.

Fay, C.W., R.J. Neves, and G.B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – striped bass. U.S. Fish and

Wildlife Service, Division of Biological Services, FWS/OBS-82/11.8. U.S. Army Corps of Engineers, TR EL-82-4. 36 pp. October 1983.

Fischer, W. 1978. FAO species identification sheets for fishery purposes. Western Central Atlantic (fishing area 31). Food and Agriculture Organization of the United Nations.

Heck, K.L., and T.A. Thoman. 1984. The nursery role of seagrass meadows in the upper and lower reaches of the Chesapeake Bay. Estuaries 7: 70-92.

Hildebrand, S.F. 1963. Family: Clupeidae. In: Fishes of the Western North Atlantic, pp. 152-249. Memoir, Sears Foundation for Marine Research 1:1-630.

Hill, J., D.L. Fowler, and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates Mid-Atlantic) – Blue Crab. U.S. Fish and Wildlife Service Biological Report 82(11.100). U.S. Army Corps of Engineers, TR EL-82-4. 18 pp. March 1989.

Jones, W.P., D.F. Martin, and J.D. Hardy. 1978. Development of fishes of the Mid-Atlantic Bight. An atlas of egg, larval and juvenile stages. Fish and Wildlife Service.

Leggett, W.C. 1976. The American shad with special reference to its migration and population dynamics in the Connecticut River. In: D. Merriman and L.M. Thorpe (eds.), The Connecticut River Ecological Study: The Impact of Nuclear Power Plant, pp. 169-225. American Fishery Society Monograph 1:169-225.

Leim, A.H. 1924. The life history of the shad *Alosa sapidissima*, (Wilson) with special reference to factors limiting its abundance. Contributions to Canadian Biology of Fisheries 2:161-284.

Locke, A., and S.C. Courtenay. 1995. Effects of environmental factors on ichthyoplankton communities in the Miramichi estuary, Culf of St. Lawrence. Journal of Plankton Research 17:333-349.

Loesch, J.L. 1969. A study of blueback herring, *Alosa aestivalis* (Mitchill), in Connecticut waters. PhD Thesis, University of Connecticut, Storrs, CT. 78pp.

MacKenzie, Jr., C.L. 1990. History of the fisheries of Raritan Bay, New York and New Jersey. Marine Fisheries Review 52: 1-45.

MacKenzie, Jr., C.L. 1996. History of oystering in the United States and Canada, featuring the eight greatest oyster estuaries. Marine Fisheries Review 58: 1-79.

Maryland Department of Natural Resources (MDNR). 2016. Horseshoe crab life history. Available http://dnr2.maryland.gov/fisheries/Pages/horseshoe-crab.aspx. Accessed September 2, 2016.

National Marine Fisheries Service (NMFS). 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pp.

Newell, R.I.E. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) – Blue Mussel. U.S. Fish and Wildlife Service Biological Report 82(11.102). U.S. Army Corps of Engineers, TR El-82-4. 25 pp. June 1989.

Newell, R.I., and D. Moran. 1989. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) blue mussel. Biological Report 82(11.102). Fish and Wildlife Service, U.S. Department of the Interior.

Pardue, G.B. 1983. Habitat suitability index models: alewife and blueback herring. U.S. Fish and Wildlife Service FWS/OBS-82/10.58. 22 pp. September 1983.

Rice, M.A. 2010. Cultured mussels of the Northeast. Northeastern Regional Aquaculture Center, NRAC Publication No. 210-2010.

Rogers, S.G., and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – Atlantic menhaden. U.S. Fish and Wildlife Service Biological Report 82(11.108). U.S. Army Corps of Engineers TR EL-82-4. 23 pp. August 1989.

Scott, W., and M. Scott. 1988. Atlantic fishes of Canada. Canadian Bulletin of Fisheries and Aquatic Science, 219. University of Toronto Press, Toronto, Canada.

Stanley, J.G., and R. DeWitt. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic) – hard clam. U.S. Fish and Wildlife Service FWS/OBS-82/11.18. U.S. Army Corps of Engineers, TR EL-82-4. 19 pp. October 1983.

Stanley, J.G., and M.A. Sellers. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – American Oyster. U.S. Fish and Wildlife Service Biological Report 82(11.65). U.S. Army Corps of Engineers, TR EL-82-4. 25 pp. July 1986.

Stier, D.J., and J.H. Crance. 1985. Habitat suitability index models and instream flow suitability curves: American shad. U.S. Fish and Wildlife Service Biological Report 82(10.88). 34 pp. June 1985.

United States Army Corps of Engineers (USACE). 2009. Delaware River main stem and channel deepening project. Draft Essential Fish Habitat evaluation. February 2009.

United States Fish and Wildlife Service (USFWS). 2011. The American Eel. Available http://www.fws.gov/northeast/newsroom/facts.html. Updated December 21, 2011.

United States Fish and Wildlife Service (USFWS). 2015. American eel, *Anguilla rostrata*. October 2015.

Walberg, C.H., and P.R. Nichols. 1967. Biology and management of the American shad and status of the fisheries. Atlantic coast of the United States, 1960. U.S. Fish and Wildlife Service, Special Science Report, Fisheries, 550. 105pp.

Zagata, C., C. Young, J. Sountis, and M. Kuehl. 2008. *Mytilus edulis*. Available http://animal.diversity.ummz.umich.edu/site/accounts/informatino/Mytilus_edulis.html.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
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JUN 12 2017

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Rail Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

RE: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Ms. Osterhues:

We have reviewed the May 2017 essential fish habitat (EFH) assessment for the US Federal Rail Administration (FRA) and New Jersey Transit Corporation (NJ Transit) for planned Hudson Tunnel Project, Hudson River, NJ and NY. The existing passenger rail tunnel (North River Tunnel, NRT) was damaged during Superstorm Sandy; in order to rehabilitate the NRT, each tube of the tunnel must be closed for over a year. To alleviate transportation impacts due to the work, new Hudson River rail crossings are proposed. The preferred alternative for the project consists of construction of a new two-track rail tunnel (Hudson River Tunnel, HRT) and rehabilitation of the NRT beneath the Hudson River between New Jersey and New York Penn Station. The HRT will extend from Secaucus, NJ, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect with New York Penn Station.

According to the EFH assessment, proposed in-water work associated with construction of the HRT in the Hudson River will occur in a 1.5 acre area, beginning approximately 200 ft west of the New York pierhead line. Proposed actions include improvement of sediment through the addition of grout to the soil to stabilize sediment (in-water ground improvement) above a portion of the tunnel to address construction risks associated with shallow cover above the tunnel. A sheet pile cofferdam system will be installed by vibratory hammer in three stages to facilitate completion of the in-water ground improvement. Although not discussed in the EFH assessment, we understand that additional in-water work consisting of wetlands fill associated with railroad track improvements is planned on the New Jersey side of the project area.

Magnuson Stevens Fisheries Management and Conservation Act (MSA)

The project area has been designated as EFH for a number of federally managed species including Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), Atlantic herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), clearnose skate (*Raja eglanteria*), cobia (*Rachycentron canadum*), dusky shark (*Carcharinus obscurus*), king mackerel (*Scomberomorus cavalla*), little skate (*Leucoraja erinacea*), red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), Spanish mackerel (*Scomberomorus maculates*), summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), and winter skate (*Leucoraja ocellata*).

The MSA requires federal agencies to consult us on project such as this that may affect EFH adversely. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation procedure.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as "any impact which reduces the quality and/or quantity of EFH" and further states that:

> An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

We have reviewed the EFH assessment for this project. The assessment adequately assesses many of the impacts of the project on EFH associated with the sediment improvements in the Hudson River; we agree that the impacts to EFH for that component of the project are not substantial. However, some of the construction activities proposed for that location, including installation of sheetpiles to construct the cofferdam systems, may adversely affect EFH for bluefish, windowpane, winter flounder and summer flounder. These adverse effects are due, in part, to impacts to prey species. The EFH final rule states that the loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat; the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH.

The EFH assessment does not include a complete assessment of how the project will temporarily and permanently impact tidal wetlands and associated open water habitats. As a cooperating agency, we have reviewed the preliminary draft environmental impact statement (PDEIS). In the PDEIS, it states that construction of the New Jersey component of the preferred alternative, including retaining walls, embankments, access roads, culverts, and a pile-supported viaduct, would result in impacts to tidal wetlands and associated open water habitats.

Prey Impacts -Anadromous Fishes
Anadromous fish such as alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), and striped bass (*Morone saxatilis*) use the Hudson River as a migratory pathway and nursery and forage habitat. Alewife and blueback herring spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. Both species are believed to be repeat spawners, generally returning to their natal rivers (Collette and Klein-MacPhee 2002). In the Mid-Atlantic, landings have declined dramatically since the mid-1960s and have remained very low in recent years (ASMFC 2007).

Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-1960's, they have been designated as Species of Concern by NOAA. "Species of concern" are those species about which NOAA has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act.

Increases in turbidity due to the resuspension of sediments into the water column during construction can degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Suspended sediment can also mask pheromones used by migratory fishes to reach their spawning grounds and impede their migration and can smother immobile benthic organisms and demersal newly-settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997).

Noise from the construction activities may also result in adverse effects. Our concerns about noise effects comes from an increased awareness that high-intensity sounds have the potential to harm both terrestrial and aquatic vertebrates (Fletcher and Busnel 1978; Kryter 1984; Richardson et al. 1995; Popper 2003; Popper et al. 2004). Effects may include (a) non-life threatening damage to body tissues, (b) physiological effects including changes in stress hormones or hearing capabilities, or (c) changes in behavior (Popper et al. 2004).

Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include *Alosa* species such alewife and blueback herring. Juvenile *Alosa* species have also been identified as prey species for windowpane flounder (*Scophthalmus aquosus*) and summer flounder *(Paralichthys dentatus)* in Steimle et al. (2000). As a result, activities that adversely affect the spawning success and the quality for the nursery habitat of these anadromous fish can adversely affect the EFH for juvenile bluefish, windowpane and summer flounder by reducing the availability of prey items.

Wetlands

Tidal wetlands are essential for healthy fisheries, coastlines, and communities, and are an integral part of our economy and culture. Wetlands also provide essential food, refuge, and nursery habitat for federally managed and NOAA Trust species, including striped bass, alewife and blueback herring. Salt marshes provide habitat for fiddler crabs and other intertidal benthic species, and provide foraging grounds for wading birds, shorebirds, waterfowl, estuarine fishes, and blue crabs. Estuarine marsh grasses provide many ecological functions to the wetland and the adjacent waters, including a source of organic nutrients, stability of the sediments, and absorption of contaminants. The shallows provide nursery habitat for many species of fish including winter flounder and summer flounder.

Summer flounder larvae migrate inshore into estuarine nursery areas, settling to the bottom of marsh creeks to transform to their juvenile stage. These juveniles will then make extensive use of the creeks, preying on creek fauna such as Atlantic silversides and mummichogs. Juvenile summer flounder may also be found in salt marsh cord grass habitat during flood tides. Juveniles utilize the marsh edges for shelter, burying themselves in the muddy substrates. Keefe and Able (1992 in Packer et al. 1999) found that summer flounder juveniles that inhabit marsh creeks exhibit the fastest growth.

The primary production in wetlands forms the base of the food web that supports invertebrates and forage fish that are then prey species for larger fish such as bluefish. Surface water retention and detention and ground water recharge provides flood control services to the surrounding community. Wetlands may help to moderate global climate change through carbon storage in wetland plant communities and soil.

The Hackensack Meadowlands are regionally significant for shellfish and marine, estuarine, and anadromous fishes, as well as for significant migratory and wintering waterfowl concentrations. The wetlands and uplands in the region are important as fish nursery areas and foraging areas for shorebirds and waterbirds. Wetlands in the project area perform many important ecological functions including water storage, nutrient cycling and primary production, sediment retention, water filtration or purification, and groundwater recharge. The loss of wetlands as a result of this project could therefore adversely affect resources of concern to us through the loss of nursery, forage, and refuge habitat, the reduction of prey species and primary production, as well as water quality degradation from the reduction in sediment retention and pollution filtration. Vegetated wetlands are also considered to be special aquatic sites under the Clean Water Act. Because of their ecological value, impacts on these special aquatic sites should be avoided and minimized.

Mitigation
Compensatory mitigation should be provided for unavoidable adverse effects to wetlands and other aquatic habitats. As this project moves forward, a mitigation plan should be developed and provided to us for review in accordance with the federal final mitigation rules published in the Federal Register on April 10, 2008 (33 CFR Chapter 2 Part 332.4 (b)). The plan should explain how the proposed compensatory mitigation will offset the impacts to shallow open-water habitat, wetlands, and EFH. It should also include performance measures, success criteria, and a long-term monitoring and maintenance plan. The site protection mechanism and long-term land steward should also be identified.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305 (b) (4) (A) of the MSA, our EFH conservation recommendations are as follows to minimize adverse effects to EFH for summer flounder, bluefish, windowpane, little skate and other federally managed species:

1. No in-water work from 11/15 to 4/15 to minimize impacts to overwintering striped bass.

2. Avoid removing or installing sheetpiles from 3/1 to 6/30 to minimize impacts to migrating anadromous species including alewife, blueback herring and striped bass.

3. Provide compensatory mitigation for unavoidable impacts to tidal wetlands. A compensatory mitigation plan should be required that documents avoidance and minimization of the loss of tidal wetlands and provides sufficient acreage to offset the habitat losses.

We will continue to work with FRA and NJ Transit as the plans for this project progress and additional details on the in-water work in the Hudson River and the impacts to wetlands within the Hackensack Meadowlands are more fully defined. As additional information on the project schedule and construction details are developed, we will evaluate whether or not the full, recommended seasonal restrictions are warranted, based on available data on the timing of migration of anadromous fishes in the project area, or if there are other options to minimize adverse effects to migrating anadromous fishes.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to the EFH conservation recommendations, including a description of the measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with these conservation recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(1) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

Federally listed species may be present in the project area. Coordination between FRA and our Protected Resources Division pursuant to Section 7 of the Endangered Species Act (ESA) is ongoing. Our Protected Resources Division will be proving comments on this project separately. Questions regarding the status of their review should be directed to Daniel Marrone at (978) 282-8465 or daniel.marrone@noaa.gov.

We look forward to our continued coordination with your office on this project as it moves forward. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson at ursula.howson@noaa.gov or (732) 872-3116.

Sincerely,

Louis A. Chiarella,
Assistant Regional Administrator
Habitat Conservation Division

NY ACOE – S. Ryba
NOAA OPR – M. Lennox
PRD – D. Marrone
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel
NYDEC – D. McReynolds
FRA – A. Castel

References

Atlantic States Marine Fisheries Commission. 2007. Species Profile: shad and river herring: Atlantic states seek to improve knowledge of stock status and protect populations coast wide. www.asmfc.org. Washington, DC.

Auld, A.H., and J.R. Schubel. 1978. Effects of suspended sediments on fish eggs and larvae: a laboratory assessment. Estuar. Coast. Mar. Sci. 6: 153-164.

Breitburg, D.L. 1988. Effects of turbidity on prey co llsumption by striped bass larvae. Trans. Amer. Fish. Soc. 117: 72-77.

Buckel, J.A. and D.O. Conover. 1997. Movements, feeding periods, and daily ration of piscivorous young-of-the-year bluefish, *Pomatomus saltatrix,* in the Hudson River estuary. *Fish. Bull.* (U.S.) 95(4):665-679.

Burton, W.H. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Prepared for: Delaware Basin Fish and Wildlife Management Cooperative, by Versar Inc., Columbia MD.

Collette, B.B. and G. Klein-MacPhee. eds. 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. Smithsonian Institution. Washington, D.C.

Fahey, M.P., P.L. Berrien, D.L. Johnson and W.W. Morse. 1999. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix* life history and habitat characteristics. U.S. Dep. Commer., NOAA Technical Memorandum NMFS-NE-144.

Fletcher, J. L. and R. G. Busnel. 1978. Effects of Noise on Wildlife. Academic Press, New York.

Keefe, M. and K.W. Able. 1992. Habitat quality in New Jersey estuaries: habitat-specific growth rates in juvenile summer flounder in vegetated habitats. Final Rep. for the New Jersey Dep. of Environmental Protection. Trenton, NJ. 26 p.

Kryter, K D. 1985. The Handbook of Hearing and the Effects of Noise (2nd ed.). Academic Press, Orlando, Florida.

Nelson, D.A. and J.L. Wheeler. 1997. The influence of dredging-induced turbidity and associated contaminants upon hatching success and larval survival of winter flounder, *Pleuronectes americanus*, a laboratory study. Final report, Grant CWF #321-R, to Connecticut Department Environmental Protection, by National Marine Fisheries Service, Milford CT.

Newcombe, C.P., and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. N. Amer. J. Fish. Manag. 11: 72-82.

Packer D.B., S. J. Griesbach, P.L. Berrien, C. A. Zetlin, D.L. Johnson D.L. and W.W. Morse. 1999. Essential fish habitat source document: summer flounder, *Paralichthys dentatus*, life history and habitat characteristics. NOAA Tech Memorandum NMFS- NE- 151. Woods Hole, MA. 88 p.

Popper, A.N. 2003. Effects of anthropogenic sound on fishes. Fisheries 28:24-31.

Popper, A N., J. Fewtrell, M E. Smith, and R.D. McCauley. 2004. Anthropogenic sound: Effects on the behavior and physiology of fishes. MTS J. 37: 35-40.

Richardson, W.J., C R. Greene Jr., C.I. Malme and D. H. Thomson. 1995. Marine Mammals and Noise. Academic Press, New York.

Steimle, F.W., R.A. Pikanowski, D.G. McMillan, C.A. Zetlin, and S.J. Wilk. 2000. Demersal fish and American lobster diets in the Lower Hudson-Raritan Estuary. NOAA Technical Memorandum NMFS-NE-161. Woods Hole, MA. 106 p.

Hudson River Tunnel

22 messages

Karen Greene - NOAA Federal <karen.greene@noaa.gov> Fri, Jun 23, 2017 at 9:43 AM
To: "Cannon, James H NAN02" <James.H.Cannon@usace.army.mil>
Cc: Ursula Howson - NOAA Affiliate <ursula.howson@noaa.gov>, "Castelli, Amishi (FRA)" <Amishi.Castelli@dot.gov>, Sandy Collins <scollins@akrf.com>, michael.folli@aecom.com

Hi Jim,

Ursula and I just spoke with Amishi, Sandy and Mike about the changes to the design of the in-river portion of the project. Of the 1.5 acres that will receive the jet grout, now 0.7 acres will result in the sediment/grout mixture to be 1 to 2 feet above the mudline. I understand that you are trying to get the public notice out and need to include proposed a compensatory mitigation proposal.

The depths in the project are put this outside of winter flounder spawning EFH, but the area is used as forage habitat by a number of species. The depth change will be minor, and we are not certain how or if the area treated with soilcrete will recover. There is the possibility that it could be covered over with sediment or be colonized by other organisms.

Determining a compensatory mitigation action that would offset this change in sediment characteristics is a challenge, and I think, not necessary. I would prefer that a plan be developed to monitor the recovery of the area. Nothing overly complicated.

Is it possible to say that there will be a change in the bottom characteristics, compensatory mitigation for the change is not necessary, but the results of the change will be monitored for five years to assess the habitat use of soilcrete and observe any sedimentation that occurs in the area?

I'll be on leave all next week. I'll be back on July 6. If you have any questions, I am available today 978 559-9871. Or you can call Ursula. 732 872-3116.

Thanks.

Karen

Karen Greene
Mid-Atlantic Field Offices Supervisor
NOAA/National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
Habitat Conservation Division
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732
732 872-3023 (office)

Sandy Collins <scollins@akrf.com> Fri, Jun 23, 2017 at 9:45 AM
To: Julie Cowing <jcowing@akrf.com>, Stephen Holley <sholley@akrf.com>

[Quoted text hidden]

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Sandy Collins
Vice President
....

AKRF, INC.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

AUG 2 1 2017

Stephan Ryba, Chief
Regulatory Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

RE: NAN-2016-01166; Amtrak/New Jersey Transit Hudson Tunnel Project, Hudson River, NJ and NY

Dear Mr. Ryba:

We have reviewed Public Notice number NAN-2016-01166-WCA dated July 7, 2017. The notice describes an application by Amtrak and New Jersey Transit (NJT) to construct a new, two-track passenger rail tunnel under the Hudson River between New Jersey and New York. The project, known as the Hudson Tunnel Project (HRT), also includes the rehabilitation of the existing North River Tunnel (NRT) and rail infrastructure improvements to connect the new tunnel to the existing Northeast Corridor. The HRT will extend from Secaucus, NJ, beneath the Palisades (North Bergen and Union City), the Hoboken waterfront, and Hudson River to connect with New York Penn Station.

The US Federal Rail Administration (FRA) is the lead federal agency for this project and has initiated consultation with us pursuant to the requirements of the Magnuson Stevens Fisheries Management and Conservation Act (MSA). The MSA requires federal agencies to consult us on projects such as this that may affect EFH adversely. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation procedure.

In a letter to FRA dated June 12, 2017, we provided the following conservation recommendations; we ask that you include these as special conditions in any permit issued to Amtrak and NJT for this project.

1. No in-water work from November 15 to April 15 to minimize impacts to overwintering striped bass.

2. Avoid removing or installing sheetpiles from March 1 to June 30 to minimize impacts to migrating anadromous species including alewife, blueback herring and striped bass.

3. Provide compensatory mitigation for unavoidable impacts to tidal wetlands. A compensatory mitigation plan should be required that documents avoidance and minimization of the loss of tidal wetlands and provides sufficient acreage to offset the habitat losses.

In addition, subsequent to our comment letter to FRA, discussions occurred between FRA and resource agencies regarding mitigation for jet-grouting and sediment stabilization of approximately 1.51 acre of benthic habitat. Approximately 0.74 acres of river bottom would be hardened as a result of the Soilcrete process and elevated above the current depths. The remaining 0.77 acres would be scoured by jet-grouting. Because the ecological effects of the use of Soilcrete are difficult to anticipate, and it is unclear if any effects that do occur would be temporary or permanent, we agreed that monitoring of the site to evaluate the recovery of the impacted benthic habitat would be acceptable in lieu of traditional compensatory mitigation for this activity. The proposed monitoring of the entire impacted area would occur for five years post-construction and would include the submittal of annual monitoring reports. The specifics of the monitoring plan will be developed by the applicant in coordination with ACOE, NMFS, and New York State Department of Environmental Conservation (NYSDEC).

We therefore add an additional conservation recommendation to the above list, and ask that you include it as a special condition in the permit issued to the applicant for this project.

4. Develop a five-year monitoring plan to evaluate benthic community recovery of the river bottom impacted by the use of Soilcrete and jet grouting. The monitoring plan should be developed with input from ACOE, NMFS and NYDEC and will include the submittal of annual reports.

We will continue to work with FRA, NJ Transit and ACOE as the plans for this project progress and additional details on the impacts to wetlands within the Hackensack Meadowlands are more fully defined. As additional information on the project schedule and construction details are developed, we will evaluate whether or not the full, recommended seasonal restrictions are warranted, based on available data on the timing of migration of anadromous fishes in the project area, or if there are other options to minimize adverse effects to migrating anadromous fishes.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to the EFH conservation recommendations, including a description of measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with these conservation recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize,.mitigate, or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(1) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

Federally listed species may be present in the project area. Coordination between FRA and our Protected Resources Division pursuant to Section 7 of the Endangered Species Act (ESA) is ongoing. Our Protected Resources Division will be proving comments on this project separately.

Questions regarding the status of their review should be directed to Daniel Marrone at (978) 282-8465 or daniel.marrone@noaa.gov.

We look forward to our continued coordination with your office on this project as it moves forward. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson at ursula.howson@noaa.gov or (732) 872-3116.

Sincerely,

Louis A. Chiarella,
Assistant Regional Administrator
for Habitat Conservation

NY ACOE – S. Ryba
NOAA OPR – M. Lennox
PRD – D. Marrone
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel
NYDEC – D. McReynolds
FRA – A. Castelli

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 2, 2018

Louis A. Chiarella
Assistant Regional Administrator
National Marine Fisheries Service
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930-2276

Re: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Mr. Chiarella:

In your June 12, 2017 response to the Federal Railroad Administration's (FRA) Request for Essential Fish Habitat (EFH) Consultation sent on May 11, 2017 (Consultation) for the planned Hudson Tunnel Project (Project), you provided the following Essential Fish Habitat (EFH) Conservation Recommendations to minimize impacts to EFH for summer flounder, bluefish, windowpane, little skate, and other federally managed species:

- No in-water work from 11/15 to 4/15 to minimize impacts to overwintering striped bass.
- Avoid removing or installing sheet piles from 3/1 to 6/30 to minimize impacts to migrating anadromous species including alewife, blueback herring, and striped bass.
- Provide compensatory mitigation for unavoidable impacts to tidal wetlands. A compensatory mitigation plan should be required that documents avoidance and minimization of the loss of tidal wetlands and provides sufficient acreage to offset the habitat losses.

The purpose of my correspondence today is to update you on design advancements that have occurred since our initial consultation; some of these design advancements will change the commitments FRA adopts to minimize impacts to EFH and EFH species. FRA recognizes the need to minimize these impacts, particularly during the spring spawning migrations, as well as during the overwintering months, and proposed complying with the recommended windows for in-water work in the Hudson Tunnel Project Draft Environmental Impact Statement (DEIS) released for public comment in July 2017. However, since that time, engineering and design on the Project has progressed and FRA cannot now commit the Project sponsor to fully comply with the recommended windows for in-water work and for removing or installing sheet piles.

When combined, the recommended windows would restrict in-river activities from mid-November through the end of June (32.5 weeks), resulting in a construction period of 19.5 weeks each year. This construction period is not long enough for the required construction work, as discussed below. In addition, based on design advancements, the Project team is now proposing some potential refinements to construction methodologies for the in-river construction work. The refinements that have the potential to affect conclusions related to EFH and EFH species are discussed below.

As presented in our initial consultation and in the Project's DEIS, the Hudson Tunnel Project will involve modifications to the bottom of the Hudson River (i.e., ground improvement) that will affect approximately 1.5 acres of the river bottom, in an area approximately 550 feet long and 120 feet wide. The in-water work for the Project will be conducted within a cofferdam system to limit disturbance to the surrounding waters. To limit the impacts of the construction on navigation, the work will be divided into either two or three stages, which will limit the area of the river within the 1.5-acre in-water work zone that is enclosed within a cofferdam at any given time. The construction staging plan we provided to you in our initial consultation and presented in the DEIS involved dividing the cofferdam into three stages of approximately equal size. In order to expedite construction, the Project team is considering using two rather than three stages. Whether two or three stages are used, each stage will be enclosed by a separate cofferdam system that will be removed when work in that area is complete, so that only one cofferdam will be present in the Hudson River at any given time.

The ground improvement work conducted within the cofferdams will require a total of 29 weeks for each stage, including 7 weeks for cofferdam installation, 19 weeks for ground improvement within the cofferdam, and 3 weeks for removal of the cofferdam, not including a time contingency for uncertainties typically encountered with in-river work, such as vessel traffic and weather impacts. The duration for each cofferdam stage exceeds the available 19.5 weeks and would extend into the no-work windows indicated in the Conservation Recommendations conveyed to us by NMFS in its June 12, 2017, response to FRA's Request for EFH Consultation. For weather and safety reasons, FRA cannot complete the ground improvement portion of the work within the cofferdams during the winter months of January and February. As such, FRA is planning to begin in-water work and cofferdam construction on July 1, following the spring spawning migration and is proposing to end this work on January 20.I In other words, FRA is planning to modify the start of the no in-water work window from November 15 to January 20, which would result in an overall no in-water work window of January 21 to June 30. Within this modified window, the majority of the work from November 15 to January 20 will be conducted within the cofferdam, and will include three weeks of cofferdam removal during late December through January 20 to complete each phase of in-water work.

Since our initial consultation with you, engineering has advanced and some modifications are now being considered for the in-river work and the design of the cofferdams. As noted above, the cofferdam may be constructed in either three stages, as presented previously, or two stages, so as to expedite the overall construction by eliminating a full season of in-river work. If implemented in three stages, the in-river work would be conducted within three separate cofferdams that are 200 feet long (first stage), 200 feet long (second stage), and 150 feet long (third stage). To comply with the modified work windows, each stage would occur in a different construction year, for a total of three separate years for the three-stage cofferdam. If implemented in two stages rather than three, the individual cofferdams would be approximately 415 feet long (first stage) and 140 feet long (second stage) and would occur in two different construction years to comply with the modified work windows. Whether two or three cofferdam stages, the in-water work will begin at the location of the cofferdam closest to the Manhattan shoreline and move outward toward the 45-foot-deep Federal Navigation Channel. Installation and removal of cofferdams will take place during weekday working hours (12 hours per day, 5 days per week).

In addition, the cofferdam design has been refined to include steel pipe king piles to support the sheet pile sections. This will provide additional strength and stability to the cofferdam structure. The king piles will be 54 inches in diameter. If a three-stage cofferdam is used, approximately 70 king piles would be used for each stage. If a two-stage cofferdam is used, the first (larger) stage would have approximately 114 king piles and the second stage would have approximately 56 king piles. The number of king piles required is based on preliminary estimates and will be subject to change by the final design/build contractor. King piles and sheet pile will be installed via vibratory hammering; impact hammering will not be used.

The EFH Assessment attached to this letter has been revised to evaluate the proposed modification to the work window and the addition of 54-inch steel-pipe piles to the cofferdams. Summaries of these updated analyses are presented below.

Updated Sediment Resuspension Analysis

As discussed in our initial consultation and described in the DEIS, sediment disturbance associated with installation and removal of the cofferdams would result in minor, short-term increases in suspended sediment. As disclosed above, 54-inch diameter steel pipe king piles would need to be installed to support the sheet pile for the cofferdam. Generally, pile installation does not result in significant sediment resuspension; the potential for sediment resuspension would be greater during cofferdam removal. While the FRA does not expect increases in suspended sediment from pile installation and removal to affect migration of anadromous species, turbidity curtains will be deployed during cofferdam removal to minimize increases in suspended sediment. The Project site is strongly influenced by the tidal and riverine currents in the Hudson River, and therefore, any temporary increase in suspended sediment associated with in-water work would dissipate shortly following cessation of pile installation and removal. Installation and removal of the cofferdams would be an intermittent disturbance (up to 7 weeks for installation and 3 weeks for removal, assuming intermittent work over 12 hours per day and 5 days per week).

The schedule for pile installation would ensure that migratory pathways are not blocked for spawning anadromous species (i.e., shad, river herring, striped bass, Atlantic sturgeon). In compliance with the timing restrictions for in-water work, installation would begin July 1st, thereby protecting anadromous species migrating up-river to spawn during the spring and early summer from March 1 through June 30. Removal of the cofferdams, with the use of turbidity curtains, would take place in January, outside the period of spawning migration for anadromous fish, including Atlantic sturgeon. Overwintering striped bass would be present in the vicinity of the project during January, but since sediment resuspension would be minor, localized, minimized through the use of turbidity curtains during cofferdam removal, and quickly dissipated, striped bass would not be adversely affected by temporary increases in turbidity. Winter flounder could also be present in the area. However, spawning habitat for winter flounder is located outside the low-cover area in much shallower waters closer to the shoreline, and would likewise not be adversely impacted by resuspended sediments during cofferdam removal which would occur with the use of a turbidity curtain.

Updated Acoustic Analysis

FRA has updated the impact analysis for underwater noise in order to address the installation and removal of 54-inch diameter steel-pipe king piles during cofferdam construction and removal. Results of the acoustic analysis are the same regardless of whether two or three cofferdam stages are used. Because no data were available for the 54-inch king piles, estimates of underwater noise levels were conservatively based on the values for 36-inch and 72-inch diameter steel-pipe piles, which bound the 54-inch piles in terms of size. The spatial extent of underwater noise associated with each of the biological thresholds for behavioral and physiological injury to fish was estimated using the Simplified Attenuation Formula in the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Acoustics Evaluation spreadsheet. The estimated sound levels during pile driving and distances to each threshold are presented in **Tables 1 through 3**.

Table 1
Representative Case Studies for Estimating Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation Rate (dB/10m)
Multiple Projects	15	24”	AZ Steel Sheet	Vibratory	5
Multiple Projects	5	36”	Steel Pipe	Vibratory	5
Multiple Projects	5	72”	Steel Pipe	Vibratory	5

Table 2
Estimates of Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Type of Pile	Hammer Type	Estimated Peak Sound Pressure Level (dB SPL_{peak})	Estimated Sound Pressure Level (dB SPL_{RMS})	Estimated Single Strike Sound Exposure Level (dB SEL)
24” AZ Steel Sheet	Vibratory	175	160	160
36” Steel Pipe	Vibratory	185	175	175
72” Steel Pipe	Vibratory	195	180	180

Table 3
Estimated Distances to Noise Levels Corresponding to the Thresholds for the Potential Onset of Recoverable Physiological Injury and Behavioral Effects for Fish

Type of Pile	Hammer Type	Distance (m) to Physiological Threshold (206 dB SPL_{peak})	Distance (m) to Behavioral Threshold (150 dB SPL_{RMS})	Distance (m) to Physiological Threshold (150 dB SEL)[1]
24” AZ Steel Sheet	Vibratory	n/a	30	30
36” Steel Pipe	Vibratory	n/a	60	60
72” Steel Pipe	Vibratory	n/a	70	70

Notes:
[1] – As explained in the NMFS GARFO Acoustics Tool: “When the received SEL from an individual pile strike is below a certain level, then the accumulated energy from multiple strikes would not contribute to injury, regardless of how many pile strikes occur. This SEL is referred to as “effective quiet”, and is assumed, for the purposes of this spreadsheet, to be 150 dB re 1µPa sSEL. Effective quiet establishes a limit on the maximum distance from the pile where injury to fishes is expected – the distance at which the single-strike SEL attenuates to 150 dB. Beyond this distance, no physical injury is expected, regardless of the number of pile strikes.”

Based on the acoustic evaluation, installation of sheet piles and king piles will not produce noise levels that exceed the peak threshold for the potential onset of recoverable physiological injury to fishes (i.e., 206 dB re: 1µPa peak sound pressure level (SPLpeak)). Fish will likely avoid the area of the Hudson River where underwater noise levels exceed the behavioral threshold of 150 dB SPLrms, which would occur within 60 to 70 meters (200 to 230 feet) of the pile being driven (i.e, the calculated distance to behavioral threshold for 36” and 72” steel pipe piles; see **Table 3** and **Figure 1**); this is the maximum extent of underwater noise that would affect fish or fish habitat during cofferdam construction and removal. Fish present within 230 feet of the source at the onset of pile driving may be temporarily exposed to noise levels that exceed the potential onset of recoverable physiological injury (150 dB SEL), but would leave the area in response to noise levels exceeding the behavioral threshold of 150 dB SPLrms. Fish within 230 feet would recover from any injury sustained at the start of vibratory pile driving for cofferdam installation and removal. Since 230 feet also represents the limit of the ensonified area corresponding to the behavioral threshold, any fish outside of that area at the onset of pile driving would be expected to remain so, and would not be exposed to levels exceeding the physiological threshold.

Since the Hudson River is approximately 4,500 feet wide at the project location, most of the river width will remain non-ensonified (< 150 dB SPLrms) during pile installation, including the 2,600-foot river channel where water depths are greater than 45 feet, and the shallower waters to the east of the low-cover area (see **Figure 1**). During installation and removal of cofferdam piles, the ensonified area will encompass approximately 460 feet of the channel (or about 18% of its width). However, even when the deepest piles are installed at the westernmost location, approximately 82% of the river channel will remain non-ensonified, leaving room for fish passage in the channel. Because the total span of the 150 dB SPLrms isopleth would not be greater than 460 feet, approximately 90% of the river width would remain non-ensonified during cofferdam installation and removal. Moreover, the daily duration of vibratory pile driving would not exceed 12 hours during a 24-hour period and work would not occur during the weekend, which means that the entire river in the vicinity of the project would be non-ensonified during the majority of the time that cofferdam construction and removal are occurring. Additionally, pile driving within those 12 hours will occur intermittently, rather than continuously.

The behavioral threshold used for analysis of noise impacts to sturgeon, as shown in Tables 1 through 3, is the standard recommended by NMFS to evaluate potential underwater noise impacts to all fishes, including other anadromous species such as river herring (alewife and blueback herring) and American shad, as well as striped bass and American eel. Within the hearing range of most fishes (i.e., 30 Hz to 3,000 Hz), striped bass and American eel have comparable hearing capabilities with sturgeon; all three species have a swim bladder, which aids in hearing, but hearing sensitivity is relatively poor, meaning that sound pressure levels need to be relatively high to be detected compared to other species (BOEM 2014).[1] The highest frequencies detected by sturgeon, striped bass, and American eel do not exceed 1,000 Hz. Because of the similarities in hearing ability for these species, the results of the underwater noise valuation for sturgeon would be applicable to striped bass and American eel.

In contrast to sturgeon, and compared to other fish species, clupeid fishes like shad and herring have relatively poor hearing, in that the sound level needs to be relatively loud to be detected by clupeids (BOEM 2014). Unlike other fish species, American shad are hearing specialists in terms of their ability to hear ultrasound in the range of 25 to 130 kHz at levels greater than 145 dB (Mann et al. 1997).[2] Other clupeids, like blueback herring and alewife, have demonstrated similar sensitivity to ultrasound. At frequencies in the range of impact pile driving (100 to 1,000 Hz), blueback herring elicited only a startle response to noise levels of 160 to 175 dB at a distance of 1 meter from the source (Nestler et al. 1992).[3] Alewife exhibited a behavioral response to high-frequency pulsed sound ranging from 110 to 150 kHz, but only at levels greater than 157 dB

[1] Bureau of Ocean Energy Management (BOEM). 2014. Appendix J. Fish Hearing and Sensitivity to Acoustic Impacts. Final Programmatic Environmental Impact Statement. Atlantic Outer Continental Shelf Proposed Geological and Geophysical Activities. Mid-Atlantic and South Atlantic Planning Areas. U.S. Department of the Interior.

[2] Mann, D.A., Z. Lu, and A.N. Popper. 1997. A clupeid fish can detect ultrasound. Nature 389:341.

[3] Nestler, J.M., G.R. Ploskey, J. Pickens, J. Menezes, and C. Schilt. 1992. Responses of blueback herring to high-frequency sound and implications for reducing entrainment at hydropower dams. North American Journal of Fisheries Management 12:667-683.

(Dunning et al. 1992).[4] The sound levels that caused a behavioral response by clupeids in these studies are comparable to those observed at a distance of 33 feet in the case studies in Tables 1 and 2 and would occur at a distance of less than 230 feet from the pile during vibratory installation of piles during cofferdam construction and removal in the Hudson River. That is, the spatial extent of noise levels associated specifically with a behavioral response by shad and river herring is smaller than the extent of the behavioral threshold for fish in general (i.e., 150 dB SPLrms).

Since the ensonified area of the river will only extend a maximum of 230 feet from the source, cofferdam installation in July and August and removal in January would not impede migration of anadromous species like river herring or sturgeon. While a small portion of the river would be ensonified during pile installation and removal, there will be room for fish passage both in the shallower waters to the east and in the river channel to the west during installation and removal of each of the three cofferdam sections. Even when the deepest piles are installed at the eastern edge of the channel, approximately 82% of the channel will remain non-ensonified and available for fish passage.

During cofferdam removal in January, overwintering juvenile sturgeon are not expected to occur in this portion of the river; any sturgeon that might occur there would likely be found in the deeper waters of the channel where water temperatures are warmer than those found in the shallower off-channel areas (Bain et al 2007;[5] NMFS 2017a[6]) and would not be exposed to elevated noise levels. Overwintering striped bass that may be present within 230 feet of the cofferdam during vibratory removal of piles would only have to move less than a few hundred feet to avoid elevated noise levels; this movement is not likely to cause any detectable physiological or energetic effects to the fish. Spawning winter flounder would not be adversely impacted by underwater noise since levels exceeding the biological thresholds would not occur in the shallow-water spawning habitat outside the ensonified area. The ensonified area represents a very small portion of the Hudson River, and similar suitable foraging habitat for winter flounder is available in this portion of the lower Hudson River. In addition to the limited spatial extent of underwater noise, the relatively short duration of the noise (i.e., up to 7 weeks for installation and 3 weeks for removal, intermittently for 12 hours during a 24-hour period) would further minimize the potential impacts to fish and EFH in the vicinity of the activity. Therefore, underwater noise associated with cofferdam installation and removal is not expected to cause significant adverse effects to EFH or EFH species, even with the modification of the seasonal window for in-water work proposed here.

If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

[4] Dunning, D.J., Q.E. Ross, P. Geoghegan, J.J. Reichle, J.K. Menezes, and J.K. Watson. 1992. Alewives avoid high-frequency sound. North American Journal of Fisheries Management 12:407-416.

[5] Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

[6] National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl: Figure 1
EFH Assessment, revised January 2018

cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT
J. Cannon, USACE
K. Pijanowski, USACE
M. Nasim, Amtrak

12/8/2017

Project Site
Low Cover Area
Spatial Extent of 150 dB Behavioral Threshold at Stage 1
Spatial Extent of 150 dB Behavioral Threshold at Stage 3

0 1,000 FEET

HUDSON TUNNEL PROJECT

Extent of Increased Underwater Noise During Cofferdam Installation
Figure 1

---------- Forwarded message ----------
From: **Castelli, Amishi (FRA)** <Amishi.Castelli@dot.gov>
Date: Tue, Mar 6, 2018 at 3:13 PM
Subject: FW: Hudson Tunnel EFH assessment for project modifications
To: "jcowing@akrf.com" <jcowing@akrf.com>, "RPalladino@njtransit.com" <RPalladino@njtransit.com>
Cc: "levinn_jason@bah.com" <levinn_jason@bah.com>, "Aviles, Maria de la Paz [USA] (aviles_maria@bah.com)" <aviles_maria@bah.com>

FYI

From: Ursula Howson - NOAA Federal [mailto:ursula.howson@noaa.gov]
Sent: Tuesday, March 06, 2018 3:04 PM
To: Castelli, Amishi (FRA) <Amishi.Castelli@dot.gov>
Cc: Karen Greene - NOAA Federal <karen.greene@noaa.gov>; Lou Chiarella - NOAA Federal <lou.chiarella@noaa.gov>
Subject: Hudson Tunnel EFH assessment for project modifications

Hello Amishi,

NMFS/HCD will not have any objections to the proposed modifications in the EFH assessment dated 2/2/18, received in our office 2/9/18. We will send a letter to that effect this week.

Thank you,
Ursula

--

Ursula Howson, PhD
NOAA/National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
Habitat Conservation Division
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732
732 872-3116 (office)
ursula.howson@noaa.gov

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 17, 2021

Louis A. Chiarella
Assistant Regional Administrator
National Marine Fisheries Service
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930-2276

Re: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Mr. Chiarella:

The purpose of my correspondence today is to update you on design advancements and schedule changes that have occurred since our previous consultations. The Federal Railroad Administration (FRA) initially sent the National Marine Fisheries Service (NMFS) a Request for Essential Fish Habitat (EFH) Consultation on May 11, 2017 (Consultation) for the planned Hudson Tunnel Project (Project). In your June 12, 2017 response, you provided the following EFH Conservation Recommendations to minimize impacts to EFH for summer flounder, bluefish, windowpane, little skate, and other federally managed species:

- No in-water work from 11/15 to 4/15 to minimize impacts to overwintering striped bass.
- Avoid removing or installing sheet piles from 3/1 to 6/30 to minimize impacts to migrating anadromous species including alewife, blueback herring, and striped bass.
- Provide compensatory mitigation for unavoidable impacts to tidal wetlands. A compensatory mitigation plan should be required that documents avoidance and minimization of the loss of tidal wetlands and provides sufficient acreage to offset the habitat losses.

On February 2, 2018, FRA sent a response to these recommendations, stating that updated engineering and design on the Project meant that FRA no longer would be able to commit the Project sponsor to fully comply with the recommended windows for in-water work and for removing or installing sheet piles. In an email dated March 6, 2018, Ursula Howard stated that NMFS/HCD will not have any objections to the proposed modifications described in the EFH assessment dated 2/2/2018. In the time since our last correspondence, design of the Project has continued to be refined.

The area of ground improvement described in previous consultations and in the Project's DEIS comprised modification to the Hudson River bottom, in an area approximately 550 feet long and 120 feet wide (approximately 1.5 acres). The method proposed for the 1.5-acre area was jet grouting, a process in which a combination of cement grout, water, and compressed air at high pressure would mix with and partially replace the soil, resulting in a stronger cemented soil with a consistency equivalent to hard clay (i.e., "soilcrete"). Within that 1.5-acre area, approximately 0.8 acres of soilcrete was proposed to be about level with the surrounding riverbed, while the remaining approximately 0.7-acre portion of soilcrete would be elevated between 1 and 2 feet above the existing mudline. To compensate for the change in nature and elevation of the river bottom habitat within the approximately 0.7 acres, the FRA proposed that the project sponsor would monitor this area, in coordination with the United States Army Corps of Engineers (USACE), NMFS, and the New York State Department of Environmental Conservation (NYSDEC) to assess its recovery as fish foraging habitat. The FRA also proposed that the project sponsor would monitor the recovery of the remaining 0.8 acres as fish foraging habitat. The proposed monitoring would occur for a period of five years post-construction and would include the submittal of annual monitoring reports.

On the basis of additional engineering assessments and the results of geotechnical borings conducted in the Hudson River following completion of the DEIS and FRA's previous correspondence with NMFS, the Project Partners are now proposing to harden an area of the river bottom that is approximately 1,200 feet long and 110 feet wide (approximately 3 acres). This is an increase of 1.5 acres over the previously evaluated 1.5-acre area. The Project Partners are also now proposing a technique known as deep soil mixing to harden the soil in this 3-acre area rather than jet grouting. Deep soil mixing is a method in which construction workers use large paddles to mix cement or cement grout with the native soil. Within this 3-acre area, the resulting hardened soil in an area of 270 feet by 110 feet (approximately 0.7 acres) will be 1.5 to 2 feet above the mudline to provide an additional protective layer of hardened soil above the tunnel alignment.

As described in previous correspondence with NMFS and in the DEIS, the in-water work for the Project will be conducted within a cofferdam system to limit disturbance to the surrounding waters. To limit the width of the river within the 3-acre in-water work zone that is enclosed within a cofferdam at any given time, the work will be divided into two stages; Stage 1 and Stage 2 (see **Figure 1**). In-water work will begin at the location of the cofferdam closest to the Manhattan shoreline and move outward towards the 45-foot-deep Federal Navigation Channel. Additionally, as described in the February 2, 2018 letter to NMFS, the cofferdam will be supported by 54-inch diameter steel pipe king piles that will be installed via vibratory hammering; impact hammering will not be used. Also, as described in the February 2, 2018 letter, a turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment resuspension. The number of king piles that will be required will be determined by the final design-build contractor.

In its February 2, 2018 letter to NMFS, FRA requested a modification of the 11/15 to 6/30 no in-water work window to 1/21 to 6/30 of each year during construction. NMFS concurred with FRA's determination that this updated schedule, in addition to the design refinements, would not affect migrating anadromous fish, overwintering striped bass or winter flounder. FRA is not requesting a change in the modified no in-water work window. Cofferdam installation and removal will still take place during weekday working hours (12 hours per day, 5 days per week), outside of the 1/21 to 6/30 no in-water work window. Table 1 provides the currently proposed project schedule. .

Table 1
Updated Project Schedule

Activity	Proposed Dates	Duration
Stage 1		
Install cofferdam	7/1/2022 – 10/10/2022	Approximately 14 weeks
Deep soil mixing within cofferdam	10/11/2022 – 6/16/2023	Approximately 36 weeks
Remove cofferdam	7/3/2023 – 8/2/2023	Approximately 4 weeks
Stage 2		
Install cofferdam	10/11/2022 – 1/20/2023	Approximately 14 weeks
Deep soil mixing within cofferdam	1/23/2023 – 9/26/2023	Approximately 35 weeks
Remove cofferdam	9/27/2023 – 10/26/2023	Approximately 4 weeks
Notes: Exact dates are subject to change as final design progresses.		

Updated Sediment Resuspension Analysis

FRA has updated the impact analysis for sediment resuspension in order to address the larger area that will be occupied by the temporary cofferdams. The same type of piles as previously evaluated will be used (i.e., 54-inch king piles and steel sheet pile). As discussed in our previous consultations and described in the DEIS, sediment disturbance associated with installation and removal of the cofferdams would result in minor, short-term increases in suspended sediment. While the area occupied by the temporary cofferdams will be larger than previously evaluated, the analysis for sediment resuspension remains the same. Generally, pile installation does not result in significant sediment resuspension; the potential for sediment resuspension would be greater during cofferdam removal. While FRA does not expect increases in suspended sediment from pile installation and removal to affect migration of anadromous species, turbidity curtains will be deployed during cofferdam removal to minimize increases in suspended sediment. The Project site is strongly influenced by the tidal and riverine currents in the Hudson River, and therefore, any temporary increase in suspended sediment associated with in-water work would dissipate shortly following cessation of pile installation and removal. Installation and removal of the cofferdams would be an intermittent disturbance (approximately 14 weeks for installation and 4 weeks for removal, assuming intermittent work over 12 hours per day and 5 days per week).

The schedule for pile installation would ensure that migratory pathways are not blocked for spawning anadromous species (i.e., shad, river herring, striped bass, Atlantic sturgeon). In compliance with the timing restrictions for in-water work, installation would begin July 1, 2022 for Stage 1 and October 11, 2022 for Stage 2, thereby protecting anadromous species migrating up-river to spawn during the spring and early summer from March 1 through June 30. Removal of the cofferdams, with the use of turbidity curtains, would take place in July through October, outside the period of spawning migration for anadromous fish, including Atlantic sturgeon. Overwintering striped bass would be present in the vicinity of the project during November through January. Cofferdam installation during these months would result in sediment resuspension that would be minor, localized, minimized through the use of turbidity curtains during cofferdam removal, and quickly dissipated; striped bass would not be adversely affected by temporary increases in turbidity. Winter flounder could also be present in the area. However, spawning habitat for winter flounder is located outside the low-cover area in much shallower waters closer to the shoreline, and would likewise not be adversely impacted by resuspended sediments during cofferdam removal which would not result in significant sediment resuspension.

Updated Acoustic Analysis

FRA has updated the impact analysis for underwater noise in order to address the larger area that will be occupied by the temporary cofferdams. The same type of piles as previously evaluated will be used (i.e., 54-inch king piles and steel sheet pile). Estimates of underwater noise levels were conservatively based on the values for 36-inch and 72-inch diameter steel-pipe piles, which bound the 54-inch piles in terms of size. The spatial extent of underwater noise associated with each of the biological thresholds for behavioral and physiological injury to fish was estimated using the Simplified Attenuation Formula in the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Acoustics Tool spreadsheet (last updated 9/14/2020). The estimated sound levels during pile driving and distances to each threshold are presented in **Tables 2 through 4**.

Table 2
Representative Case Studies for Estimating Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation Rate (dB/10m)
Not Available	15	24”	AZ Steel Sheet	Vibratory	5
Not Available	5	36”	Steel Pipe	Vibratory	5
Not Available	5	72”	Steel Pipe	Vibratory	5

Table 3
Proxy-Based Estimates for Underwater Noise

Type of Pile	Hammer Type	Estimated Peak Noise Level (dB SPL_{peak})	Estimated Pressure Level (dB SPL_{RMS})	Estimated Single Strike Sound Exposure Level (dB SEL)
24” AZ Steel Sheet	Vibratory	175	160	160
36” Steel Pipe	Vibratory	185	175	175
72” Steel Pipe	Vibratory	195	180	180

Table 4
Estimated Distances to Sturgeon/Salmon Injury and Behavioral Thresholds

Type of Pile	Hammer Type	Distance (m) to 206 dB SPL_{peak}	Distance (m) to 150 dB SPL_{RMS} (surrogate for 187 dBcSEL injury) [1]	Distance (m) to Behavioral Disturbance Threshold (150 dB SPL_{RMS})
24” AZ Steel Sheet	Vibratory	n/a	30	30
36” Steel Pipe	Vibratory	n/a	60	60
72” Steel Pipe	Vibratory	n/a	70	70

Notes:
[1] As explained in the NMFS GARFO Acoustics Tool: “When the received SEL from an individual pile strike is below a certain level, then the accumulated energy from multiple strikes would not contribute to injury, regardless of how many pile strikes occur. This SEL is referred to as “effective quiet”, and is assumed, for the purposes of this spreadsheet, to be 150 dB re 1µPa sSEL. Effective quiet establishes a limit on the maximum distance from the pile where injury to fishes is expected – the distance at which the single-strike SEL attenuates to 150 dB. Beyond this distance, no physical injury is expected, regardless of the number of pile strikes.”

Based on the acoustic evaluation, installation of sheet piles and king piles will not produce noise levels that exceed the peak threshold for the potential onset of recoverable physiological injury to fishes (i.e., 206 dB re: 1µPa peak sound pressure level (SPLpeak)). Fish will likely avoid the area of the Hudson River where underwater noise levels exceed the behavioral threshold of 150 dB SPLrms, which would occur within 60 to 70 meters (200 to 230 feet) of the pile being driven (i.e, the calculated distance to behavioral threshold for 36" and 72" steel pipe piles; see **Table 4** and **Figure 1**); this is the maximum extent of underwater noise that would affect fish or fish habitat during cofferdam construction and removal. Fish present within 230 feet of the source at the onset of pile driving may be temporarily exposed to noise levels that exceed the potential onset of recoverable physiological injury (150 dB sSEL, as a surrogate for the 187 dB cSEL), but would leave the area in response to noise levels exceeding the behavioral threshold of 150 dB SPLrms. Fish within 230 feet would recover from any injury sustained at the start of vibratory pile driving for cofferdam installation and removal. Because 230 feet also represents the limit of the ensonified area corresponding to the behavioral threshold, any fish outside of that area at the onset of pile driving would be expected to remain so, and would not be exposed to levels exceeding the physiological threshold.

Because the Hudson River is approximately 4,500 feet wide at the project location, most of the river width will remain non-ensonified (< 150 dB SPLrms) during pile installation, including the 2,600-foot river channel where water depths are greater than 45 feet, and the shallower waters to the east of the low-cover area (see **Figure 1**). During installation and removal of cofferdam piles, the ensonified area will encompass approximately 460 feet of the river (or about 10% of its width), a portion of which will extend into the deeper navigation channel. However, even when the deepest piles are installed at the westernmost location, which is 600 feet into the channel, approximately 68% of the river channel will remain non-ensonified, leaving room for fish passage in the channel. Because the total span of the 150 dB SPLrms isopleth would not be greater than 460 feet, approximately 90% of the river width would remain non-ensonified during cofferdam installation and removal. Moreover, the daily duration of vibratory pile driving would not exceed 12 hours during a 24-hour period and work would not occur during the weekend, which means that the entire river in the vicinity of the project would be non-ensonified during the majority of the time that cofferdam construction and removal are occurring. Additionally, pile driving within those 12 hours will occur intermittently, rather than continuously.

The behavioral threshold used for analysis of noise impacts to sturgeon, as shown in **Tables 2 through 4**, is the standard recommended by NMFS to evaluate potential underwater noise impacts to all fishes, including other anadromous species such as river herring (alewife and blueback herring) and American shad, as well as striped bass and American eel. Within the hearing range of most fishes (i.e., 30 Hz to 3,000 Hz), striped bass and American eel have comparable hearing capabilities with sturgeon; all three species have a swim bladder, which aids in hearing, but hearing sensitivity is relatively poor, meaning that sound pressure levels need to be relatively high to be detected compared to other species (BOEM 2014).[1] The highest frequencies detected by sturgeon, striped bass, and American eel do not exceed 1,000 Hz. Because of the similarities in hearing ability for these species, the results of the underwater noise valuation for sturgeon would be applicable to striped bass and American eel.

In contrast to sturgeon, and compared to other fish species, clupeid fishes like shad and herring have relatively poor hearing, in that the sound level needs to be relatively loud to be detected by clupeids (BOEM 2014). Unlike other fish species, American shad are hearing specialists in terms of their ability to hear ultrasound in the range of 25 to 130 kHz at levels greater than 145 dB (Mann

[1] Bureau of Ocean Energy Management (BOEM). 2014. Appendix J. Fish Hearing and Sensitivity to Acoustic Impacts. Final Programmatic Environmental Impact Statement. Atlantic Outer Continental Shelf Proposed Geological and Geophysical Activities. Mid-Atlantic and South Atlantic Planning Areas. U.S. Department of the Interior.

et al. 1997).[2] Other clupeids, like blueback herring and alewife, have demonstrated similar sensitivity to ultrasound. At frequencies in the range of impact pile driving (100 to 1,000 Hz), blueback herring elicited only a startle response to noise levels of 160 to 175 dB at a distance of 1 meter from the source (Nestler et al. 1992).[3] Alewife exhibited a behavioral response to high-frequency pulsed sound ranging from 110 to 150 kHz, but only at levels greater than 157 dB (Dunning et al. 1992).[4] The sound levels that caused a behavioral response by clupeids in these studies are comparable to those observed at a distance of 33 feet in the case studies in Tables 1 and 2 and would occur at a distance of less than 230 feet from the pile during vibratory installation of piles during cofferdam construction and removal in the Hudson River. That is, the spatial extent of noise levels associated specifically with a behavioral response by shad and river herring is smaller than the extent of the behavioral threshold for fish in general (i.e., 150 dB SPLrms).

Because the ensonified area of the river will only extend a maximum of 230 feet from the source, cofferdam installation between July 1 and January 21 and removal between July and October will not impede migration of anadromous species like river herring or sturgeon. While a small portion of the river will be ensonified during pile installation and removal, there will be room for fish passage both in the shallower waters to the east and in the river channel to the west during installation and removal of each of the two cofferdam sections. Even when the deepest piles are installed towards the eastern edge of the channel, approximately 68% of the channel will remain non-ensonified and available for fish passage.

During cofferdam removal in the summer and fall, any migrating sturgeon that might occur there would likely be found in the deeper waters of the channel rather than those found in the shallower off-channel areas (Bain et al 2007;[5] NMFS 2017a[6]) and would not be exposed to significantly elevated noise levels. Overwintering striped bass or winter flounder that may be present within 230 feet of the cofferdam during vibratory installation of piles would only have to move less than a few hundred feet to avoid elevated noise levels; this movement is not likely to cause any detectable physiological or energetic effects to the fish. Spawning winter flounder would not be adversely impacted by underwater noise since levels exceeding the biological thresholds would not occur in the shallow-water spawning habitat outside the ensonified area. The ensonified area represents a very small portion of the Hudson River, and similar suitable foraging habitat for winter flounder is available in this portion of the lower Hudson River. In addition to the limited spatial extent of underwater noise, the relatively short duration of the noise (i.e., approximately 14 weeks for installation and 4 weeks for removal, intermittently for 12 hours during a 24-hour period) would further minimize the potential impacts to fish and EFH in the vicinity of the activity. While the extent of increased underwater noise will reach farther into the deeper navigation channel, it will not reach the levels associated with physical injury to fish. The behavioral impact with the new construction method will be similar to what was evaluated previously, except that the ensonified area will encompass more of the channel. Even with this change, 68% of the channel and 90% of

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[2] Mann, D.A., Z. Lu, and A.N. Popper. 1997. A clupeid fish can detect ultrasound. Nature 389:341.

[3] Nestler, J.M., G.R. Ploskey, J. Pickens, J. Menezes, and C. Schilt. 1992. Responses of blueback herring to high-frequency sound and implications for reducing entrainment at hydropower dams. North American Journal of Fisheries Management 12:667-683.

[4] Dunning, D.J., Q.E. Ross, P. Geoghegan, J.J. Reichle, J.K. Menezes, and J.K. Watson. 1992. Alewives avoid high-frequency sound. North American Journal of Fisheries Management 12:407-416.

[5] Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

[6] National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

the river will remain non-ensonified and available for fish passage. The change does not constitute a new impact, nor will it result in a significant adverse effect on EFH species. Therefore, underwater noise associated with cofferdam installation and removal is not expected to cause significant adverse effects to EFH or EFH species, even with the modification of the construction method for in-water work proposed here.

In the most recent consultation, the Project assumed that a 1.5-acre area of river bottom within the Hudson River would be strengthened using jet grout (soilcrete). Within the 1.5-acre low-cover area, approximately 0.8 acres of soilcrete was proposed to be approximately level with the surrounding riverbed, while the remaining approximately 0.7-acre portion of the 1.5-acre low-cover area would require that the soilcrete be elevated between 1 and 2 feet above the existing mudline. Now, the deep soil mixing in the low cover area of the Project alignment where ground hardening is required will convert soft substrate to artificial hard bottom in an area encompassing 3 acres (132,000 square feet). Within the 3-acre footprint, approximately 0.68 acres (29,700 square feet) will comprise hardened soil that rises 1.5 to 2 feet above the mudline (the remaining 2.3 acres will be flush with the mudline), which is roughly the same as the 0.7 acres of elevated soilcrete that was previously evaluated. The addition of this hard-bottom area in place of the soft-bottom substrate will modify potential foraging habitat for EFH species, but represents a small area relative to the thousands of acres of similar foraging habitat in the Hudson River. The elevated area of concrete will not result in a physical barrier to migration for anadromous species given the width of the river at the project location (approximately 4,500 feet) and the low profile of the elevated area (1.5 to 2 feet above the mudline). As previously proposed, the Project Sponsor will monitor this area, in coordination with USACE, NMFS, and NYSDEC, to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 2.3 acres as fish foraging habitat. The proposed monitoring will occur for a period of five years post-construction and will include the submittal of annual monitoring reports. For these reasons EFH will not be adversely modified, and the increased footprint of ground improvement is not likely to affect EFH or designated species.

If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

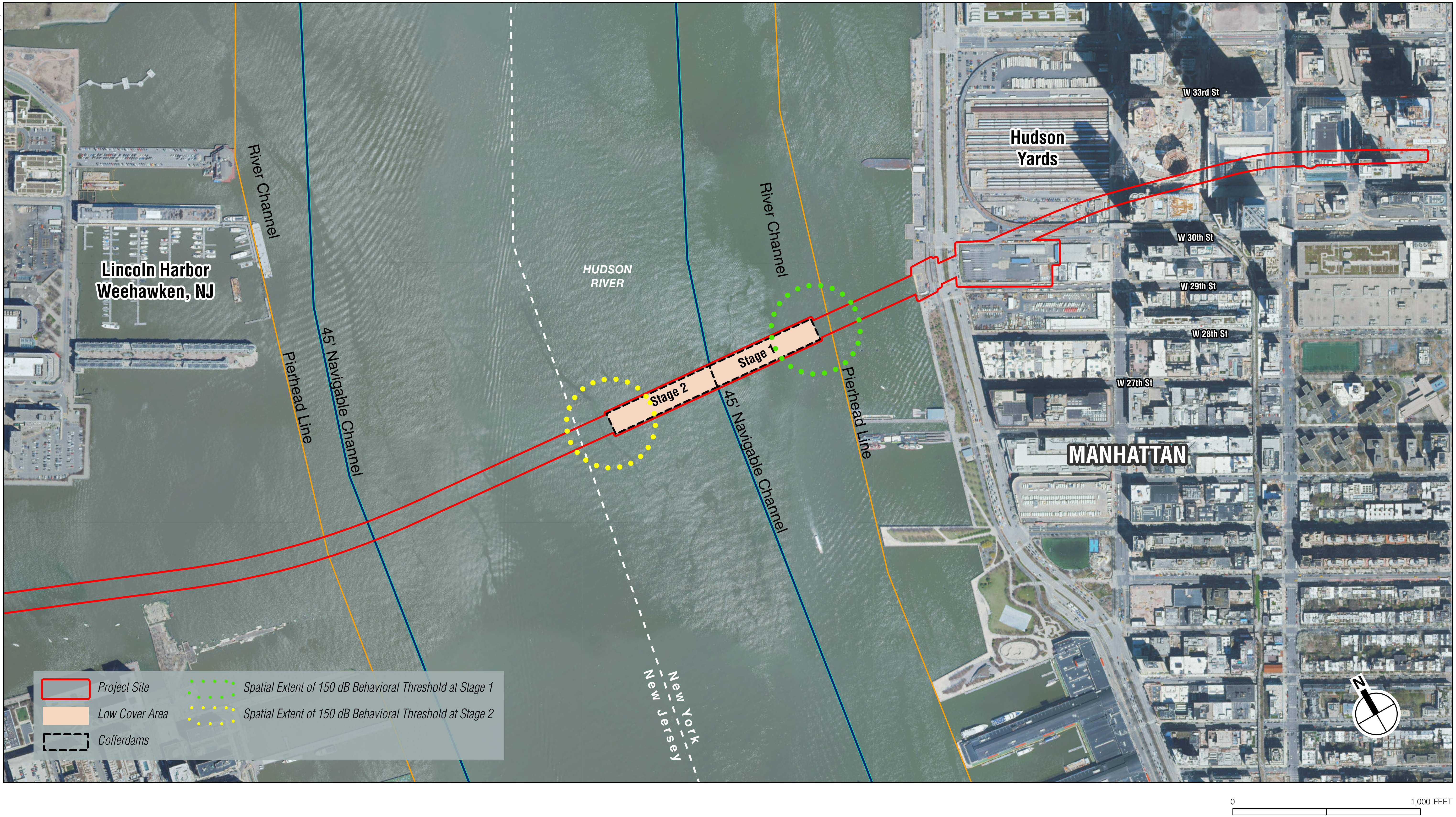
Sincerely,

Marlys Osterhues
Chief of Environment and Project Engineering
Federal Railroad Administration

Encl: Figure 1 – Extent of Increased Underwater Noise During Cofferdam Installation

cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT
R. Miranda, USACE
K. Pijanowski, USACE
M. Nasim, Amtrak
B. Engle, PANYNJ

2/17/21



HUDSON TUNNEL PROJECT

Extent of Increased Underwater Noise During Cofferdam Installation
Figure 1

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

March 17, 2021

Marlys Osterhues
Chief of Environment and Project Engineering
Federal Rail Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

RE: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Ms. Osterhues:

We have received your February 17, 2021, letter for the US Federal Railroad Administration (FRA) Hudson Tunnel Project, Hudson River, New Jersey and New York. As indicated in your letter, we originally provided the following essential fish habitat (EFH) conservation recommendations pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) following a May 11, 2017, consultation for the project:

- No in-water work from 11/15 to 4/15 to minimize impacts to overwintering striped bass.
- Avoid removing or installing sheet piles from 3/1 to 6/30 to minimize impacts to migrating anadromous species including alewife, blueback herring, and striped bass.
- Provide compensatory mitigation for unavoidable impacts to tidal wetlands. A compensatory mitigation plan should be required that documents avoidance and minimization of the loss of tidal wetlands and provides sufficient acreage to offset the habitat losses.

On February 2, 2018, consultation was reinitiated and the FRA requested a modification to the 11/15 to 4/15 work window, provided that much of the work would be performed within a cofferdam system to limit noise and turbidity. Our office was amenable to the project design refinements and a modified work schedule that prohibits in-water work from 1/21 to 6/30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

The February 17, 2021, letter indicated a revised scope of work based on additional engineering assessments and results of geotechnical borings conducted in the Hudson River following completion of the Draft Environmental Impact Statement and FRA's previous correspondence with our office. Project activities, which formerly included modifying 1.5-acres of the soft river bottom through jet grouting, have changed to hardening 3-acres of river bottom through deep soil mixing. Within the 3-acre footprint, approximately 0.68 acres will comprise hardened soil that rises 1.5 to 2 feet above the mudline and the remaining 2.3 acres will be flush with the mudline. The revised scope of work will continue follow the revised in-water work window for cofferdam installation and removal, avoiding work from 1/21 to 6/30, and remaining in-water work will be conducted within the cofferdam system. In line with the previous proposal, the 3-acre area, in coordination with US Army Corp of Engineers New York District, New York State Department of Conservation, and our office, will be monitored for five years post-construction to assess its recovery as fish foraging habitat. Monitoring will include the submittal of annual monitoring reports.

We have reviewed the information provided and agree with your conclusion that the adverse effects of this project on EFH will not be substantial. As discussed in your letter, project activities have been designed to avoid and minimize impacts as practical. Based upon the information provided, we do not have any objections to the revised scope of work and additional EFH conservation recommendations are not warranted. Please note that further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above determination.

We look forward to continued coordination on this project. If you have any questions or need additional information, please call Jessie Murray at (732) 872-3023 or by e-mail (Jessie.Murray@noaa.gov).

Sincerely,

GREENE.KAREN.M.1365830785
Digitally signed by GREENE.KAREN.M.1365830785
Date: 2021.03.17 16:16:46 -04'00'

Karen M. Greene
Mid-Atlantic Branch Chief
Habitat and Ecosystem Services Division

cc:

FRA – A. Castelli
NJ TRANSIT – R. Palladino
GARFO PRD – E. Carson-Supino
New York District ACOE – S. Ryba, R. Miranda
NYSDEC – D. McReynolds
NJDEP – S. Biggins, K. Davis
FWS – S. Mars
EPA Region II – M. Finocchiaro

Consultation with State and Federal Agencies

National Marine Fisheries Service Endangered Species Act

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

May 11, 2017

Daniel Marrone
National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Re: Request for Endangered Species Act Concurrence, Hudson Tunnel Project, Hudson River

Dear Mr. Marrone:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) are acting as joint lead agencies for the preparation of a Draft Environmental Impact Statement (EIS), in compliance with the National Environmental Policy Act of 1969 (NEPA), for the Hudson Tunnel Project (Project). FRA has prepared this request for Endangered Species Act (ESA) concurrence from your office for the Preferred Alternative for the Project (Preferred Alternative). The Preferred Alternative comprises construction of a new two-track rail tunnel and rehabilitation of the existing passenger rail tunnel beneath the Hudson River between New Jersey and New York Penn Station. The existing passenger rail tunnel, the North River Tunnel, is currently used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service.

FRA has made the determination that the Preferred Alternative may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NMFS or any critical habitat designated under the ESA of 1973, as amended. More information about the Project and supporting analysis for this determination is provided below.

Proposed Project

The Project is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Construction of the new tunnel will require some construction activity in the Hudson River. In-water activities associated with construction of the Hudson River Tunnel are expected to last approximately 15 months, beginning in late 2019 and ending in late 2020. There are no in-water activities associated with the rehabilitation of the North River Tunnel, as this work will take place within the existing tunnel structure. The Project will comply with all regulatory restrictions for in-water construction activities, including the restriction for pile driving between November 1 and April 30 within Hudson River Park to protect overwintering striped bass and winter flounder spawning.

Proposed In-Water Construction Activities

The Hudson River Tunnel will be constructed by tunnel boring machine (TBM) beneath the river bottom, but will require in-water work within a small section of the Hudson River. As the Hudson River Tunnel approaches Manhattan, it will be relatively shallow beneath the river bottom, which could cause difficulties during tunnel boring. Generally, tunnels that are bored through soft soils, like those in the Hudson River, should have soil above the tunnel equivalent to half the tunnel's diameter or greater to avoid these challenges. This would require at least 14 feet of cover over the 28-foot-diameter tunnel. For a 500-foot length of the alignment west of the New York pierhead line, the tunnel will have cover of less than 14 feet. To address the construction risks associated with shallow cover, the Project will include ground improvement in this portion of the river bottom before the TBM excavation occurs.

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative.

Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an 18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3-4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

The jet grouting will be conducted within the cofferdams in waters ranging from 30 to 50 feet in depth, and grout will be injected into the soil to a depth of approximately 34 feet below the river bottom (the midpoint of the tunnel's height) and up to the surface of the river bottom sediment.

Jet grouting operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to low strength rock. The material used will have a consistency equivalent to hard clay and will be applied over 1.5 acres of the river bottom. Prior to removal of the cofferdam walls, all jet grout excess will be removed and any excess turbidity in pooled water will be brought down to be compliant with contract environmental requirements. Excess soil displaced by the jet grouting will be contained within the cofferdam and removed for off-site disposal by excavators stationed on the barges.

Construction personnel will travel to the in-water work area via tugboat or dinghy; two boats are likely necessary, one for the crew and the other for delivery of materials. The in-water work will be accomplished in two 8-hour shifts per day on weekdays. All construction material and equipment will be left on up to four barges at the work site, which will be moored-in-place for the duration of in-water construction at each cofferdam segment. The barges will be relatively small (approximately 30 feet wide by 90 feet long; total of up to 10,800 square feet for the four barges) and will be moored in deep water.

During rehabilitation of the existing North River tunnel, which will be conducted entirely within the existing structure, water in the tunnel will continue to be discharged to the North and South Tube Mid-river sump pumps, which empty into the Weehawken sump, and discharge to the Hudson River. This water is and will continue to be monitored and discharged in accordance with Amtrak's discharge permit NJPDES Permit No. NJ0164640.

Description of the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). For this project, the action area includes the 1.5-acre area within the cofferdam for each stage

(24,000 square feet during Stage 1; 24,000 square feet during Stage 2; and 18,000 square feet during Stage 3), the area of the river ensonified during cofferdam installation, and the 10,800 square feet shaded by the barges. The area to be permanently affected by the Preferred Alternative is the 1.5-acre low-cover area, where the existing fine-grained silt/clay sediments will be mixed with cement grout, resulting in soilcrete material with a consistency equivalent to hard clay.

During vibratory hammering of the steel sheetpile for the cofferdams, the 187 dB cSEL isopleth (threshold for sturgeon injury) will extend a distance of about 30 meters (98 feet) from the sheet piles. Behavioral disturbance to sturgeon represented by the 150 dB SPLrms isopleth will also occur at a distance of 30 meters (98 feet) from the steel sheet piles.

Sediment disturbance caused by the installation and removal of the cofferdams will result in minor sediment resuspension, which will dissipate quickly with the currents of the Hudson River, which average about 1.4 knots during both ebb and flood tides at the mouth of the river (NOAA 2013). The two small vessels used for transport of personnel and materials will likely travel only a short distance in deep waters between the work site and the Manhattan shoreline.

NMFS Listed Species (and Critical Habitat) in the Action Area

According to correspondence with the NMFS Protected Resources Division, there are two species of fish listed under the ESA that occur or have the potential to occur in the action area and may be adversely affected by the Project (NMFS 2016). ESA species include:

- Atlantic sturgeon (*Acipenser oxyrinchus*) – Endangered except for Gulf of Maine Distinct Population Segment (DPS), which is Threatened (77 FR 5880 and 77 FR 5914)
- Shortnose sturgeon (*Acipenser brevirostrum*) – Endangered (32 FR 4001, Recovery Plan: NMFS & USFWS 1998)

Shortnose Sturgeon

Shortnose sturgeon are anadromous bottom-feeding fish that can be found throughout the Hudson River from the Battery to the Federal Dam at Troy. Peterson and Bain (2002) estimated that the Hudson River shortnose sturgeon population contained about 61,000 fish. Shortnose sturgeon may occasionally use areas of the lower Hudson River downstream of the George Washington Bridge; however, spawning, nursery, and overwintering areas are located well upstream of the project site (Bain et al. 2007), and no eggs or larval shortnose sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries (NMFS 2016). Although larvae can be found in brackish regions of the Hudson River, juveniles from 2 to 8 years old are predominately confined to reaches upriver from the Project site. Primary summer habitat for shortnose sturgeon is the river channel in the middle section of the Hudson River Estuary, where water depths range from 43 to 138 feet (Bain et al. 2007). More recently, the New York State Thruway Authority conducted mobile tracking of tagged shortnose sturgeon within the Hudson River north of the project site, between the George Washington Bridge and

Stony Point, and found that approximately 58 percent of all detections of shortnose sturgeon were in waters shallower than 20 feet (NMFS 2017), indicating some use of shallower water habitat within that portion of the Hudson River. Overall, the Hudson River south of the Tappan Zee Bridge, including the portion of the river where the Project is located, is not considered optimal shortnose sturgeon habitat (Bain 1997). No critical habitat has been designated for shortnose sturgeon.

Atlantic Sturgeon

Atlantic sturgeon are anadromous bottom-feeding fish that spawn in freshwater sections of the Hudson River and overwinter throughout the New York Bight, off the south shore of Long Island, and throughout Long Island Sound (Waldman et al. 1996, Bain 1997, Savoy and Pacileo 2003). Adults migrate from the ocean upriver to spawn in fresh water above the salt front from late April to early July (Smith 1985, Stegemann 1999). Females migrate from the river back to marine waters following spawning, but males may remain in the river until October or November. Early life stages (i.e., eggs, larvae, and smaller juveniles) are relatively intolerant of salinity; young-of-year Atlantic sturgeon exhibit poor survival at salinities ranging from 5 to 10 parts per thousand (ppt), and older juveniles (Age-1 and Age-2) may tolerate salinities up to 12 ppt (Kynard and Horgan 2002, ASMFC 2012). NMFS (2016) has indicated that no eggs or larval Atlantic sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries; however, transient sub-adults and adults can occur primarily in the deeper waters of the river channel adjacent to the Project site. According to recent surveys conducted by NMFS and multiple state agencies in the region, the majority of Atlantic sturgeon occurred in waters between 10 and 15 meters (32 and 49 feet) in depth, and many of these sturgeon were found off the west coast of Long Island (Dunton et al. 2010). Tagging studies have indicated that Atlantic sturgeon from this aggregation have also been detected in the Hudson River north of the Project site (NMFS 2017).

Critical habitat for Atlantic sturgeon has been proposed for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy (77 FR 35701). The Project falls within this proposed critical habitat. For Atlantic sturgeon, the physical or biological features of critical habitat that are essential to the conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults;
- Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and

- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

Effects Determination

All jet grouting will be conducted within the cofferdams, and not have the potential to affect shortnose and Atlantic sturgeon. Use of up to four barges and two small vessels during construction constitutes a very minimal increase in vessel traffic and shading in the heavily-traveled project area. The potential for project vessel interaction with sturgeon is extremely minimal, as barges will be moored-in-place in relatively deep water during in-water work, and just two small vessels will be used periodically to transport personnel and materials to and from the site. Since the lower Hudson River is an area of heavy vessel activity and there is little chance of species interaction with project vessels, periodic use of these vessels for the approximate 15-month in-water construction period will not have an adverse effect on threatened or endangered species and is not considered further. During rehabilitation of the existing North River Tunnel, water will continue to be discharged in accordance with Amtrak's NJPDES permit and will not adversely affect aquatic resources, including threatened or endangered species and critical habitat.

The effects or stressors of the proposed project that could potentially have an effect on threatened or endangered species include sediment resuspension, underwater noise during cofferdam installation and removal, temporary loss of foraging habitat, and the addition of 1.5 acres of soilcrete for the in-water ground improvement, as discussed below.

Sediment Resuspension

Sediment disturbance associated with installation and removal of the cofferdams will result in minor, short-term increases in suspended sediment and re-deposition of sediments and associated contaminants. In general, installation of sheetpile cofferdams, like pile driving, generally does not result in significant levels of sediment disturbance. The greatest potential for increased turbidity typically occurs when the sheetpile is removed (MPCA 2017). Project proponents will implement a Pollution Prevention Plan developed for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during sheet pile installation and jet grouting activities conducted from construction barges. Increases in suspended sediment associated with installation and removal of the cofferdams will be temporary and localized to the immediate vicinity of construction activities. Re-suspended sediments will dissipate quickly with the tidal currents of the Hudson River after the completion of the sediment disturbing activity. No long-term effects to either species or critical habitat for Atlantic sturgeon will occur as a result of sediment resuspension during construction of the Project.

Underwater Noise

Installation and removal of the steel sheetpile cofferdam walls will be conducted using a vibratory hammer, which will minimize underwater noise impacts. Noise levels consistent with vibratory sheet pile installation (i.e., 175 dB SPLpeak, 160 dB SPLrms) may reach behavioral and injury thresholds for sturgeon, but only at close distances (approximately 30 meters, or 98 feet). Since the river is over 4,000 feet wide in the project location, any transient individuals in the area will have ample opportunity to move to a non-ensonified portion of the river. During Stage 3 of in-water ground improvement, when the third cofferdam is installed 100 feet into the navigation channel, about 80 percent of the distance across the channel will remain non-ensonified, and sturgeon will be able to avoid the portion of the channel in proximity to pile driving in favor of similar suitable habitat. Underwater noise levels associated with project vessel traffic during the 15-month in-water construction period will have a minimal effect on ambient noise, as the lower Hudson River is already an area of heavy vessel traffic, to which fish are likely adapted. Therefore, increased underwater noise levels resulting from the Preferred Alternative will not have the potential to result in significant adverse effects to shortnose or Atlantic sturgeon.

Loss of Habitat

During in-water ground improvement within the low-cover area, Between 18,000 and 24,000 square feet (0.4 and 0.6 acres) within the series of cofferdams will be unavailable at any given time during in-water construction. The temporary loss of benthic habitat is not expected to result in a substantial reduction in foraging opportunities for sturgeon, which feed on benthic macroinvertebrates. Suitable habitat for foraging will continue to be available in the vicinity of the Project, including habitat within the navigation channel during Stage 3 of jet grouting. Additionally, these areas will once again become available when jet grouting is complete and the cofferdams are removed. When compared to the available habitat that will still be available within the lower Hudson River, this temporary loss of foraging habitat will not result in a significant adverse effect to either species of sturgeon or to critical habitat for Atlantic sturgeon. While the 1.5-acre low-cover area will initially be unsuitable for burrowing organisms, over time sediments are expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that would provide forage for sturgeon. Therefore, the loss of habitat will not have the potential to result in significant adverse effects to shortnose or Atlantic sturgeon.

Conclusions

Based on the analysis that all effects of the Preferred Alternative will be insignificant, we have determined that the Hudson Tunnel Project is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl (1)
cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT

Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2012. Habitat Addendum IV to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon. September 2012.

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48: 347-358.

Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

Kynard, B., and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*, and shortnose sturgeon *A. brevirostrum*, with notes on social behavior. Environmental Biology of Fishes 63: 137-150.

Minnesota Pollution Control Agency (MPCA). 2017. Minnesota Stormwater Manual. Available http://stormwater.pca.state.mn.us/index.php/Main_Page. Updated March 2, 2017.

National Marine Fisheries Service (NMFS). 2016. Letter from Mark Murray-Brown, NMFS, to Sandy Collins, AKRF, re response to request for information on threatened and endangered species. December 8, 2016.

National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

National Oceanic and Atmospheric Administration (NOAA). 2013. Current station locations and ranges. Available http://www.tidesandcurrents.noaa.gov/currents10/tab2ac4.html. Revised October 15, 2013.

Peterson, D., and M. Bain. 2002. Sturgeon of the Hudson River: Current status and recent trends of Atlantic and shortnose sturgeon. Annual Meeting of the American Fisheries Society, Baltimore, MD.

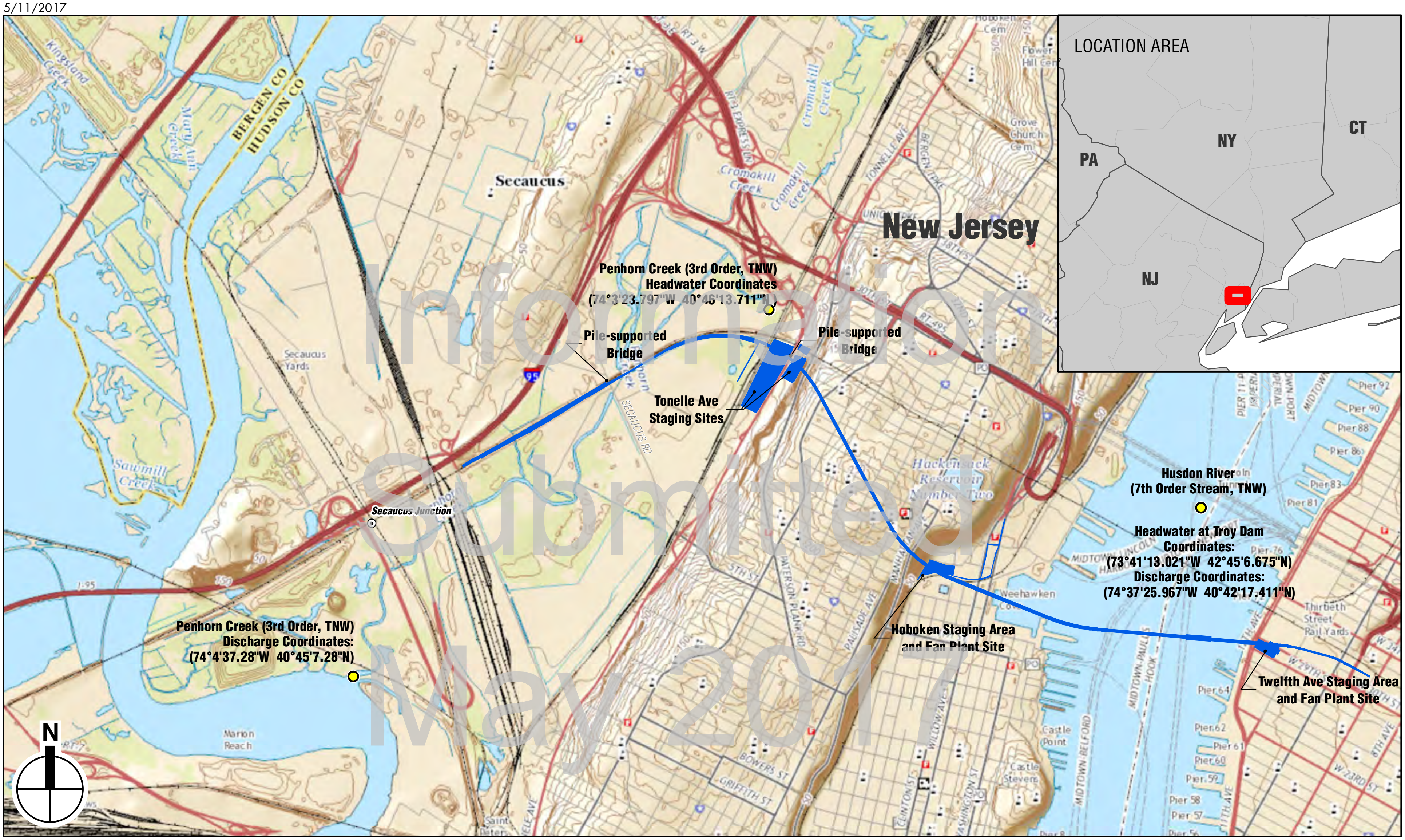
Savoy, T., and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon in Connecticut waters. Transactions of the American Fisheries Society 132: 1-8.

Smith, C.L. 1985. The Inland Fishes of New York State. The New York State Department of Environmental Conservation.

Stegemann, E.C. 1999. New York's Sturgeon. NY State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources.

Waldman, J.R., J.T. Hart, and I.I. Wirgin. 1996. Stock composition of the New York Bight Atlantic sturgeon fishery based on analysis of mitochondrial DNA. Transactions of the American Fisheries Society 125: 364-371.

5/11/2017



Project Construction and Staging Areas

0 5,000 FEET

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

HUDSON TUNNEL PROJECT

U.S. Department of Transportation

Federal Railroad Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

June 14, 2017

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Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Re: Request for Endangered Species Act Concurrence, Hudson Tunnel Project, Hudson River

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- Shortnose sturgeon (*Acipenser brevirostrum*) – Endangered (32 FR 4001, Recovery Plan: NMFS & USFWS 1998)

Shortnose Sturgeon

Shortnose sturgeon are anadromous bottom-feeding fish that can be found throughout the Hudson River from the Battery to the Federal Dam at Troy. Peterson and Bain (2002) estimated that the Hudson River shortnose sturgeon population contained about 61,000 fish. Shortnose sturgeon may occasionally use areas of the lower Hudson River downstream of the George Washington Bridge; however, spawning, nursery, and overwintering areas are located well upstream of the project site (Bain et al. 2007), and no eggs or larval shortnose sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries (NMFS 2016). Although larvae can be found in brackish regions of the Hudson River, juveniles from 2 to 8 years old are predominately confined to reaches upriver from the Project site. Primary summer habitat for shortnose sturgeon is the river channel in the middle section of the Hudson River Estuary, where water depths range from 43 to 138 feet (Bain et al. 2007); however, mobile tracking of tagged shortnose sturgeon by the New York State Thruway Authority between the George Washington Bridge and Stony Point north of the project site found that approximately 58 percent of all detections of shortnose sturgeon were in waters shallower than 20 feet (NMFS 2017), indicating some use of shallower water habitat within that portion of the Hudson River. Upriver of Stony Point to Saugerties, shortnose sturgeon were found only in the deep navigation channel during the Authority's tracking; no tracking was conducted downriver of the George Washington Bridge. In general, the Hudson River south of Piermont Pier, including the portion of the river where the Project is located, is not considered optimal shortnose sturgeon habitat (Bain 1997). No critical habitat has been designated for shortnose sturgeon.

Atlantic Sturgeon

Atlantic sturgeon are anadromous bottom-feeding fish that spawn in freshwater sections of the Hudson River and overwinter throughout the New York Bight, off the south shore of Long Island, and throughout Long Island Sound (Waldman et al. 1996, Bain 1997, Savoy and Pacileo 2003). Adults migrate from the ocean upriver to spawn in fresh water above the salt front from late April to early July (Smith 1985, Stegemann 1999). Females migrate from the river back to marine waters following spawning, but males may remain in the river until October or November. Early life stages (i.e., eggs, larvae, and smaller juveniles) are intolerant of salinity and occur primarily in freshwater habitats; young-of-year Atlantic sturgeon exhibit poor survival at salinities ranging from 5 to 10 parts per thousand (ppt), and older juveniles (Age-1 and Age-2) may tolerate salinities up to 12 ppt (Kynard and Horgan 2002, ASMFC 2012). NMFS (2016) has indicated that no eggs or larval Atlantic sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries; however, transient sub-adults and adults can occur primarily in the deeper waters of the river channel adjacent to the Project site. According to recent surveys conducted by NMFS and multiple state agencies in the region, the majority of Atlantic sturgeon occurred in waters between 10 and 15 meters (32 and 49 feet) in depth, and many of these sturgeon were found off the west coast of Long Island (Dunton et al. 2010). Tagging studies have indicated that Atlantic sturgeon from this aggregation have also been detected in the Hudson River north of the Project site (NMFS 2017).

Critical habitat for Atlantic sturgeon has been proposed for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy (77 FR 35701). The Project falls within this proposed critical habitat. For Atlantic sturgeon, the physical or biological features of critical habitat that are essential to the conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of

subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and

- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

Given the location of the Project, the project activities will not occur in the vicinity of hard bottom substrate in low salinity waters; and the installation of the cofferdams will not remove any soft substrate used for juvenile foraging and physiological development. Therefore this element of the proposed critical habitat will not be adversely modified or destroyed by the Project. As the proposed actions will only produce low concentrations of total suspended solids of between 5 to 10 mg/L (FHWA 2012), it would have insignificant or discountable effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the action area. Given the width of the Hudson River at the project location (approximately 4,350 feet), the temporary addition of the cofferdams will not add a physical barrier to passage between the river mouth and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults.

We have considered the effects of the proposed action on the proposed Critical Habitat for Atlantic sturgeon and conclude that the proposed action is not likely to result in the destruction or adverse modification of proposed critical habitat. Accordingly, no conference is required at this time.

Effects Determination

All jet grouting will be conducted within the cofferdams, and not have the potential to affect shortnose and Atlantic sturgeon. Use of up to four barges and two small vessels during construction constitutes a very minimal and localized increase in vessel traffic and shading in the heavily-traveled project area. The potential for project vessel interaction with sturgeon is extremely minimal, as barges will be moored-in-place in relatively deep water during in-water work, and two small, shallow-draft vessels will be used periodically and over short durations to transport personnel and materials to and from the site. Since the lower Hudson River is an area of heavy vessel activity and there is little chance of species interaction with project vessels, periodic use of these vessels for the approximate 15-month in-water construction period will not adversely affect threatened or endangered species and is not considered further. During rehabilitation of the existing North River Tunnel, water will continue to be discharged in accordance with Amtrak's NJPDES permit and will not adversely affect aquatic resources, including threatened or endangered species or critical habitat.

The effects or stressors of the proposed project that could potentially have an effect on threatened or endangered species include sediment resuspension, underwater noise during cofferdam installation and removal, temporary loss of foraging habitat, and the addition of 1.5 acres of soilcrete for the in-water ground improvement, as discussed below.

Vessel Traffic

In our analysis we considered three elements: (1) the existing baseline conditions, (2) the action and what it adds to existing baseline conditions, and (3) new baseline conditions (the existing baseline conditions and the action together). We have determined that vessel traffic added to baseline conditions as a result of the Preferred Alternative is not likely to adversely affect ESA-listed species for the following reasons.

Adding project vessels to the existing baseline will not increase the risk that any vessel in the area will strike an individual, or will increase it to such a small extent that the effect of the action (i.e., any increase in risk of a strike caused by the project) cannot be meaningfully measured or detected. The baseline risk of a vessel strike within the lower Hudson River is unknown. Existing maritime traffic on the Hudson River in the Project area includes passenger ferries operating between multiple terminals, freight and barge traffic, cruise vessels, and other commercial and recreational boats. Cruise vessels up to 1,000 feet in length pass through the Project area going to and from the Manhattan Cruise Terminal, which is located near 48th Street and handles approximately 150 ships annually. The most recent annual volumes of commercial maritime traffic on the Hudson River from the U.S. Army Corps of Engineers (USACE)[1], for 2010-2014, show an average of 222,106 vessels per year traversing the Project area, with a majority of those vessels having a draft of 12 feet or less (approximately 99 percent). This average does not include the numerous private pleasure craft and ferries that also operate within this area. Sightseeing boats and privately owned yachts and smaller watercraft are commonly active in the Project area, particularly in the warmer months.

As discussed above under the description of the proposed project, during the project activities, a minimal number of project vessels will be added to the baseline (two small boats for crew and material delivery each day, and up to four barges moored-in-place for the duration of in-water construction). The addition of project vessels will also be intermittent, temporary, and restricted to a small portion of the overall action area on any given day. As such, any increased risk of a vessel strike caused by the project will be too small to be meaningfully measured or detected. As a result, the effect of the action on the risk of a vessel strike in the action area is insignificant.

Sediment Resuspension

Sediment disturbance associated with installation and removal of the cofferdams will result in minor, short-term increases in suspended sediment of between 5 to 10 mg/L (FHWA 2012), and re-deposition of sediments and associated contaminants. In general, sheet pile installation produces about half the level of suspended sediment produced by pile driving and one quarter of that produced by dredging (Caltrans 2001). Sediment resuspension resulting from installation of the sheetpile cofferdams will have insignificant or discountable effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the action area. The greatest potential for increased turbidity typically occurs when the sheetpile is removed (MPCA 2017). Project proponents will implement a Pollution Prevention Plan developed for the in-water construction activities to minimize the potential for discharge of

[1] http://www.navigationdatacenter.us/wcsc/webpub14/Part1_WWYs_TripsbyTT_Dr_Yr_2014_2010.htm

materials to the Hudson River during sheet pile installation and jet grouting activities conducted from construction barges. Increases in suspended sediment associated with installation and removal of the cofferdams will be temporary and localized to the immediate vicinity of construction activities. Re-suspended sediments will dissipate quickly with the tidal currents of the Hudson River after the completion of the sediment disturbing activity. No long-term effects to either species or critical habitat for Atlantic sturgeon will occur as a result of sediment resuspension during construction of the Project. Given the fact that increases in suspended sediment will be temporary, minimal, and localized to the vicinity of construction activities, and will have insignificant or discountable effects on sturgeon migration, any effects will be too small to be meaningfully measured or detected. As a result, the effect of sediment resuspension on ESA species is insignificant.

Underwater Noise

Installation and removal of the steel sheetpile cofferdam walls will be conducted using a vibratory hammer, which will minimize underwater noise impacts. As described above, noise levels associated with vibratory installation of sheet pile (i.e., 175 dB SPLpeak, 160 dB SPLrms) may reach behavioral and injury thresholds for sturgeon, but only at close distances (approximately 30 meters, or 98 feet); noise levels are not expected to reach or exceed the thresholds for recoverable injury. Since the river is over 4,000 feet wide in the project location, any transient individuals in the area will have ample opportunity to move to a non-ensonified portion of the river. During Stage 3 of in-water ground improvement, when the third cofferdam is installed 100 feet into the navigation channel, about 80 percent of the distance across the channel will remain non-ensonified, and sturgeon will be able to avoid the portion of the channel in proximity to pile driving in favor of similar suitable habitat. Underwater noise levels associated with project vessel traffic during the 15-month in-water construction period will have a minimal effect on ambient noise, as the lower Hudson River is already an area of heavy vessel traffic, to which fish are likely adapted. Therefore, increased underwater noise levels resulting from the Preferred Alternative will not have the potential to result in significant adverse effects to shortnose or Atlantic sturgeon. Given the small distance ESA species would need to move to avoid the disturbance levels of noise, any effects will be too small to be meaningfully measured or detected, and the effects of noise on ESA species are insignificant.

Loss of Habitat

During in-water ground improvement within the low-cover area, Between 18,000 and 24,000 square feet (0.4 and 0.6 acres) within the series of cofferdams will be unavailable at any given time during in-water construction. The temporary loss of benthic habitat is not expected to result in a substantial reduction in foraging opportunities for sturgeon, which feed on benthic macroinvertebrates. Suitable habitat for foraging will continue to be available in the vicinity of the Project, including habitat within the navigation channel during Stage 3 of jet grouting. Additionally, these areas will once again become available when jet grouting is complete and the cofferdams are removed. When compared to the available habitat that will still be available within the lower Hudson River, this temporary loss of foraging habitat will not result in a significant adverse effect to either species of sturgeon or to critical habitat for Atlantic sturgeon. While the 1.5-acre low-cover area will initially be unsuitable for burrowing organisms, over time sediments are expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that would provide forage for sturgeon. Therefore, the loss of habitat will not have the potential to result in significant adverse effects to shortnose or Atlantic sturgeon. Given the small and temporary loss of habitat, and the fact that similar habitat will continue to be available to ESA species nearby, the effects of habitat loss will be too small to be meaningfully measured or detected, and the effects of habitat loss on ESA species are insignificant.

Conclusions

Based on the analysis that all effects of the Preferred Alternative will be insignificant, we have determined that the Hudson Tunnel Project is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Stephanie B Perry for

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl (1)
cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT

Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2012. Habitat Addendum IV to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon. September 2012.

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48: 347-358.

Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

California Department of Transportation (Caltrans). 2001. Pile Installation Demonstration Project, Fisheries Impact Assessment. PIDP EA 012081, Caltrans Contract 04A0148. San Francisco – Oakland Bay Bridge East Span Seismic Safety Project.

Federal Highway Administration (FHWA). 2012. Biological Assessment for the Tappan Zee Pile Installation Demonstration Project. January 2012. 105 pp.

Kynard, B., and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*, and shortnose sturgeon *A. brevirostrum*, with notes on social behavior. Environmental Biology of Fishes 63: 137-150.

Minnesota Pollution Control Agency (MPCA). 2017. Minnesota Stormwater Manual. Available http://stormwater.pca.state.mn.us/index.php/Main_Page. Updated March 2, 2017.

National Marine Fisheries Service (NMFS). 2016. Letter from Mark Murray-Brown, NMFS, to Sandy Collins, AKRF, re response to request for information on threatened and endangered species. December 8, 2016.

National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

National Oceanic and Atmospheric Administration (NOAA). 2013. Current station locations and ranges. Available http://www.tidesandcurrents.noaa.gov/currents10/tab2ac4.html. Revised October 15, 2013.

Peterson, D., and M. Bain. 2002. Sturgeon of the Hudson River: Current status and recent trends of Atlantic and shortnose sturgeon. Annual Meeting of the American Fisheries Society, Baltimore, MD.

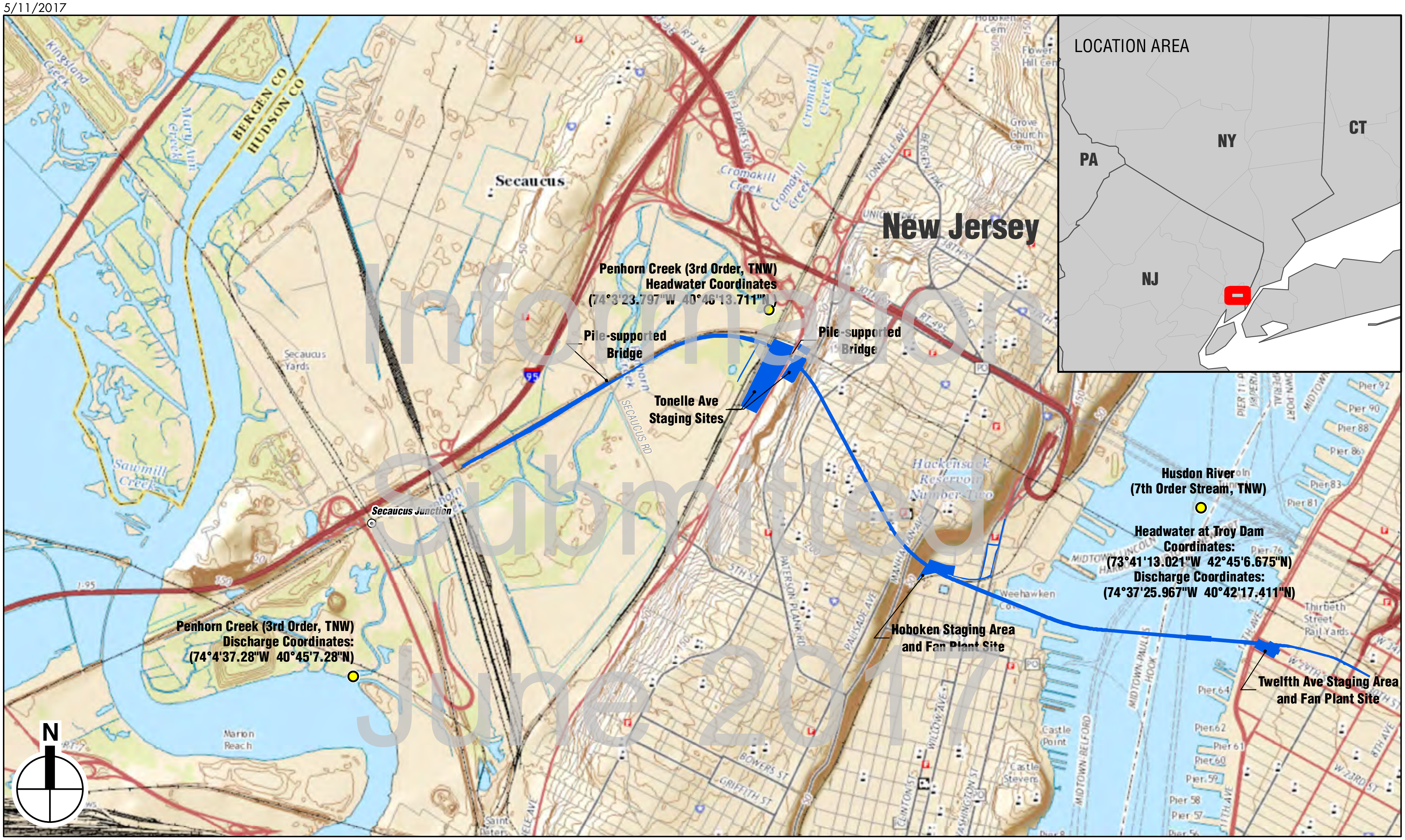
Savoy, T., and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon in Connecticut waters. Transactions of the American Fisheries Society 132: 1-8.

Smith, C.L. 1985. The Inland Fishes of New York State. The New York State Department of Environmental Conservation.

Stegemann, E.C. 1999. New York's Sturgeon. NY State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources.

Waldman, J.R., J.T. Hart, and I.I. Wirgin. 1996. Stock composition of the New York Bight Atlantic sturgeon fishery based on analysis of mitochondrial DNA. Transactions of the American Fisheries Society 125: 364-371.

5/11/2017



Project Construction and Staging Areas

0 5,000 FEET

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

HUDSON TUNNEL PROJECT

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN 28 2017

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington. DC 20590

Re: ESA Section 7 Hudson Tunnel Project

Dear Ms. Osterhues:

We have completed our consultation under section 7 of the Endangered Species Act (ESA) in response to your letter received on June 16, 2017 regarding the above-referenced proposed project. We reviewed the action agency's consultation request document and related materials. Based on our knowledge, expertise, and the action agency's materials, we concur with the action agency's conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under our jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required.

You do not mention which life stages of sturgeon will be present in the action area. Juvenile and adult shortnose may occur in the action area as well as adult and subadult Atlantic sturgeon. Although your analysis covers the effects of underwater noise, you do not state that you expect sturgeon to modify their behavior and move away from the esonified project area upon exposure to underwater noise levels of 150 dB re 1 μPA RMS. Given the small distance a sturgeon would need to swim to avoid the esonified area, and due to the large width of the river any movements of the fish will be undetectable and not interfere with any essential life behaviors such as spawning or migration. These clarifications regarding your analysis of the effects of the proposed action do not affect your determination that effects of underwater noise are insignificant or alter your not likely to adversely affect determination, and we maintain our concurrence with your conclusion that the proposed action is not likely to adversely affect any NMFS ESA-listed species in the action area.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. Should you have any questions about this correspondence please contact Dan Marrone at 978-282-8465 or Daniel.Marrone@noaa.gov. For questions related to Essential Fish Habitat please contact Ursula Howson with our Habitat Conservation Division at 732-872-3116 or Ursula.Howson@noaa.gov.

Sincerely,

Kimberly B. Damon-Randall
Assistant Regional Administrator
for Protected Resources

EC: Marrone NMFS/PRD; Castelli FRA
PCTS: NER-2017-14217
File Code: \Section 7\Non-Fisheries\Federal Railroad\Hudson Tunnel Project\Incoming

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

July 21, 2017

Daniel Marrone
National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Re: Re-initiation of Consultation Under the Endangered Species Act, Hudson Tunnel Project, Hudson River

Dear Mr. Marrone:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) submitted a letter to the National Marine Fisheries Service (NMFS) requesting concurrence from NMFS under section 7 of the Endangered Species Act (ESA) for the Hudson Tunnel Project (Project) on June 14, 2017. National Marine Fisheries Service (NMFS) completed this consultation under on June 28, 2017, and concurred with FRA's conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under NMFS jurisdiction.

Since submission of our concurrence request, the characterization of impacts of the in-water portion of Preferred Alternative for the Project within the Hudson River has changed with respect to the effects to the elevation of the river bottom within approximately 0.7 acres of the1.5 acres of river bottom originally identified as being modified through the addition of grout to the soil (so as to provide stability to the ground above the shallow tunnel). As described below, FRA is thus re-initiating consultation with NMFS regarding the potential effects of the Project on ESA species. All other assessment of impacts of the Preferred Alternative remain unchanged from what was presented in our June 14, 2017, request for concurrence. FRA has made the determination that the Preferred Alternative, with the change in the effects of the in-water component within the Hudson River, may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NMFS or any critical habitat designated under the ESA of 1973, as amended.

Changes to the Preferred Alternative

As part of the Project, a 1.5-acre area (the "low-cover area") of river bottom within the Hudson River will be strengthened using jet grout, involving a mix of cement grout, water, and compressed air at high pressure that will mix with and partially replace the soil, resulting in a stronger cemented soil with a consistency equivalent to hard clay (i.e., "soilcrete"). Within the 1.5-acre low-cover area, approximately 0.8 acres of soilcrete will be approximately level with the surrounding riverbed. Within this portion of the low-cover area, the Preferred Alternative will allow for sediment deposition and possibly provide soft bottom habitat for benthic invertebrates, and therefore, will not result in adverse impacts to Atlantic or shortnose sturgeon as determined in the June 14, 2017 request for concurrence. However, the remaining approximately 0.7-acre portion (120 feet wide and 270 feet long) of the 1.5-acre low-cover area would require that the soilcrete be elevated between 1 and 2 feet above the existing mudline.

The 0.7-acre elevated portion of the soilcrete will provide habitat for encrusting organisms, but may have a lower potential to accumulate sediment that would provide soft-bottom habitat for bottom-feeding fish. As a result, the 0.7 acres of elevated soilcrete is not likely to be suitable foraging habitat for Atlantic sturgeon or shortnose sturgeon. This area is outside the 45-foot-deep Federal navigation channel but within an area of the river that is approximately 50 feet deep. Juvenile and adult Atlantic sturgeon in this part of the Hudson River typically occur in deeper waters and may occur in this area as transients, in the case of migrating adults, or for foraging, in the case of juveniles and subadults. Shortnose sturgeon also have the potential to use this 0.7-acre portion of the river. Despite the conversion of soft-bottom habitat to hard-bottom habitat, the potential loss of this area as foraging habitat for Atlantic and shortnose sturgeon is small relative to the unaffected soft-bottom habitat in the lower Hudson River. Therefore, the potential loss of this area as foraging habitat for Atlantic and shortnose sturgeon may affect but is unlikely to adversely affect this species. The slight increase in elevation of the river bottom in this location will not cause obstruction of passage for either species of sturgeon.

The conversion of soft-bottom habitat to hard-bottom habitat will alter proposed critical habitat identified for use by juvenile Atlantic sturgeon for foraging and physiological development. However, the 0.7-acre area of elevated soilcrete represents a small area relative to the thousands of acres of available foraging habitat suitable for Atlantic sturgeon in the Hudson River. The addition of soilcrete will result in increased elevation of up to 2 feet above the river bottom at water depths of approximately 45 to 50 feet. Given the width of the Hudson River in the study area (approximately 4,350 feet), the permanent impact to 0.7 acres of deep-water, soft-bottom habitat will not create a physical barrier to passage between the river mouth and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults. The habitat conversion is not likely to have significant effects on water flow, dissolved oxygen levels, salinity, or water temperature. Therefore, this aspect of the proposed critical habitat for Atlantic sturgeon will not be adversely modified. Following the issuance of the final critical habitat decision by NMFS, FRA will initiate consultation with NMFS regarding the potential impacts of the in-water work to critical habitat.

Conclusions

Given the temporary nature of the loss of habitat within the 0.8-acre portion of soilcrete that would be of similar elevation to the river bed, and the small potential loss of habitat within the 0.7-acre portion of soilcrete elevated above the riverbed, and the fact that similar habitat would continue to be available to ESA species nearby, the effects of habitat loss would be too small to be meaningfully measured or detected, and the effects of habitat loss on ESA species would be insignificant. Therefore, our previous determination that the Hudson Tunnel Project is not likely to adversely affect any listed species is unchanged and we request your concurrence with this determination. After construction is complete, the Project Sponsor will monitor the recovery of the 0.7 acres of elevated soilcrete, and the remaining 0.8 acres of soilcrete, as foraging habitat for five years. Monitoring of this area will be conducted in consultation with USACE, NMFS, and NSYDEC.

If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT

FW: Hudson Tunnel Project-ESA

Daniel Marrone - NOAA Federal <daniel.marrone@noaa.gov> Mon, Jul 24, 2017 at 12:56 PM
To: "Castelli, Amishi (FRA)" <Amishi.Castelli@dot.gov>
Cc: "RPalladino@njtransit.com" <RPalladino@njtransit.com>, "Osterhues, Marlys (FRA)" <Marlys.Osterhues@dot.gov>, "jcowing@akrf.com" <jcowing@akrf.com>, "scollins@akrf.com" <scollins@akrf.com>, William Barnhill <william.barnhill@noaa.gov>

Hi Amishi,
The proposed modifications in your letter dated July 21, 2017, will not affect ESA-listed species or critical habitat beyond what was considered in the June 28, 2017, consultation. No further consultation is necessary.
Dan
[Quoted text hidden]

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 2, 2018

Daniel Marrone
National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Re: Re-initiation of Consultation Under the Endangered Species Act, Hudson Tunnel Project, Hudson River

Dear Mr. Marrone:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) requested concurrence from the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) for the Hudson Tunnel Project (Project) on June 14, 2017. On June 28, 2017, NMFS completed this consultation, and concurred with FRA's conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under NMFS jurisdiction. FRA subsequently submitted updated information regarding the Preferred Alternative on July 21, 2017, and on July 24, 2017, NMFS concurred, via an email reply to FRA, with FRA's conclusion of no adverse effects to ESA-listed species or critical habitat as a result of the revisions.

Since submission of the previous requests for concurrence, FRA has refined the cofferdam design and schedule for in-water work within the Hudson River. Additionally, the NMFS issued the Final Rule for the designation of Critical Habitat for the endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic sturgeon (*Oxyrinchus oxyrinchus*) and the threatened Gulf of Maine Distinct Population Segment of Atlantic sturgeon (82 FR 39160, August 17, 2017).

As described below, FRA is thus re-initiating consultation with NMFS regarding the potential for the refinements to the cofferdam design and schedule for in-water work to affect conclusions related to ESA species and designated critical habitat. FRA has updated the impact assessments for sediment resuspension and underwater noise to reflect these changes, as described below. All other assessment of impacts of the Preferred Alternative remains unchanged from what was presented in our June 14, 2017 and July 21, 2017 requests for concurrence. FRA has made the determination that the Preferred Alternative, inclusive of the new refinements in design and schedule for in-water work and in consideration of the updated sediment resuspension and acoustic analyses, may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NMFS or any critical habitat designated under the ESA of 1973, as amended. More information about the refinements in design and schedule and supporting analyses for this determination is provided below.

Updated Project Design and Schedule for In-Water Work

As presented in our initial consultation and in the Project's DEIS, modification to 1.5 acres of the Hudson River bottom will be required, in an area approximately 550 feet long and 120 feet wide. The in-water work for the Project will be conducted within a cofferdam system to limit disturbance to the surrounding waters. To limit the width of the river within the 1.5-acre in-water work zone that is enclosed within a cofferdam at any given time, the work will be divided into either two or three stages. Whether two or three stages are used, each stage will be enclosed by a separate cofferdam that will be removed when work in that area is complete, such that only one cofferdam will be in the river at a given time. If implemented in two stages, the individual cofferdams would be approximately 415 feet long (first stage) and 140 feet long (second stage) and would occur in two different construction years. If implemented in three stages, the in-water work would be conducted within three separate cofferdams that are 200 feet long (first and second stages) and 150 feet long (third stage), and would occur in three construction years. Whether completed in two or three stages, the in-water work will begin at the location of the cofferdam closest to the Manhattan shoreline and move outward towards the 45-foot-deep Federal Navigation Channel.

Additionally, subsequent to our initial consultation, as engineering and design progressed resulting in a refinement to the cofferdam design to include 54-inch diameter steel pipe king piles to support the sheet pile sections. This will provide additional strength and stability to the cofferdam structure. If a two-stage cofferdam is used, the first (larger) stage would have approximately 114 king piles and the second stage would have approximately 56 king piles. If a three-stage cofferdam is used, 70 king piles would be needed for each stage. The number of king piles required is based on preliminary estimates and will be subject to change by the final design/build contractor. King piles and sheet pile will be installed via vibratory hammering; impact hammering will not be used. Installation of sheet and king piles to construct the cofferdam sections will last approximately 7 weeks for each section. Ground improvement work within each cofferdam section is anticipated to last up to 19 weeks, followed by removal of the sheet and king piles during a 3-week period. The estimated duration for each of these activities and the total duration of 29 weeks for each cofferdam section are considered to be the worst-case scenario.

A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment resuspension. Installation and removal of cofferdams will take place during weekday working hours (12 hours per day, 5 days per week). Even without incorporating a time contingency for uncertainties typically encountered with in-river work, such as vessel traffic and weather impacts, the necessary duration for each cofferdam stage exceeds the available 19.5 weeks and would extend into the no in-water work timing restriction period indicated in the Conservation Recommendations conveyed to FRA by NMFS Habitat Conservation Division in its June 12, 2017, response to FRA's Request for EFH Consultation. FRA has requested from NMFS a modification of the no in-water work window such that it would be from 1/21 to 6/30 instead of 11/15 to 6/30,[1] of each year during construction. Within this modified construction window, the majority of the work from 11/15 to 1/20 will be conducted within the cofferdam, and would include three weeks of cofferdam removal during late December through January 20 to complete each phase of in-water work.

Updated Sediment Resuspension Analysis

As discussed in our initial consultation, sediment disturbance associated with installation and removal of the cofferdams will result in minor, short-term increases in suspended sediment. As disclosed above, as part of refinements to project design, FRA now recommends that 54-inch diameter steel pipe king piles will need to be installed to support the sheet pile for the cofferdam. Generally, pile installation does not result in significant sediment resuspension; the potential for sediment resuspension is greater during cofferdam removal. While the FRA does not expect increases in suspended sediment from pile installation and removal to affect shortnose or Atlantic sturgeon, turbidity curtains will be deployed during cofferdam removal to minimize increases in suspended sediment. The project site is strongly influenced by the tidal and riverine currents in the Hudson River, and therefore, any temporary increase in suspended sediment associated with in-water work will dissipate shortly following cessation of pile installation and removal. Installation and removal of the cofferdams will be an intermittent disturbance (up to 7 weeks for installation and 3 weeks for removal, assuming intermittent work over 12 hours per day and 5 days per week).

The schedule for pile installation will ensure that migratory pathways are not obstructed for spawning shortnose or Atlantic sturgeon. In compliance with the timing restrictions for in-water work, installation will begin July 1st, thereby protecting anadromous species migrating up-river to spawn during the spring and early summer from March 1 through June 30. Removal of the cofferdams, with the use of turbidity curtains, will take place in January, outside the period of spawning migration for anadromous fish, including sturgeon.

Updated Acoustic Analysis

FRA has updated the impact analysis for underwater noise in order to address the installation and removal of 54-inch diameter steel pipe king piles during cofferdam construction and removal. Because no data were available for the 54-inch king piles, estimates of underwater noise levels were conservatively based on the values for 36-inch and 72-inch diameter steel pipe piles, which bound the 54-inch piles in terms of size. The spatial extent of underwater noise associated with each of the biological thresholds for behavioral and physiological injury to fish was estimated using the Simplified Attenuation Formula in the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Acoustics Evaluation spreadsheet. The estimated sound levels during pile driving and distances to each threshold are presented in **Tables 1 through 3**.

[1] This request to NMFS for a modification of the in-water seasonal timing restriction and associated construction work window is being made concurrently via a letter to Louis Chiarella of the NMFS Habitat Conservation Division.

Table 1
Representative Case Studies for Estimating Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation Rate (dB/10m)
Multiple Projects	15	24”	AZ Steel Sheet	Vibratory	5
Multiple Projects	5	36”	Steel Pipe	Vibratory	5
Multiple Projects	5	72”	Steel Pipe	Vibratory	5

Table 2
Estimates of Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Type of Pile	Hammer Type	Estimated Peak Sound Pressure Level (dB SPL_{peak})	Estimated Sound Pressure Level (dB SPL_{RMS})	Estimated Single Strike Sound Exposure Level (dB SEL)
24” AZ Steel Sheet	Vibratory	175	160	160
36” Steel Pipe	Vibratory	185	175	175
72” Steel Pipe	Vibratory	195	180	180

Table 3
Estimated Distances to Noise Levels Corresponding to the Thresholds for the Potential Onset of Recoverable Physiological Injury and Behavioral Effects for Fish

Type of Pile	Hammer Type	Distance (m) to Physiological Threshold (206 dB SPL_{peak})	Distance (m) to Behavioral Threshold (150 dB SPL_{RMS})	Distance (m) to Physiological Threshold (150 dB SEL)[1]
24” AZ Steel Sheet	Vibratory	n/a	30	30
36” Steel Pipe	Vibratory	n/a	60	60
72” Steel Pipe	Vibratory	n/a	70	70

Notes:
[1] – As explained in the NMFS GARFO Acoustics Tool: “When the received SEL from an individual pile strike is below a certain level, then the accumulated energy from multiple strikes would not contribute to injury, regardless of how many pile strikes occur. This SEL is referred to as “effective quiet”, and is assumed, for the purposes of this spreadsheet, to be 150 dB re 1µPa sSEL. Effective quiet establishes a limit on the maximum distance from the pile where injury to fishes is expected – the distance at which the single-strike SEL attenuates to 150 dB. Beyond this distance, no physical injury is expected, regardless of the number of pile strikes.”

Based on the acoustic evaluation, installation of sheet piles and king piles will not produce noise levels that exceed the peak threshold for the potential onset of recoverable physiological injury to fishes (i.e., 206 dB re: 1µPa peak sound pressure level (SPLpeak)). Fish will likely avoid the area of the Hudson River where underwater noise levels exceed the behavioral threshold of 150 dB SPLrms, which would occur within 60 to 70 meters (200 to 230 feet) of the pile being driven (i.e, the calculated distance to behavioral threshold for 36” and 72” steel pipe piles (see **Table 3** and **Figure 1**); this is the maximum extent of underwater noise that would affect fish or fish habitat during cofferdam construction and removal. Fish present within 230 feet of the source at the onset of pile driving may be temporarily exposed to noise levels that exceed the potential onset of recoverable physiological injury (150 dB SEL), but would leave the area in response to noise levels exceeding the behavioral threshold of 150 dB SPLrms. Fish within 230 feet would recover from any injury sustained at the start of vibratory pile driving for cofferdam installation and removal. Since 230 feet also represents the limit of the ensonified area corresponding to the behavioral threshold, any fish outside of that area at the onset of pile driving would be expected to remain so, and would not be exposed to levels exceeding the physiological threshold.

Since the Hudson River is approximately 4,500 feet wide at the project location, most of the river width will remain non-ensonified (< 150 dB SPLrms) during pile installation, including the 2,600-foot river channel where water depths are greater than 45 feet, and the shallower waters to the east of the low-cover area (see **Figure 1**). During installation and removal of cofferdam piles, the ensonified area will encompass approximately 460 feet of the channel (or about 18% of its width). However, even when the deepest piles are installed at the westernmost location, approximately 82% of the river channel will remain non-ensonified, leaving room for fish passage in the channel. Because the total span of the 150 dB SPLrms isopleth would not be greater than 460 feet, approximately 90% of the river width would remain non-ensonified during cofferdam installation and removal. Moreover, the daily duration of vibratory pile driving would not exceed 12 hours during a 24-hour period and work would not occur during the weekend, which means that the entire river in the vicinity of the project would be non-ensonified during the majority of the time that cofferdam construction and removal are occurring. Additionally, pile driving within those 12 hours will occur intermittently, rather than continuously.

Since the ensonified area of the river would only extend a maximum of 230 feet from the source, cofferdam installation in July and August and removal in January will not impede migration of shortnose or Atlantic sturgeon. While a small portion of the river would be ensonified during pile installation and removal, there would be room for fish passage both in the shallower waters to the east and in the river channel to the west during installation and removal of each of the three cofferdam sections. Even when the deepest piles are installed at the eastern edge of the channel, approximately 82% of the channel will remain non-ensonified and available for fish passage. During cofferdam removal in January, overwintering juvenile sturgeon are not expected to occur in this portion of the river; any sturgeon that might occur there would likely be found in the deeper waters of the channel where water temperatures are warmer than those found in the shallower off-channel areas (Bain et al. 2007;[2] NMFS 2017a[3]) and would not be exposed to elevated noise levels. In addition to the limited spatial extent of underwater noise, the relatively short duration of the noise (i.e., up to 7 weeks for installation and 3 weeks for removal, intermittently for 12 hours during a 24-hour period) would further minimize the potential impacts to shortnose and Atlantic sturgeon in the vicinity of the activity. Therefore, underwater noise associated with cofferdam installation and removal is not expected to cause significant adverse effects to ESA-listed species, even with the modification of the seasonal timing restriction for in-water work that has been proposed.

[2] Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

[3] National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

Critical Habitat for Atlantic Sturgeon

Subsequent to the previous consultation, critical habitat for Atlantic sturgeon has been finalized for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy (82 FR 39160). As discussed when this designation was proposed, the Project falls within the critical habitat for Atlantic sturgeon. The physical or biological features of critical habitat that are essential to the conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and
- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

The project activities will not occur in the vicinity of hard bottom substrate in low salinity waters, and the installation of cofferdams (including king piles) will not remove any soft substrate used for juvenile foraging and physiological development. Overwintering juvenile sturgeon are not expected to occur in the portion of the river where cofferdams will be used; any sturgeon that might occur in this region of the Hudson River would likely be found in the deeper waters of the channel where water temperatures are warmer than those found in the shallower off-channel areas (Bain et al. 2007; NMFS 2017a), where construction is proposed. Therefore, this element of the proposed critical habitat will not be adversely modified or destroyed by the Project. As the project activities will only produce low concentrations of total suspended solids of between 5 to 10 mg/L (FHWA 2012[4]), and the effects of sediment resuspension will be minimize through the use of a turbidity curtain, the Preferred Alternative would have insignificant or discountable effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the area. Given the width of the Hudson River at the project location, the temporary addition of the cofferdams between July and January for each of two or three construction years (depending on whether two or three cofferdam segments are used) will not add a physical barrier to passage between the river mouth and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults.

[4] Federal Highway Administration (FHWA). 2012. Biological Assessment for the Tappan Zee Pile Installation Demonstration Project. January 2012. 105 pp.

Conclusion

Considering the analyses described above, we conclude that the Preferred Alternative is not likely to result in the destruction or adverse modification of critical habitat, and the Project is not likely to adversely affect any listed species under NMFS's jurisdiction. If you have questions or require additional information, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT
J. Cannon, USACE
M. Nasim, Amtrak

Project Site

Low Cover Area

Spatial Extent of 150 dB Behavioral Threshold at Stage 1

Spatial Extent of 150 dB Behavioral Threshold at Stage 3

0 1,000 FEET

12/8/2017

HUDSON TUNNEL PROJECT

Extent of Increased Underwater Noise During Cofferdam Installation

Figure 1

From: Daniel Marrone - NOAA Federal <daniel.marrone@noaa.gov>
Sent: Wednesday, February 14, 2018 11:19:56 AM
To: Castelli, Amishi (FRA)
Cc: RPalladino@njtransit.com; James.H.Cannon@usace.army.mil; Nasim, Mohammed N (Mohammed.Nasim@amtrak.com); Osterhues, Marlys (FRA)
Subject: Re: Hudson Tunnel Project-Section 7 re-initiation

Hi Amishi,
The proposed modifications in your letter dated February 2, 2018, will not affect ESA-listed species or critical habitat beyond what was considered in the June 28, 2017, consultation. No further consultation is necessary.
Dan

On Fri, Feb 9, 2018 at 10:37 AM, Castelli, Amishi (FRA) <Amishi.Castelli@dot.gov> wrote:

> Good morning Dan- On behalf of Marlys Osterhues, I'm transmitting the attached letter re-initiating Section 7 consultation for the Hudson Tunnel Project to incorporate design updates and updates in Critical Habitat designations.
>
> Please contact me with any questions or concerns.
>
> Best,
>
> Amishi
>
> **Amishi Castelli, Ph.D.**
>
> *Environmental Protection Specialist*
>
> *U.S Department of Transportation, Federal Railroad Administration*
>
> *Office of Program Delivery, Environment and Corridor Planning Division (RPD-13)*
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> 617-431-0416

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 18, 2021

Jennifer Anderson
National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Re: Re-initiation of Consultation Under the Endangered Species Act, Hudson Tunnel Project, Hudson River

Dear Ms. Anderson:

The Federal Railroad Administration (FRA) respectfully requests re-initiation of consultation with the National Marine Fisheries Service (NMFS) regarding the potential for refinements to the design and schedule of the Hudson Tunnel Project (Project) to affect conclusions related to species listed under Section 7 of the Endangered Species Act (ESA) and designated critical habitat. FRA initially requested concurrence from NMFS under Section 7 of the ESA for the Project on June 14, 2017. On June 28, 2017, NMFS completed this consultation, and concurred with FRA's conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under NMFS jurisdiction. On July 21, 2017, FRA submitted information describing a change to the Project resulting in an approximately 0.7-acre portion of the 1.5-acre ground improvement area that would be one to two feet above the mudline, converting soft bottom habitat within the elevated area to hard bottom habitat. On July 24, 2017, NMFS concurred, via an email reply to FRA, with FRA's conclusion that the proposed modifications would not affect ESA-listed species or critical habitat as a result of the Project change beyond what was considered in the June 28, 2017 consultation, and that no further consultation was necessary. On February 2, 2018, FRA submitted information describing additional changes to the Project which included refinements to the cofferdam design and modifications to the in-water work schedule. The change to the cofferdam design included the use of 54-inch diameter steel pipe king piles to support the sheet pile sections of the cofferdam. The change to the in-water work schedule incorporated consideration of completing the in-water activities in either two or three stages, rather than the three stages previously proposed. Because NMFS had issued the Final Rule for designation of Critical Habitat for the endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic sturgeon (*Oxyrinchus oxyrinchus*) and the threatened Gulf of Maine Distinct Population Segment of Atlantic sturgeon, the February 2, 2018 request for concurrence evaluated the potential for the Project to affect Critical Habitat for Atlantic sturgeon. In response to these modifications, NMFS concurred, via email reply on February 14, 2018, with FRA's conclusion that the proposed modifications would not affect ESA-listed species or critical habitat beyond what was considered in the June 28, 2017 consultation and that no further consultation was necessary.

Since submission of the previous requests for concurrence, additional engineering analyses have led to further refinements in the design and schedule for in-water work within the Hudson River. Because of the increase in the area to be affected and the new method for hardening the soil, we are requesting a re-initiation of consultation. FRA has updated the impact assessment for underwater noise, habitat modification, and designated critical habitat for Atlantic sturgeon to reflect these changes, as described below. All other assessments of impacts resulting from the Project remain unchanged from what was presented in our June 14, 2017, July 21, 2017, and February 2, 2018 requests for concurrence. FRA has made the determination that the Project, inclusive of the new refinements in design and schedule for in-water work and in consideration of the updated sediment resuspension and acoustic analyses, may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NOAA Fisheries or any critical habitat designated under the ESA of 1973, as amended. More information about the refinements in design and schedule and supporting analyses for this determination is provided below.

Updated Project Design and Schedule for In-Water Work

The area of ground improvement described in previous consultations and in the Project's DEIS comprised modification to the Hudson River bottom, in an area approximately 550 feet long and 120 feet wide (approximately 1.5 acres). The method proposed for the 1.5-acre area was jet grouting, a process in which a combination of cement grout, water, and compressed air at high pressure would mix with and partially replace the soil, resulting in a stronger cemented soil with a consistency equivalent to hard clay (i.e., "soilcrete"). Within that 1.5-acre area, approximately 0.8 acres of soilcrete was proposed to be about level with the surrounding riverbed, while the remaining approximately 0.7-acre portion of soilcrete will be elevated between 1 and 2 feet above the existing mudline.

Based on the results of additional engineering assessments and geotechnical borings conducted in the Hudson River following completion of the DEIS and FRA's previous correspondence with NMFS, the Project Partners are now proposing to harden an area of the river bottom that is approximately 1,200 feet long and 110 feet wide (approximately 3 acres). This is an increase of 1.5 acres over the previously evaluated 1.5-acre area. The Project Partners are also now proposing a technique known as deep soil mixing to harden the soil in this 3-acre area rather than jet grouting. Deep soil mixing is a method in which construction workers use large paddles to mix cement or cement grout with the native soil. Within this 3-acre area, the resulting hardened soil in an area of 270 feet by 110 feet (approximately 0.7 acres) will be 1.5 to 2 feet above the mudline to provide an additional protective layer of hardened soil above the tunnel alignment.

As described in previous correspondence with NMFS and in the DEIS, the in-water work for the Project will be conducted within a cofferdam system to limit disturbance to the surrounding waters. To limit the width of the river within the 3-acre in-water work zone that is enclosed within a cofferdam at any given time, the work will be divided into two stages; Stage 1 and Stage 2 (see **Figure 1**). In-water work will begin at the location of the cofferdam closest to the Manhattan shoreline and move outward towards the 45-foot-deep Federal Navigation Channel. Additionally, as described in the February 2, 2018 letter to NMFS, the cofferdam will be supported by 54-inch diameter steel pipe king piles that will be installed via vibratory hammering; impact hammering will not be used. The area surrounded by the cofferdam will be checked for sturgeon before the deep soil mixing begins. Should sturgeon become entrapped within the cofferdam area, work will cease and NOAA Fisheries will be notified. Also, as described in the February 2, 2018 letter, a turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment resuspension. The cofferdams will be removed once the improved soil has hardened. The number of king piles that will be required will be determined by the final design-build contractor. The proposed modifications do not include changes to the ESA-listed species that are present or the action area except that the size of the area to be affected is now 3 acres instead of 1.5 acres.

In its February 2, 2018 letter to NMFS, FRA requested a modification of the 11/15 to 6/30 no in-water work window to 1/21 to 6/30[1] of each year during construction. NMFS concurred with FRA's determination that this updated schedule, in addition to the design refinements, may affect, but is not likely to adversely affect any species listed as threatened or endangered by NMFS or any critical habitat. FRA is not requesting a change in the modified no in-water work window. Cofferdam installation and removal will still take place during weekday working hours (12 hours per day, 5 days per week), outside of the 1/21 to 6/30 no in-water work window. **Table 1** provides the currently proposed Project schedule.

Table 1
Updated Project Schedule

Activity	Proposed Dates	Duration
Stage 1		
Install cofferdam	7/1/2022 – 10/10/2022	Approximately 14 weeks
Deep soil mixing within cofferdam	10/11/2022 – 6/16/2023	Approximately 36 weeks
Remove cofferdam	7/3/2023 – 8/2/2023	Approximately 4 weeks
Stage 2		
Install cofferdam	10/11/2022 – 1/20/2023	Approximately 14 weeks
Deep soil mixing within cofferdam	1/23/2023 – 9/26/2023	Approximately 35 weeks
Remove cofferdam	9/27/2023 – 10/26/2023	Approximately 4 weeks
Notes: Exact dates are subject to change as final design progresses.		

<u>Updated Effects Analysis</u>

<u>*Habitat Modification*</u>

In the low-cover area where grout will be injected or mixed to form a hard soilcrete, approximately 3 acres of fine-grained silt/clay sediments would no longer provide habitat for infaunal macroinvertebrates, or those that live within the sediment, resulting in a loss

[1] This request to NMFS for a modification of the in-water seasonal timing restriction and associated construction work window was made concurrently via a letter to Louis Chiarella of the NMFS Habitat Conservation Division.

of forage for fish such as shortnose and Atlantic sturgeon. In this area, when construction is complete, the 3 acres of soilcrete would initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete, which would provide some foraging habitat for benthic feeders, such as shortnose and Atlantic sturgeon. About 2.3 acres of the soilcrete will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete in this lower profile area at sedimentation rates typical of the lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates to recolonize on. Therefore, within this 2.3-acre portion of the low-cover area, the modification of the river bottom to achieve the soil improvement necessary to protect the Preferred Alternative would be temporary and the area to be affected is small compared to the available foraging habitat within the action area.

The other 0.7 acres of the soilcrete area will be between 1 and 2 feet above the existing mudline. This elevated portion of the soilcrete would provide habitat for encrusting organisms, which would provide some foraging habitat for fish. However, because it will be higher than the surrounding river bottom, this area may have a lower potential to accumulate sediment that would provide soft-bottom habitat for benthic invertebrates and would not, therefore, provide forage habitat to soft-bottom feeding fish species such as Atlantic sturgeon. As compensation for the change in the nature and elevation of bottom habitat within the elevated 0.7 acres, the Project Sponsor, in cooperation with the other Project Partners, will monitor this area, in coordination with NMFS as well as the United States Army Corps of Engineers and the New York State Department of Environmental Conservation, for five years to assess its recovery as fish foraging habitat and will include the submittal of regular monitoring reports. The Project Sponsor, in cooperation with the other Project Partners, will also monitor the recovery of the remaining 2.3 acres of soilcrete for five years post-construction. The loss of soft-bottom habitat within the 0.7-acre elevated portion of the soilcrete represents a small loss of this type of habitat compared to the available foraging habitat within the action area.

The schedule for pile installation will ensure that migratory pathways are not obstructed for spawning shortnose or Atlantic sturgeon. In compliance with the timing restrictions for in-water work, installation will begin July 1, 2022 for Stage 1 and October 11, 2022 for Stage 2, thereby protecting anadromous species migrating up-river to spawn during the spring and early summer from March 1 through June 30. Removal of the sheet pile, with the use of turbidity curtains, will take place in July through October in 2023. While Atlantic sturgeon migrate upriver to spawning grounds beginning in late April and migrate out of the river by August[2], the cofferdam will encompass 1,200 feet of the river's 4,500-foot width at this location, allowing ample space for Atlantic sturgeon to migrate up and down the river. Therefore, the effects of habitat modification are too small to be meaningfully measured or detected and are insignificant.

Acoustic Analysis

FRA has updated the impact analysis for underwater noise in order to address the larger area that will be occupied by the temporary cofferdams which will extend farther into the Hudson River channel than evaluated in the February 2, 2018 request for concurrence. The

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[2] Fox, D. and K. Hattala, personal communication with NMFS, April 2014; Dovel, W.L. & T.J. Berggren. 1983. Atlantic sturgeon of the Hudson Estuary, New York. New York Fish and Game J. 30: 140–172.

same type of piles as previously evaluated will be used (i.e., 54-inch king piles and steel sheet pile). Estimates of underwater noise levels were conservatively based on the values for 36-inch and 72-inch diameter steel pipe piles, which bound the 54-inch piles in terms of size. The spatial extent of underwater noise associated with each of the biological thresholds for behavioral and physiological injury to fish was estimated using the Simplified Attenuation Formula in the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Acoustics Tool spreadsheet (last updated 9/14/2020). The estimated sound levels during pile driving and distances to each threshold are presented in **Tables 2 through 4**.

Table 2
Proxy Projects for Estimating Underwater Noise

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation Rate (dB/10m)
Not Available	15	24”	AZ Steel Sheet	Vibratory	5
Not Available	5	36”	Steel Pipe	Vibratory	5
Not Available	5	72”	Steel Pipe	Vibratory	5

Table 3
Proxy-Based Estimates for Underwater Noise

Type of Pile	Hammer Type	Estimated Peak Noise Level ($dBSPL_{peak}$)	Estimated Pressure Level ($dB\ SPL_{RMS}$)	Estimated Single Strike Sound Exposure Level (dB SEL)
24” AZ Steel Sheet	Vibratory	175	160	160
36” Steel Pipe	Vibratory	185	175	175
72” Steel Pipe	Vibratory	195	180	180

Table 4
Estimated Distances to Sturgeon Injury and Behavioral Thresholds

Type of Pile	Hammer Type	Distance (m) to 206 dB SPL_{peak}	Distance (m) to 150 dB sSEL (surrogate for 187 dBcSEL injury)[1]	Distance (m) to Behavioral Disturbance Threshold (150 dB SPL_{RMS})
24” AZ Steel Sheet	Vibratory	n/a	30	30
36” Steel Pipe	Vibratory	n/a	60	60
72” Steel Pipe	Vibratory	n/a	70	70

Notes:
[1] As explained in the NMFS GARFO Acoustics Tool: “When the received SEL from an individual pile strike is below a certain level, then the accumulated energy from multiple strikes would not contribute to injury, regardless of how many pile strikes occur. This SEL is referred to as “effective quiet”, and is assumed, for the purposes of this spreadsheet, to be 150 dB re 1µPa sSEL. Effective quiet establishes a limit on the maximum distance from the pile where injury to fishes is expected – the distance at which the single-strike SEL attenuates to 150 dB. Beyond this distance, no physical injury is expected, regardless of the number of pile strikes.”

Exposure to underwater noise levels of 206 dBpeak and 187 cSEL can result in injury to sturgeon. In addition to the "peak" exposure criteria which relates to the energy received from a single pile strike, the potential for injury exists for multiple exposures to noise over a period of time; this is accounted for by the cSEL threshold. The cSEL is not an instantaneous maximum noise level but is a measure of the accumulated energy over a specific period of time (e.g., the period of time it takes to install a pile). When it is not possible to accurately calculate the distance to the 187 dBcSEL isopleth, we calculate the distance to the 150 dBsSEL isopleth. The farther a fish is away from sheet piles being driven, the more strikes it must be exposed to accumulate enough energy to result in injury. At some distance from the pile, a fish is far enough away that, regardless of the number of strikes it is exposed to, the energy accumulated is low enough that there is no potential for injury. For this Project, the distance to the 150 dBsSEL isopleth is no greater than 70 meters. In order to be exposed to potentially injurious levels of noise during installation of the piles, a sturgeon would need to be within 70 meters of the pile being driven to be exposed to this noise for any prolonged time period. This is extremely unlikely to occur as it is expected that sturgeon would modify their behavior at 70 meters from the installed piles and quickly move away from the area before cumulative injury levels are reached.

Behavioral effects, such as avoidance or disruption of foraging activities, may occur in sturgeon exposed to noise above 150 dB RMs. It is expected that underwater noise levels would be below 150 dB RMS at distances beyond approximately 70 meters from the pile being installed. Should sturgeon move into the action area where the 150 dB RMS isopleth extends, it is reasonable to assume that a sturgeon, upon detecting underwater noise levels of 150 dB RMS, will modify its behavior such that it redirects its course of movement away from the ensonified area and therefore, away from the Project site. If any movements away from the ensonified area do occur, it is extremely unlikely that these movements will affect essential sturgeon behaviors (e.g., spawning, foraging, resting, and migration), as the area is not a spawning area, and the Hudson River is sufficiently large enough to allow sturgeon to avoid the ensonified area while continuing to forage and migrate. Given the small distance a sturgeon would need to move to avoid the disturbance levels of noise, any effects will not be able to be meaningfully measured or detected. Therefore, the effects of noise on sturgeon are insignificant.

Critical Habitat for Atlantic Sturgeon

The proposed Project and its associated action area are located within designated Atlantic sturgeon critical habitat (New York Bight DPS, Hudson River Unit). Critical habitat is defined by section 3 of the ESA as "(1) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species (NOAA 2016)."

River features crucial to the reproduction and recruitment in Atlantic sturgeon were considered when determining critical habitat NMFS identified the following physical and biological features (PBFs) as essential to the conservation of Atlantic sturgeon (NMFS 2017):

- PBF #1—Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0 to 0.5 parts per thousand (ppt) range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- PBF #2—Aquatic habitat with gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;
- PBF #3—Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (i) unimpeded movement of adults to and from spawning sites; (ii) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (iii) staging, resting, or holding of subadults or spawning condition adults.
- PBF #4—Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (i) spawning; (ii) annual and interannual adult, subadult, larval, and juvenile survival; and (iii) larval, juvenile, and subadult growth, development, and recruitment (e.g., 13°C to 26°C for spawning habitat and no more than 30°C for juvenile rearing habitat, and 6 milligrams per liter (mg/L) dissolved oxygen (DO) or greater for juvenile rearing habitat.

The Project's action area contains physical and biological features identified under PBFs #2, #3, and #4. Spawning habitat (PBF #1) does not occur in the action area, which is much too far downstream in high salinity waters and does not contain hard substrate. The sections below provide evaluations of potential impacts of the proposed action on each PBF present in the action area.

PBF 2

The Hudson River in the vicinity of the action area is characterized by soft substrate and salinity levels ranging from less than 1 ppt to 30.5 ppt; therefore the Project area contains physical and biological features identified under PBF 2. The deep soil mixing in the low cover area of the Project alignment where ground hardening is required will convert soft substrate to artificial hard bottom in an area encompassing 3 acres (132,000 square feet). Within the 3-acre footprint, approximately 0.68 acres (29,700 square feet) will comprise hardened soil that rises 1.5 to 2 feet above the mudline (the remaining 2.3 acres will be flush with the mudline), which is roughly the same as the 0.7 acres of elevated soilcrete that was previously evaluated. The addition of this hard-bottom area in place of the soft-bottom substrate will modify designated critical habitat for Atlantic sturgeon (juvenile foraging and physiological development) and may temporarily displace them, but this 0.7 acres represents a small area relative to the thousands of acres of available foraging habitat suitable for Atlantic sturgeon within the action area. Over time, sediments will be deposited over the remaining 2.3 acres of soilcrete that will be flush with the mudline at sedimentation rates typical of the lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates to recolonize on. Therefore, the effects to the conservation function of PBF 2 would be too small to be meaningfully measured or detected and are thus insignificant.

PBF 3

Although the action area contains physical and biological features identified under PBF 3, Atlantic sturgeon are not expected to occur in significant numbers at this location. Transient sub-adults may be present as they move through shallower marine waters along the Atlantic coast and adults may be present as seasonal migrants in the deeper waters of the river channel adjacent to the Project site. Given the width of the Hudson River at the action area, the temporary addition of the cofferdams between July 2022 and October 2023 will not add a physical barrier to passage between the river mouth and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults. Additionally, the impact to 3 acres of deep water soft-bottom habitat will not create a physical barrier to passage between the river mouth and spawning sites. Within that area, the 0.68 acres elevated 1.5 to 2 feet above the mudline will be located in waters ranging from 45 to 50 feet deep and also will not result in a physical barrier to fish passage. Sturgeon will have ample space to swim around the temporary structures. Therefore, the effects to the conservation function of PBF 3 would be too small to be meaningfully measured or detected and are thus insignificant.

PBF 4

Temperature, salinity, and oxygen values in the action area provide conditions that could support: annual and interannual adult, subadult, and juvenile survival; and juvenile, and subadult growth, development, and recruitment. Therefore the Project area contains physical and biological features identified under PBF 4. Overwintering juvenile sturgeon are expected to occur much farther upstream in the river compared to where cofferdams will be used; any sturgeon that might occur in this region of the Hudson River would likely be found in the deeper waters of the channel where water temperatures are warmer than those found in the shallower off-channel areas (Bain et al. 2007; NMFS 2017a[3],[4]), where construction is proposed. As the Project activities will only produce low concentrations of total suspended solids of between 5 to 10 mg/L (FHWA 2012[5]), and the effects of sediment resuspension will be minimized through the use of a turbidity curtain the effect on water quality from resuspended sediment will be minimal and temporary. Therefore, the proposed action will have insignificant effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the area. The conversion of 3 acres of soft-bottom habitat to artificial hard-bottom habitat, with a portion elevated above the mudline, will not have significant effects on water flow, dissolved oxygen levels, salinity, or water temperature. Therefore the effects to the conservation function of PBF 4 would be too small to be meaningfully measured or detected and are insignificant.

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[3] Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

[4] National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

[5] Federal Highway Administration (FHWA). 2012. Biological Assessment for the Tappan Zee Pile Installation Demonstration Project. January 2012. 105 pp.

Conclusion

Based on the analysis that all effects of the proposed action when added to the baseline will be insignificant and/or discountable, we have determined that the proposed action is not likely to adversely affect any listed species or critical habitat under NMFS jurisdiction. We have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

If you have questions or require additional information, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

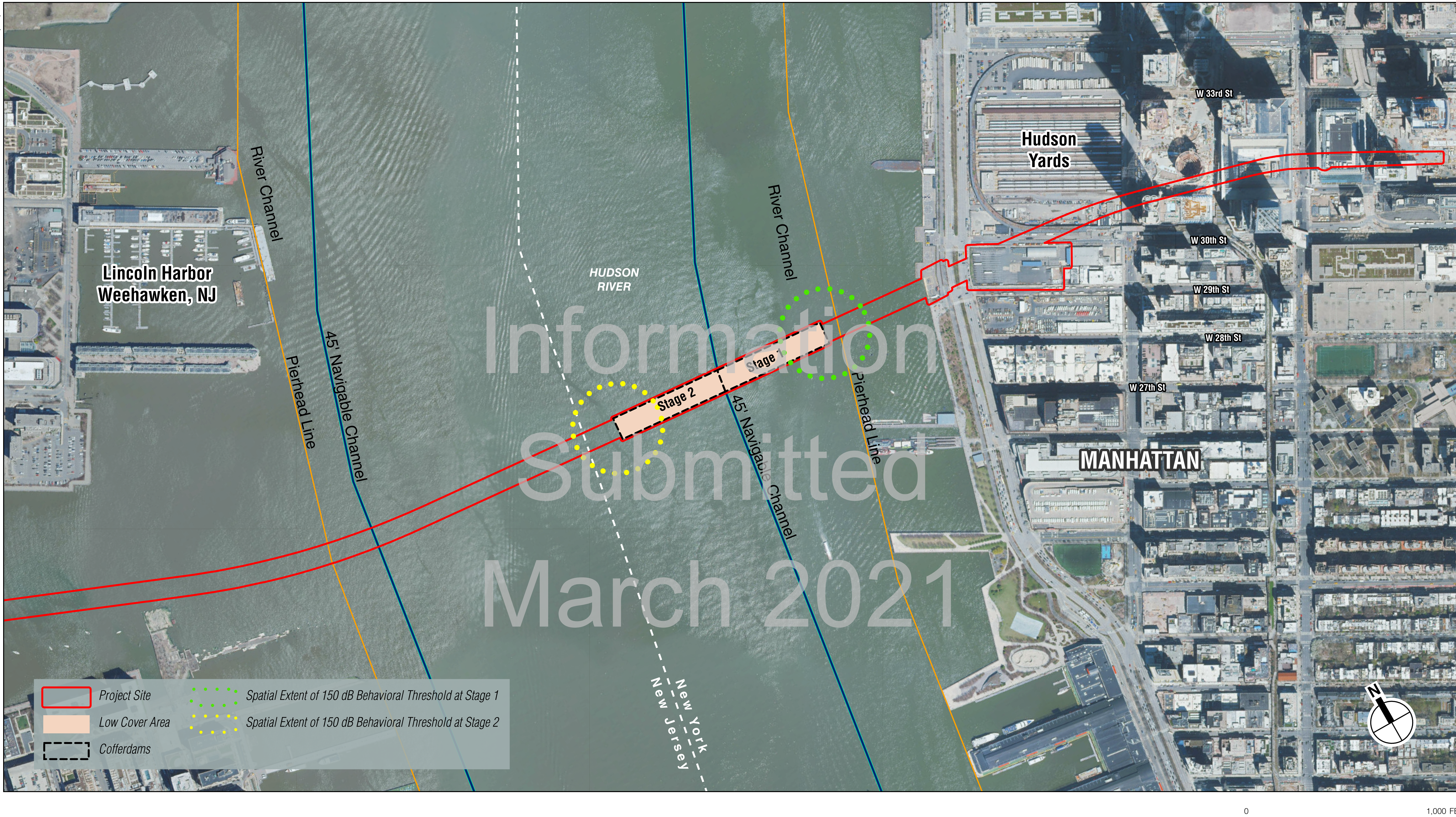
Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl: Figure 1 – Extent of Increased Underwater Noise During Cofferdam Installation

cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT
R. Miranda, USACE
M. Nasim, Amtrak
B. Engle, PANYNJ

2/17/21



HUDSON TUNNEL PROJECT

Extent of Increased Underwater Noise During Cofferdam Installation
Figure 1

Consultation with State and Federal Agencies

United States Fish and Wildlife Service New Jersey Field Office

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Greater Atlantic Region
55 Great Republic Drive
Gloucester, MA 01930

April 2, 2021

Marlys Osterhues
U.S. Department of Transportation
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Re-initiation of Consultation under the Endangered Species Act, Hudson Tunnel Project, Hudson River

Dear Ms. Osterhues:

We have completed our consultation under section 7 of the Endangered Species Act (ESA) in response to your letter received March 19, 2021, regarding the above-referenced proposed project. In your letter, you made the preliminary determination that reinitiation of our previous consultation, dated June 28, 2017, was necessary due to changes in the proposed project that had introduced effects that had not been previously analyzed. You also requested our concurrence that the project, as modified by the described changes, was not likely to adversely affect listed species. Based on the information and analysis you provided, we concur with your determination that reinitiation of consultation is required as a result of the proposed modifications. Furthermore, based on our knowledge, expertise, and your materials, we concur with your conclusion that the proposed action is not likely to adversely affect any National Marine Fisheries Service ESA-listed species or designated critical habitat. Therefore, no further consultation pursuant to section 7 of the ESA is required.

Please refer to our June 28, 2017, concurrence letter to review the clarifications we offered regarding the life stages that are present in the action area. These comments remain relevant to your March 19, 2021, letter as well, and are incorporated into the administrative record by reference. This incorporation by reference also applies to all previously completed analyses and all information contained within the 2017 consultation.

Reinitiation of consultation is required and shall be requested by the federal agency or by us, where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required.

Should you have any questions about this correspondence please contact Edith Carson-Supino at (978) 282-8490 or by email (Edith.Carson-Supino@noaa.gov). For questions related to Essential Fish Habitat, please contact Jessie Murray with our Habitat and Ecosystem Services Division at (732)-872-3116 or by email at Jessie.Murray@noaa.gov.

Sincerely,

Jennifer Anderson

Jennifer Anderson
Assistant Regional Administrator
for Protected Resources

EC: Murray, NMFS/HESD; Castelli, FRA
PCTS: GARFO-2021-00572
File Code: H:\Section 7 Team\Section 7\Non-Fisheries\Federal Railroad\FRA Hudson Tunnel Project\2021 Reinitiation

U.S. Department
of Transportation

Federal Railroad Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

May 11, 2017

Steve Mars
Regional Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
Atlantic Professional Park
4 East Jimmie Leeds Road
Galloway, New Jersey 08205

Re: Request for Concurrence under the Endangered Species, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act for the Hudson Tunnel Project, Secaucus, New Jersey to Manhattan, New York

Dear Mr. Mars:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) are acting as joint lead agencies for the preparation of a Draft Environmental Impact Statement (EIS), in compliance with the National Environmental Policy Act of 1969 (NEPA), for the Hudson Tunnel Project (Project). The FRA has prepared this request for Endangered Species Act (ESA),[1] Migratory Bird Treaty Act of 1918 (MBTA),[2] and Bald and Golden Eagle Protection Act of 1940 (BGEPA)[3] concurrence from your office for the Preferred Alternative for the Project (Preferred Alternative). The Preferred Alternative comprises construction of a new two-track rail tunnel and rehabilitation of the existing passenger rail tunnel beneath the Hudson River between New Jersey and New York Penn Station. The existing passenger rail tunnel, the North River Tunnel, is currently used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service.

FRA has made the determination that the Preferred Alternative may affect, but is not likely to adversely affect, any species listed as threatened or endangered by U.S. Fish and Wildlife Service (USFWS) or any critical habitat designated under the ESA of 1973, as amended. More information about the Project and supporting analysis for this determination is provided below.

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[1] 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.
[2] 40 Stat. 755, as amended; 16 U.S.C. 703-712
[3] 54 Stat. 240, as amended; 16 U.S.C. 668-668c

Proposed Project

The Project is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson Tunnel by tunnel boring machine (TBM); in-water ground improvement over 1.5 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel. Construction activities associated with the new Hudson Tunnel will begin in 2019 and will be completed in 2026. Rehabilitation of the existing tunnel will begin in 2026 and be completed in early 2030.

The USFWS's Information, Planning and Conservation (IPaC) online planning tool indicates that no Federally-listed threatened or endangered species have the potential to occur in the vicinity of the proposed project, and no critical habitats for species under USFWS jurisdiction fall within the project area (**Attachment 1**). Migratory birds and bald eagle, which fall under the jurisdiction of the MBTA and BGEPA, respectively, were identified by the USFWS IPaC resource list as having the potential to be affected by the proposed actions. These species are discussed below.

New Jersey Approach Tracks

The western portion of the new surface alignment from Secaucus to North Bergen will include: construction of a new raised right-of-way (including segments of retained fill, sloped embankment, and viaducts); an adjacent access road in one segment; installation of new tracks and modification of existing tracks; installation of drainage systems; and installation of signals, power supply, and other related rail infrastructure. Construction of the embankment support structures will involve earthmoving and grading, bringing large quantities of earth and gravel, and additional material to allow for compression and settling to adequately support the track system. In areas of retained fill and retained cut, the retaining walls will be installed on foundations supported by deep piles. Two pile-supported bridges will be required, one over Secaucus Road and one over the Conrail and NYS&W tracks. Piles will be installed along the entire New Jersey alignment to support the associated overhead catenary, signals, communications, and other rail systems. Temporary construction staging areas and temporary construction access roads will be required for this work. A construction staging site will be established to the east and west of Tonnelle Avenue in North Bergen, where the alignment of the Preferred Alternative will cross beneath that roadway, and will be used for the construction of the surface tracks and for the tunnel beneath the Palisades. A new 20-foot-wide permanent access road required for emergency responders will be constructed along the south side of the new tracks in the sloped embankment section east of Secaucus Road.

Hudson River Tunnel

The tunnel section of the Preferred Alternative will begin at the western face of the Palisades at a new excavated tunnel portal. The tunnel through the Palisades will consist of two approximately 5,130-foot-long tubes, each constructed by a TBM operating eastward. The initial 50 feet of the tunnel will be constructed using controlled drilling and blasting, to excavate a starter tunnel in which the TBM can launch. Temporary fire-life safety systems will be installed within the new tunnel as it is excavated to protect workers during construction. This will include temporary tunnel ventilation, powered by large fans that will operate continuously during construction activities. Excavated rock and soil will be removed and transferred to the Tonnelle Avenue staging site, and either reused or disposed of at an appropriate off-site location.

A new ventilation shaft and fan plant for the Hudson Tunnel, the "Hoboken shaft site," will be used as a tunnel access point and staging site during construction of both the Palisades and Hudson River sections of the tunnel. The 130-foot-diameter vertical ventilation shaft will be excavated from the surface through earth and rock, and support walls will be installed to support the sides of the excavated area. The rock portion of the shaft and starter tubes at the bottom of the shaft will be excavated using controlled drill and blast. A soft-soil TBM, which will be used to construct the portion of the tunnel beneath the Hudson River, will be launched from the Palisades tunnel. Ground improvement through injection of grout into the soil and voids in the rock will be used to prepare the ground for the TBMs. Once the Hoboken shaft is completed, it will be used as the terminus of the Palisades tunnel. Following completion of the river tunnel, construction of emergency access/egress components of the shaft and the ventilation fan plant building will occur via typical construction methods.

The tunnel beneath Hoboken and the Hudson River will consist of two approximately 7,200-foot-long tubes, each constructed by a TBM operating eastward. Underpinning and ground improvement through jet grout injection will be conducted along affected portions of the alignment in this location. All river tunnel construction work, with the exception of the in-water ground improvement discussed below, will be conducted underground beneath the river bed. Excavated material from the tunnel and cross passages will be removed at the rear of the TBMs and brought out of the tunnel at the Hoboken shaft site.

In-water Ground Improvement

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative. Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an 18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3-4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

Manhattan Shoreline Ground Improvement

The TBMs will continue below the Hudson River bottom, through the foundations of the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue, and to the Manhattan shaft site at Twelfth Avenue, where the TBMs will be removed. In advance of the TBMs passing through, ground improvements will be made in the Manhattan bulkhead area to improve tunneling conditions and avoid cut-and-cover construction through this area. Cement grout will be installed from the land side of the bulkhead, which consists of riprap, cobbles, and timber support piles, to fill large voids and improve stability prior to ground freezing. To allow tunneling beneath the surface, the soft soils in the Manhattan waterfront zone will be treated through ground freezing, a technique that involves installation of a network of underground pipes and then circulation of a cold liquid through the pipe network until the ground around the pipes freezes solid. The pipes will be installed vertically and diagonally to minimize surface disturbance. Freeze plants, typically housed within one or two work trailers, will be temporarily located on the nearby Twelfth Avenue staging site and/or within the West 30th Street Heliport.

Manhattan Shaft and Fan Plant Sites and Track Connections

The Manhattan shaft site is located on the east side of Twelfth Avenue between West 29th and West 30th Streets. A vertical shaft will be excavated from the surface to the depth of the new tunnel, and a slurry plant will be located on the site to support the creation of slurry walls to support the shaft. Once the ventilation shaft is completed, the site will be used for staging of the tunnel segment from the shaft to the median of Twelfth Avenue, which will be conducted via sequential excavation method (SEM). Cut-and-cover construction will be required to cross West 30th Street and Tenth Avenue, near the connection to existing PSNY tracks. A fan plant to provide ventilation for the new tunnel segment from the Twelfth Avenue shaft to the new Manhattan portal at Tenth Avenue will be constructed near Tenth Avenue within an existing Amtrak easement area above the tracks of the A Yard and beneath the Lerner Building. Minor excavation and track modifications will be necessary to connect the Preferred Alternative to the existing track system at PSNY.

North River Tunnel Rehabilitation

Once construction of both tubes of the new tunnel is complete and Amtrak and NJ TRANSIT services are shifted to the new tunnel, rehabilitation of the North River Tunnel will begin in one tube at a time. The Tonnelle Avenue staging area will be used to transport debris and construction materials. Rehabilitation work will include reconstruction of the bench walls and track system; cabling work in the duct banks, along the tunnel crown, and above the bench walls; and any necessary work to address cracking and spalling on the interior face of the tunnel wall. Work will begin at the Manhattan end of the tunnel and move westward toward the portal in North Bergen. Virtually all of this work will occur underground, with only the materials delivery and debris removal being visible at the Tonnelle Avenue staging site. Upon completion of all rehabilitation activities, the rehabilitated tube will be recommissioned and returned to active rail service, and rehabilitation activities in the second tube will commence.

__Compliance__

Endangered Species Act – According to the USFWS IPaC resource list (**Attachment 1**), there are no threatened or endangered species or critical habitat that have the potential to occur in the vicinity of the proposed project. Therefore, FRA has determined that the proposed project will have no impact on Federally-listed threatened or endangered species or critical habitat under the jurisdiction of USFWS.

Migratory Bird Treaty Act – According to the USFWS IPaC resource list, there are a number of migratory birds of concern that could potentially be affected by the proposed project, as presented in **Table 1**, below. These species are identified as having breeding, wintering, migrating, or year-round habitat in the study area (see **Attachment 1**). No peregrine falcon nests were identified within the vicinity of the project site (NJDEP 2016).

Table 1
Migratory Birds of Concern Listed in USFWS IPaC Resource List

American oystercatcher (*Haematopus palliatus*)	Peregrine falcon (*Falco peregrinus*)
American bittern (*Botaurus lentiginosus*)	Pied-billed grebe (*Podilymbus podiceps*)
Black skimmer (*Rynchops niger*)	Prairie warbler (*Setophaga discolor*)
Black-billed cuckoo (*Coccyzus erythropthalmus*)	Purple sandpiper (*Calidris maritima*)
Blue-winged warbler (*Vermivora cyanoptera*)	Red knot (*Calidris canutus rufa*)
Canada warbler (*Cardellina canadensis*)	Rusty blackbird (*Euphagus carolinus*)
Cerulean warbler (*Setophaga cerulea*)	Saltmarsh sparrow (*Ammodramus caudacutus*)
Fox sparrow (*Passerella iliaca*)	Seaside sparrow (*Ammodramus maritimus*)
Golden-winged warbler (*Vermivora chrysoptera*)	Short-eared owl (*Asio flammeus*)
Gull-billed tern (*Gelochelidon nilotica*)	Snowy egret (*Egretta thula*)
Hudsonian godwit (*Limosa haemastica*)	Upland sandpiper (*Bartramia longicauda*)
Kentucky warbler (*Geothlypis formosa*)	Willow flycatcher (*Empidonax traillii*)
Least bittern (*Ixobrychus exilis*)	Wood thrush (*Hylocichla mustelina*)
Least tern (*Sternula antillarum*)	Worm eating warbler (*Helmitheros vermivorum*)
Loggerhead shrike (*Lanius ludovicianus*)	

In order to minimize impacts to migratory birds with the potential to breed in the vicinity of the proposed project, vegetation clearing and/or initial placement of fill material will not occur in the primary breeding period for most bird species (April through July) and will instead occur between October and March (i.e., prior to or after the breeding season), to prevent birds from attempting to breed where additional construction activity would later occur. Any timing restrictions or other potential conditions will be imposed as a condition of the New Jersey Department of Environmental Protection (NJDEP) permits anticipated for project implementation. Noise generated during construction of the proposed project will be temporary and intermittent, and as such, will not likely have long-term or adverse effects to migratory birds potentially occurring in the area. Wildlife communities, including birds, have been established under existing conditions with visual and auditory disturbances associated with urban environments. Construction activities have the potential to temporarily displace individuals of some species from the immediate vicinity of the activity, however, construction activities are not expected to increase disturbance levels to the extent that these species would abandon the area altogether.

For the reasons presented above, FRA has determined that the project may affect, but is not likely to adversely affect, migratory birds or their habitat.

Bald and Golden Eagle Protection Act – The bald eagle (*Haliaeetus leucocephalus*) was identified by the USFWS IPaC resource list as having the potential to be affected by the proposed project. Based on correspondence with New Jersey Natural Heritage Program on October 27, 2016, and with New York Natural Heritage Program on November 10, 2016, no nesting sites have been identified as occurring in the project vicinity. Any temporary loss of foraging habitat during construction of the proposed project will not adversely affect bald eagles, as any individuals that may be present in the area would be expected to move to other similar available foraging habitat in the vicinity of the project site. Therefore, FRA has determined that the project may affect, but is not likely to adversely affect, bald eagles or their habitat.

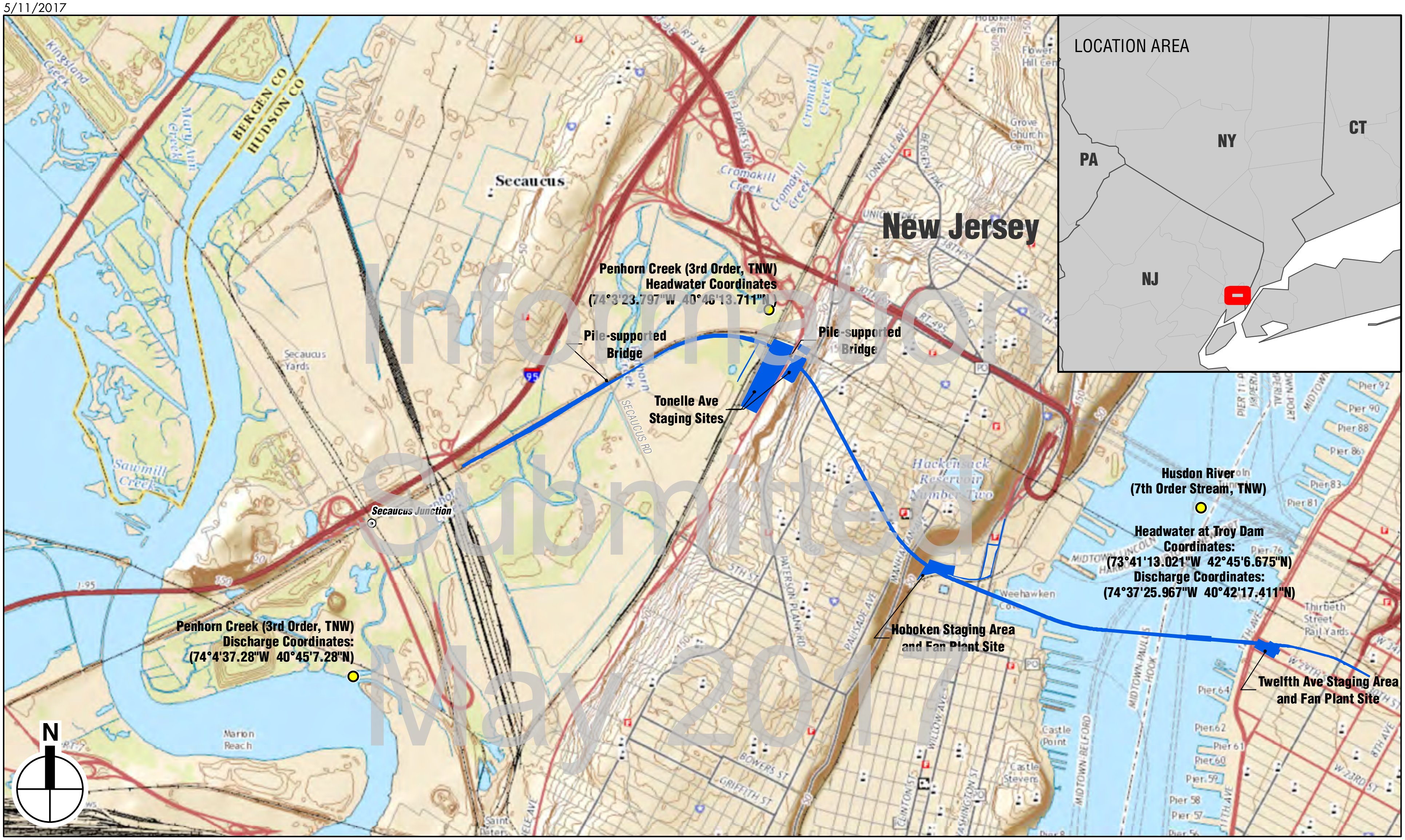
If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl (2)
cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT

5/11/2017



Project Construction and Staging Areas

0 5,000 FEET

HUDSON TUNNEL PROJECT

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

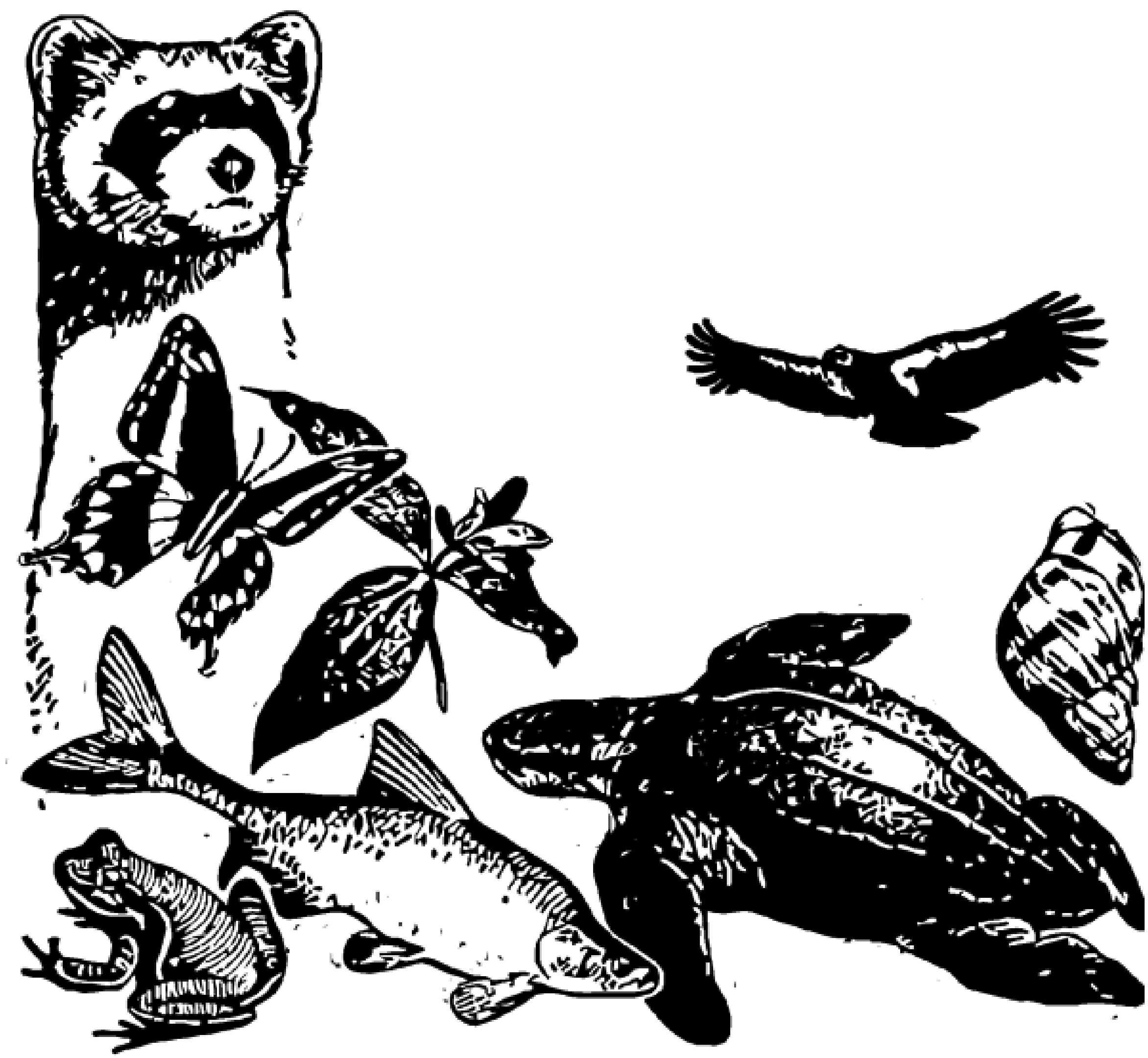
U.S. Fish & Wildlife Service

Hudson Tunnel

IPaC Trust Resources Report

Generated October 12, 2016 10:02 AM MDT, IPaC v3.0.9

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

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U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

Hudson Tunnel

LOCATION

New Jersey and New York

IPAC LINK

https://ecos.fws.gov/ipac/project/ANSAT-3O2HJ-BTLFT-DPOMT-UORXPI

U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

New Jersey Ecological Services Field Office
927 North Main Street, Building D
Pleasantville, NJ 08232-1454
(609) 646-9310

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967
(631) 286-0485

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

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Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

There are no endangered species in this location

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

American Oystercatcher Haematopus palliatus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black Skimmer Rynchops niger — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
On Land Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
On Land Season: Breeding

Cerulean Warbler Dendroica cerulea — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — Bird of conservation concern
On Land Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G4

Gull-billed Tern Gelochelidon nilotica — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JV

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
At Sea Season: Migrating

Kentucky Warbler Oporornis formosus — Bird of conservation concern
On Land Season: Breeding

Least Bittern Ixobrychus exilis
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Least Tern Sterna antillarum — Bird of conservation concern
On Land Season: Breeding

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Peregrine Falcon Falco peregrinus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
On Land Season: Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
On Land Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
On Land Season: Wintering

Red Knot Calidris canutus rufa — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DM

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
On Land Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus — Bird of conservation concern
On Land Season: Breeding

Seaside Sparrow Ammodramus maritimus — Bird of conservation concern
On Land Season: Year-round

Short-eared Owl Asio flammeus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula — Bird of conservation concern
On Land Season: Breeding

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC

Willow Flycatcher Empidonax traillii — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
On Land Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
On Land Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Estuarine And Marine Deepwater

E1UBL
E1UBL6x

Estuarine And Marine Wetland

E2EM5P
E2EM5P6

E2EM5P6d
E2EM5Pd

Freshwater Pond

PUBHx

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

Sandy Collins <scollins@akrf.com>

FW: Hudson Tunnel Project: preliminary draft DEIS for review

From: Mars, Steve [mailto:steve_mars@fws.gov]
Sent: Friday, May 12, 2017 11:45 AM
To: Castelli, Amishi (FRA)
Cc: rpalladino@njtransit.com; Popowski, Ron; Steve Sinkevich
Subject: Re: Hudson Tunnel Project: preliminary draft DEIS for review

The U.S. Fish and Wildlife Service (Service) New Jersey Field Office (NJFO) offers the following comments for Project related activities that occur in New Jersey. Additional comments from the New York Field Office of the Service (for Project related activities occurring in New York) may also be forthcoming.

The NJFO concurs that the project will not adversely affect a listed species under Service's jurisdiction in New Jersey. The NJFO recommends that no tree clearing occur from March 15 to September 30 to protect nesting migratory birds in the Project area that are protected under the Migratory Bird Treaty Act. The applicant should demonstrate that they have adhered to the sequencing protocols of the Clean Water Act (avoidance, minimization, and compensation - 40 CFR Part 230 "*Guidelines for Specification of Disposal Sites for Dredged of Fill Material*") as they consider selection of the preferred Project alternative. All unavoidable impacts to the aquatic environment should be compensated for in accordance with the Final Rule: Mitigation for Losses of Aquatic Resources, Department of Defense and the Environmental Protection Agency, April 10, 2008 (Federal Register Vol. 73, No 70: pp. 19594-19705).

Please contact Steven Mars, Senior Biologist at 609-382-5267 if you require additional information on this matter.

Steven Mars

USFWS/NJFO

4 East Jimmie Leeds Road

Galloway, NJ 08205

On Thu, May 4, 2017 at 7:54 AM, Castelli, Amishi (FRA) <Amishi.Castelli@dot.gov> wrote:

Good morning,

The FRA and NJ TRANSIT are pleased to provide a preliminary draft of the Draft Environmental Impact Statement (DEIS) for the Hudson Tunnel Project for participating and cooperating agency review. You may find background on the project, the proposed action, and the preferred alternative below. Please note that this administrative review draft is still a draft in progress and is not for public distribution. Ongoing work and feedback from agencies will result in revisions to this document before it is released.

FRA looks forward to receiving your comments on the sections pertaining to resources under your agency's jurisdiction. As you are aware, the schedule for the Hudson Tunnel Project is accelerated; as such, we respectfully request your comments by Thursday, May 25, 2017. You may submit your comments directly to me and/or RJ Palladino (rpalladino@njtransit.com or 973-491-7791) at NJ TRANSIT via email. All comments received will be evaluated as the Draft EIS is finalized.

Please feel free to contact me or RJ if you have any questions or need any other information.

Best,

Amishi

PROJECT BACKGROUND

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) are preparing an Environmental Impact Statement (EIS) to evaluate the Hudson Tunnel Project (the Proposed Action), pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.), the Council on Environmental Quality NEPA implementing regulations (40 CFR 1500-1508), and FRA NEPA procedures (64 FR 28545, May 26, 1999, as updated in 78 FR 2713, January 14, 2013).

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The Notice of Availability of the Draft Environmental Impact Statement for the Hudson Tunnel Project is anticipated for June 30, 2017 and will begin a public comment period of no less than 45 days and include public hearings on the DEIS in both New York and New Jersey.

Amishi Castelli, Ph.D.

Environmental Protection Specialist

U.S Department of Transportation, Federal Railroad Administration

Office of Program Delivery, Environment and Corridor Planning Division (RPD-13)

One Bowling Green, Suite 429

New York, NY 10004-1415

617-431-0416

Sandy Collins <scollins@akrf.com>

FW: Hudson Tunnel Project: revisions to impacts analysis

From: Castelli, Amishi (FRA)
Sent: Tuesday, February 06, 2018 12:32 PM
To: Mars, Steve <steve_mars@fws.gov>
Cc: rpalladino@njtransit.com; Popowski, Ron <ron_popowski@fws.gov>; Steve Sinkevich <steve_sinkevich@fws.gov>
Subject: RE: Hudson Tunnel Project: revisions to impacts analysis

Dear Steve,

I hope this note finds you well. As you may recall, FRA (in coordination with NJ TRANSIT) requested concurrence from the USFWS under Section 7 of the ESA, and review under the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, for the Hudson Tunnel Project (Project) on May 11, 2017. On May 12, 2017, you responded via email (see chain below) that USFWS New Jersey Field Office concurred that the project will not adversely affect a listed species under the Service's jurisdiction in New Jersey. You recommended that no tree clearing occur from March 15 to September 30 to protect nesting migratory birds in the project area that are protected under the Migratory Bird Treaty Act.

The purpose of this communication now is to update you on design advancements that have occurred since our initial consultation and subsequent evaluations that were presented in the Draft EIS last summer. Since submission of the previous requests for concurrence, FRA has refined the design for the portion of the surface alignment in the New Jersey Meadowlands (i.e., between Secaucus Road and the Conrail/ NYSW rail corridor). The portion of the surface alignment previously proposed to be supported by a sloped embankment would now be supported on a viaduct over wetlands within the Meadowlands. This design reduces the permanent impacts to wetlands from approximately 7 acres to 4 acres but requires additional pile driving within the Meadowlands. As recommended by the USFWS, vegetation removal within the project site will be conducted outside of the breeding season (October to March 14) to avoid direct impacts to birds protected under the Migratory Bird Treaty Act but pile driving and other construction activities will occur in the Meadowlands during the breeding season.

We have revised the evaluation of temporary impacts to breeding birds in the EIS to address the potential for the additional pile driving within the Meadowlands to result in indirect impacts on breeding birds, and would welcome your input on our conclusions. We found that birds breeding near the project site will experience construction noise disturbance, but any individual birds of species that are intolerant of the disturbance would distance themselves from the noise and utilize other portions of the marsh contiguous with the project area. The noisiest activity, pile driving, will only have the potential to span one breeding season. Therefore, we have concluded that the additional pile driving in the Meadowlands would not alter the conclusion we'd presented in the Draft EIS that temporary impacts to breeding birds due to construction activities would not be significant.

Of the 29 migratory bird species of conservation concern listed on the IPaC report for the project and included in our May 11, 2017, consultation request, only two—– the seaside sparrow and saltmarsh sparrow— are considered to have the potential to breed near the project site on the basis of their habitat associations, geographic range within New Jersey, listing as a breeding bird of the Meadowlands by the New Jersey Sports and Exposition Authority, and records of the New Jersey Natural Heritage Program. Both are very uncommon breeding birds of the Meadowlands and prefer marshes dominated by saltmarsh cordgrass, unlike the phragmites-dominated marsh surrounding the project site. Neither species is therefore likely to occur near the project site. Nevertheless, much of the marsh surrounding the project site would be unaffected by construction noise and remain available to any seaside or saltmarsh sparrows seeking to nest in the area. Therefore we conclude that construction activities would not adversely affect these two species.

As mentioned above, any comments FWS may have on our conclusions regarding impacts to birds protected under the Migratory Bird Treaty Act are welcome – we'd look to incorporating any such comments into the Final EIS we are currently developing. (As an FYI and heads up, we will also be distributing a preliminary draft of the Final EIS to all participating agencies, including FWS, shortly....that review would give you another chance to review the construction changes, our analyses, and our conclusions).

Please contact me with any questions.

Best,

Amishi

Amishi Castelli, Ph.D.

Environmental Protection Specialist

U.S Department of Transportation, Federal Railroad Administration

Office of Program Delivery, Environment and Corridor Planning Division (RPD-13)

One Bowling Green, Suite 429

New York, NY 10004-1415

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Steven Mars

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The files associated with this document can be accessed at:

[redacted]

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Amishi Castelli, Ph.D.

Environmental Protection Specialist

U.S Department of Transportation, Federal Railroad Administration

Office of Program Delivery, Environment and Corridor Planning Division (RPD-13)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967-2258
Phone: (631) 286-0485 Fax: (631) 286-4003

In Reply Refer To: April 16, 2021
Consultation Code: 05E1LI00-2021-SLI-0484
Event Code: 05E1LI00-2021-E-01138
Project Name: Hudson Tunnel 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 ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system 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:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

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 Tracking Number 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:

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967-2258
(631) 286-0485

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
(609) 646-9310

Project Summary

Consultation Code:	05E1LI00-2021-SLI-0484
Event Code:	05E1LI00-2021-E-01138
Project Name:	Hudson Tunnel Project
Project Type:	TRANSPORTATION

Project Description: The Hudson Tunnel Project (Project) is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY). It will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson River Tunnel by tunnel boring machine (TBM); staging and construction of a ventilation shaft and fan plant in Hoboken, NJ; in-water ground improvement over 3 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel.

Major components of the Project will include:

• Two new surface tracks parallel to the south side of the NEC beginning at a realigned Allied Interlocking in Secaucus , New Jersey just east of NJ TRANSIT’s Secaucus Junction Station. The eastern portion of these tracks where the tracks deviate from the NEC will be accessible for maintenance via new gravel access road. The new Hudson River Tunnel with two tracks in separate tubes beneath the Palisades and the Hoboken waterfront area east of the Palisades, continuing beneath the Hudson River to Manhattan. In New Jersey, the tunnel will begin at a portal in the western slope of the Palisades, just east of Tonnelle Avenue (US Routes 1 and 9). The two new tracks will continue through the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue (Route 9A) to meet the underground Hudson Yards Right-of-Way Preservation Project being developed by Amtrak beneath the Hudson Yards overbuild project at the Western and Eastern Rail Yards in Manhattan.

• Two new tracks and associated rail systems to be added by the Project to the Hudson Yards Right-of-Way Preservation Project.

• Extension of the tunnel past the Hudson Yards Right-of-Way Preservation Project beneath Tenth Avenue to a tunnel portal east of Tenth Avenue, within the complex of tracks located beneath the existing building that spans the tracks on the east side of Tenth Avenue (450 West 33rd Street). The new tunnel portal will be adjacent to the tunnel portals

for Amtrak's Empire Line and for the North River Tunnel.
• Track connections east of Tenth Avenue to the existing approach tracks into PSNY.
• A ventilation shaft and associated fan plant building in Hoboken, New Jersey.
• A ventilation shaft and fan plant building near Twelfth Avenue between West 29th and 30th Streets (Block 675) in Manhattan.
• A fan plant beneath or near the building at 450 West 33rd Street at Tenth Avenue, which sits above the rail right-of-way.
• Rehabilitation of the existing North River Tunnel.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.75997705,-74.01740866040885,14z

Counties: New Jersey and New York

Endangered Species Act Species

There is a total of 0 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.

Critical habitats

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
Phone: (609) 646-9310 Fax: (609) 646-0352
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

In Reply Refer To: April 16, 2021
Consultation Code: 05E2NJ00-2021-SLI-0977
Event Code: 05E2NJ00-2021-E-02321
Project Name: Hudson Tunnel 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 that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*)

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

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:

New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
(609) 646-9310

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967-2258
(631) 286-0485

Project Summary

Consultation Code:	05E2NJ00-2021-SLI-0977
Event Code:	05E2NJ00-2021-E-02321
Project Name:	Hudson Tunnel Project
Project Type:	TRANSPORTATION

Project Description: The Hudson Tunnel Project (Project) is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY). It will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson River Tunnel by tunnel boring machine (TBM); staging and construction of a ventilation shaft and fan plant in Hoboken, NJ; in-water ground improvement over 3 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel.

Major components of the Project will include:

• Two new surface tracks parallel to the south side of the NEC beginning at a realigned Allied Interlocking in Secaucus , New Jersey just east of NJ TRANSIT’s Secaucus Junction Station. The eastern portion of these tracks where the tracks deviate from the NEC will be accessible for maintenance via new gravel access road. The new Hudson River Tunnel with two tracks in separate tubes beneath the Palisades and the Hoboken waterfront area east of the Palisades, continuing beneath the Hudson River to Manhattan. In New Jersey, the tunnel will begin at a portal in the western slope of the Palisades, just east of Tonnelle Avenue (US Routes 1 and 9). The two new tracks will continue through the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue (Route 9A) to meet the underground Hudson Yards Right-of-Way Preservation Project being developed by Amtrak beneath the Hudson Yards overbuild project at the Western and Eastern Rail Yards in Manhattan.

• Two new tracks and associated rail systems to be added by the Project to the Hudson Yards Right-of-Way Preservation Project.

• Extension of the tunnel past the Hudson Yards Right-of-Way Preservation Project beneath Tenth Avenue to a tunnel portal east of Tenth Avenue, within the complex of tracks located beneath the existing building that spans the tracks on the east side of Tenth Avenue (450 West 33rd Street). The new tunnel portal will be adjacent to the tunnel portals

for Amtrak’s Empire Line and for the North River Tunnel.
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• A ventilation shaft and associated fan plant building in Hoboken, New Jersey.
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• A fan plant beneath or near the building at 450 West 33rd Street at Tenth Avenue, which sits above the rail right-of-way.
• Rehabilitation of the existing North River Tunnel.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.75997705,-74.01740866040885,14z

Counties: New Jersey and New York

Endangered Species Act Species

There is a total of 0 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.

Critical habitats

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

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31

NAME	BREEDING SEASON
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler *Vermivora pinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Jun 30
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Cerulean Warbler *Dendroica cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 28 to Jul 20
Clapper Rail *Rallus crepitans* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 10 to Oct 31
Dunlin *Calidris alpina arcticola* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere

NAME	BREEDING SEASON
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Kentucky Warbler *Oporornis formosus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Least Tern *Sterna antillarum* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 20 to Sep 10
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds elsewhere
Nelson's Sparrow *Ammodramus nelsoni* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Purple Sandpiper *Calidris maritima* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Red-throated Loon *Gavia stellata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

NAME	BREEDING SEASON
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Seaside Sparrow *Ammodramus maritimus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 20
Semipalmated Sandpiper *Calidris pusilla* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Snowy Owl *Bubo scandiacus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Whimbrel *Numenius phaeopus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

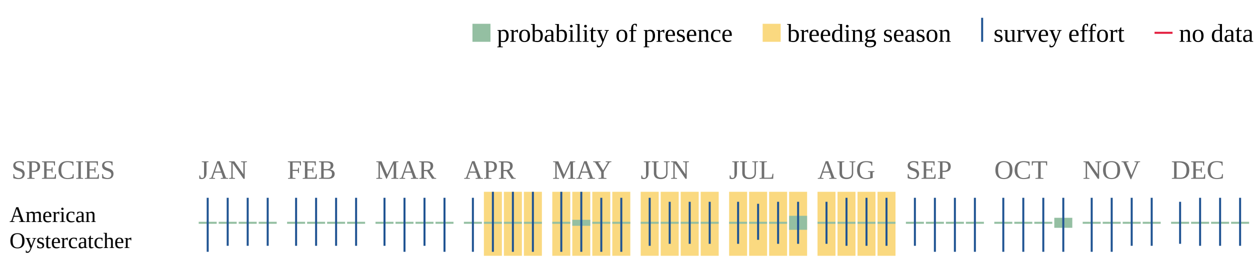
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

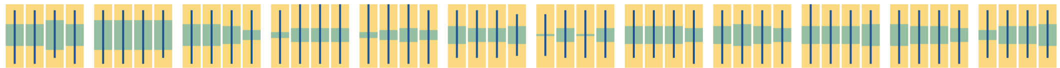
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

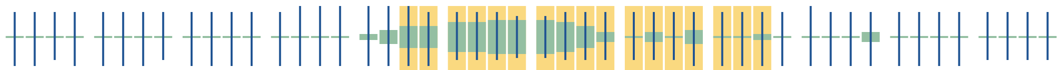


BCC Rangewide
(CON)

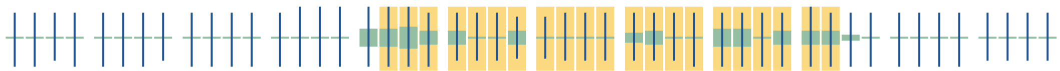
Bald Eagle
Non-BCC
Vulnerable



Black Skimmer
BCC Rangewide
(CON)

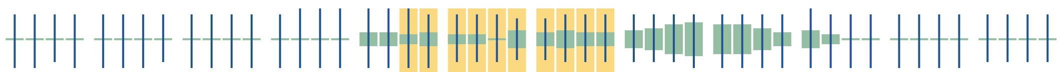


Black-billed
Cuckoo
BCC Rangewide
(CON)

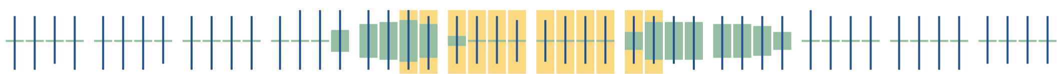


Blue-winged
Warbler
BCC - BCR

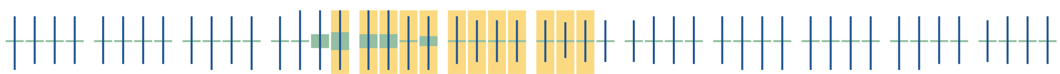
Bobolink
BCC Rangewide
(CON)



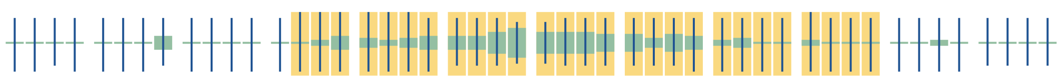
Canada Warbler
BCC Rangewide
(CON)



Cerulean Warbler
BCC Rangewide
(CON)

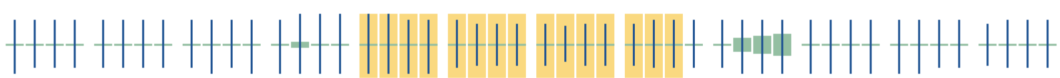


Clapper Rail
BCC - BCR

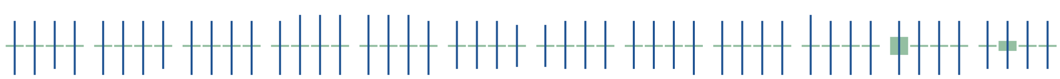


Dunlin
BCC - BCR

Eastern Whip-poor-will
BCC Rangewide
(CON)

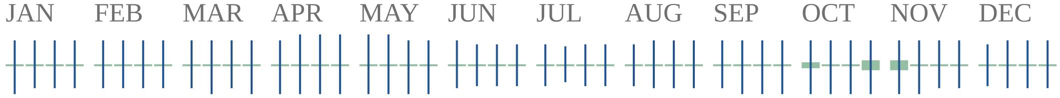


Evening Grosbeak
BCC Rangewide
(CON)

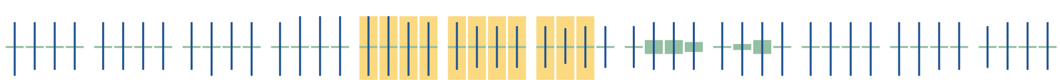


SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

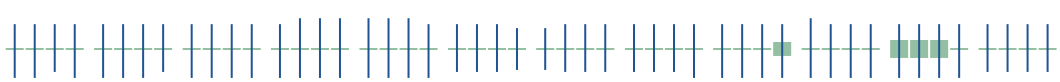
Golden Eagle
Non-BCC
Vulnerable



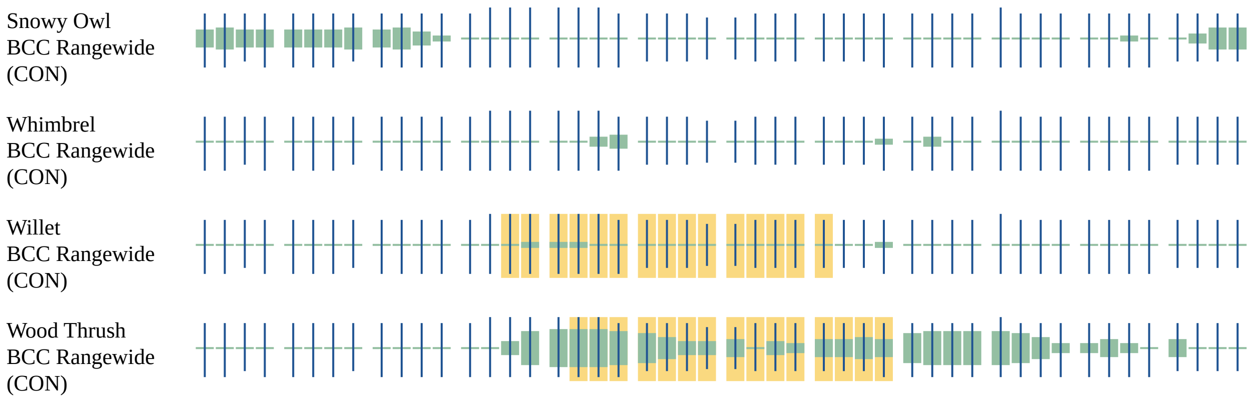
Golden-winged
Warbler
BCC Rangewide
(CON)



Hudsonian Godwit
BCC Rangewide
(CON)




Kentucky Warbler
BCC Rangewide
(CON)
Least Tern
BCC - BCR
Lesser Yellowlegs
BCC Rangewide
(CON)
Long-eared Owl
BCC Rangewide
(CON)
Nelson's Sparrow
BCC Rangewide
(CON)
Prairie Warbler
BCC Rangewide
(CON)
Prothonotary
Warbler
BCC Rangewide
(CON)
Purple Sandpiper
BCC Rangewide
(CON)
Red-headed
Woodpecker
BCC Rangewide
(CON)
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Red-throated Loon
BCC Rangewide
(CON)
Ruddy Turnstone
BCC - BCR
Rusty Blackbird
BCC Rangewide
(CON)
Seaside Sparrow
BCC Rangewide
(CON)
Semipalmated
Sandpiper
BCC Rangewide
(CON)
Short-billed
Dowitcher
BCC Rangewide
(CON)



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

ESTUARINE AND MARINE DEEPWATER

- E1UBLx6
- E1UBLx
- E1UBL

ESTUARINE AND MARINE WETLAND

- E2EM1/SS1P6
- E2EM5P
- E2EM5P6
- E2EM5Pd6
- E2EM5Pd

FRESHWATER EMERGENT WETLAND

- PEM5E
- PEM5R

FRESHWATER POND

- PUBHx

RIVERINE

- R5UBFx
- R5UBH

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, New Jersey 08205
Tel: 609/646 9310
www.fws.gov/northeast/njfieldoffice/

In reply refer to:
2021-CPA-0014

Amishi Castelli, Ph.D.
U.S Department of Transportation, Federal Railroad Administration
Office of Program Delivery, Environment and Corridor Planning Division (RPD-13)
One Bowling Green, Suite 429
New York, New York 10004-1415

Subject: Federal Railroad Administration and New Jersey Transit Corporation: Hudson Tunnel Project: revisions to impacts analysis; Hudson River, Hudson County, New Jersey and New York County, New York.

Dear Ms. Castelli:

The U.S. Fish and Wildlife Service (Service) is in receipt of your email dated April 14, 2021 which detailed further design modifications and mitigative measures that the Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJT) are proposing to implement in the final design of the subject project.

The Service's New Jersey Field Office provided previous preliminary comments on the project on April 6, 2021 and May 12, 2018 in which we recommended a time-of-year restriction for all vegetation clearing to protect any nesting birds protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712) and for the FRA and NJT to demonstrate compliance with Section 404(b)(1) Guidelines of the Clean Water Act (CWA) (33 U.S.C. 403). In addition the Service recommended that the applicant provide sufficient compensatory mitigation to offset any unavoidable adverse impacts to the aquatic environment.

The following comments are specific to those portions of the project that are in the area of operation of the New Jersey Field Office. Additional comments for project related impacts in the State of New York may be forthcoming from the New York Field Office (copied here).

AUTHORITY

The following comments are provided under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), National Environmental Policy Act (83 Stat. 852, as amended; 42 U.S.C. 4321 *et seq*) (NEPA), the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), the Bald and Golden Eagle Protection Act (BGEPA) (16

Migratory Birds

The applicant continues to propose a time-of-year restriction for all vegetation clearing from March 15 thru September 30 of any given year to protect migratory birds that may be utilizing the project area. The Service appreciates the FRA and NJT's commitment to avoid and minimize potential impacts to any migratory birds found in the project area and concur in the use of this time-of-year construction window.

Clean Water Act

The applicant has reduced the original footprint of potential impacts to wetlands and Waters of the U.S from 7 acres to the current 4 acres. The Service continues to recommend additional reductions to impacts to the aquatic environment and looks forward to reviewing a comprehensive mitigation plan in accordance with the 2008 Mitigation Rule for all aquatic impacts that could not be avoided.

The Service also recommends that for areas of Penhorn Creek that will be relocated/dredged/excavated that an investigation be undertaken to determine if any contaminants of concern (*i.e.*, mercury, dioxin, or PCB's) will be encountered with the newly proposed activities. Further, the Service recommends that any contaminated sediments encountered be removed from the aquatic environment and/or are sufficiently capped *(i.e.*, up to two feet of clean material) at the proposed finished grade to avoid or minimize any bio-accumulative impacts of organisms found in Penhorn Creek.

The Service also recommends the FRA and NJT determine the functional capacity of the tidal gate that is being replaced. The Service is concerned that tidal waters and organisms may be passing the existing tidal gate and that improving its functional capacity may prohibit organisms from passing the structure in the future.

In conclusion, the Service appreciates the opportunity to comment on this Project. These comments are offered in the spirit of interagency cooperation and to assist the FRA and NJT in best serving the public's interest. Please contact Ron Popowski at Ron_Popowski@fws.gov should you have any question regarding the Service's review of this Project.

Sincerely,

Field Supervisor
Eric Schrading

Cc: NYFO

Consultation with State and Federal Agencies

New Jersey Department of Environmental Protection

Chris Christie, Governor
Kim Guadagno, Lieutenant Governor
Richard T. Hammer, Commissioner
Steven H. Santoro, Executive Director

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

November 27, 2017

Ms. Diane Dow
Director, Land Use Regulation Program
New Jersey Department of Environmental Protection
401 East State Street, 7th Floor
Mail Code: 401-07B
P.O. Box 420
Trenton, New Jersey 08625-0420

Reference: Hudson Tunnel Project
Town of Secaucus, Township of North Bergen, City of Union City, and City of Hoboken, Hudson County, New Jersey and Borough of Manhattan, New York County, New York

Dear Ms. Dow:

Amtrak, in partnership with NJ TRANSIT and the Port Authority of New York and New Jersey, is proposing the Hudson Tunnel Project to preserve the current functionality of the Northeast Corridor (NEC) Hudson River rail crossing and strengthen the resilience of the NEC while maintaining uninterrupted commuter and intercity rail service. The project will involve construction of a new rail tunnel under the Hudson River, and related railroad infrastructure in New Jersey and New York to connect the new rail tunnel to the existing NEC, and rehabilitation of the existing North River Tunnel beneath the Hudson River. Specifically, the proposed action consists of providing additional tracks adjacent to the Amtrak NEC from the area of County Road near Allied Interlocking to Tonnelle Avenue in North Bergen. At Tonnelle Avenue, a new rail tunnel would be constructed eastward, passing below the Palisades, the Hudson River, and the west side of Manhattan to Penn Station New York.

The purpose of the Hudson Tunnel Project is to: 1) improve service reliability and upgrade existing tunnel infrastructure; 2) maintain existing NEC service, capacity, and functionality by ensuring North River Tunnel rehabilitation occurs as soon as possible; 3) strengthen the NEC's resiliency to provide reliable service across the Hudson River, facilitating long-term infrastructure maintenance and enhancing operational flexibility; 4) not preclude future trans-Hudson rail capacity expansion projects; and 5) minimize impacts on the natural and built environment.

In the Meadowlands, the proposed project alignment is situated south of the existing NEC tracks. As the alignment heads east to the new portal beneath the Palisades, it veers south of the NEC to avoid Amtrak Substation 42. As a consequence, the alignment will impact the northern portion of the New York, Susquehanna & Western (NYSW) Railway Wetland Mitigation Site located in North Bergen adjacent to their railroad. This wetland mitigation site was the result of a Settlement Agreement between NYSW and the United States Army Corps of

Engineers (USACE) regarding USACE Permit File No. 90-0679. Post construction, the wetland mitigation site was entered into a Conservation Easement on March 27, 2013 by the NYSW with the New Jersey Department of Environmental Protection (NJDEP) assigned as the grantee.

The Hudson Tunnel Project proposes the construction of a viaduct through the Meadowlands to minimize impacts to wetlands and to reduce life-cycle costs associated with future maintenance. The viaduct will be founded on a series of piers with four of them having direct impact to the wetland mitigation site. In addition, an access road is proposed between the viaducts to serve for future maintenance of the railroad and to act as a life/safety facility during emergencies. Finally, a bridge abutment associated with the proposed crossing of the NYSW and Conrail railroads will also impact the wetland mitigation site. In total, approximately 0.22 acres of the wetland mitigation site will be impacted by the Hudson Tunnel Project. The piers and abutment will have direct impacts to 0.04 acres of the wetland mitigation site and the access road will also have 0.04 acres of direct impact. An additional 0.14 acres of shading impact will result from the viaducts.

The proposed Hudson Tunnel Project is a key infrastructure improvement for New Jersey, New York, the greater Metropolitan region, as well as the nation. We respectfully request the release of a portion of the wetland mitigation site conservation easement to allow use of this land for the proposed railroad. To compensate for the use of the 0.22 acre portion of the mitigation conservation easement, Amtrak proposes the purchase of 0.44 acres of wetland mitigation acre-credits from an approved wetland mitigation bank in the applicable service area. The purchase of wetland mitigation credits is proposed as on-site mitigation is not possible due to the lack of suitable sites adjacent to the existing wetland mitigation site. The adjacent lands are either existing freshwater wetlands, PSE&G high tension wire towers and associated access road, or NYSW/Norfolk Southern railroad facilities. In addition, enhancement of the existing *Phragmites*-dominated wetlands within the Meadowlands is not recommended as the likelihood of success is predicated on the management of this highly aggressive invasive grass species that currently forms a monoculture throughout the wetland system.

The Project Team would like to meet with you and the Mitigation Unit staff to discuss the proposed mitigation approach and determine the necessary next steps involved in the process.

Please feel free to contact either myself at (973) 491-7017 or jgeitner@njtransit.com or Timothy Hand of the Gateway Trans-Hudson Partnership at (732) 564-3245 or timothy.hand@aecom.com.

Very truly yours,

John Geitner, CHMM
Senior Director
Environment, Energy & Sustainability
NJ TRANSIT

cc: A. Castelli, FRA
M. Nasim, AMTRAK
M. Corrado, AMTRAK
P. Messick, AMTRAK

RJ Palladino, NJT
P. Rice, GHTP
J. Cannon, USACE

USACE Jurisdictional Determination

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

MAR 3 - 2017

Regulatory Branch

SUBJECT: Draft Wetland Delineation Report, March 1, 2017 for the Proposed Gateway Hudson Tunnel Project Hudson Tunnel Project, NAN-2016-01166-WCA, Town of Secaucus, Township of North Bergen and Township of Weehawken, Hudson County, New Jersey, and City of New York, Kings County, New York.

AMTRAK
ATTN: Mohammed Nasim, P.E.
Senior Director of Engineering and Design
30th Street Station
2955 Market Street – 4S-059
Philadelphia, Pennsylvania 19104

Dear Mr. Nasim:

The New York District of the U.S. Army Corps of Engineers, has reviewed the document entitled "Draft Wetland Delineation Report", dated March 1, 2017, received March 1st, and provides the following comments:

A. As the delineation drawings provided in the draft report appear to be CAD drawings that were reduced to 8.5x11 inches, the applicant should ensure the "Limit of Disturbance", waters of the United States (Traditional Navigable Waters, TNW) and wetland boundaries are all clearly depicted and legible. All drawing notes and legends describing the waters of the United States and wetlands, including the Mean High Water and Spring High Water elevations, should also be legible and clearly labeled. The total acreage of the area within the "Limit of Disturbance" along the proposed alignment should be provided or noted on the title drawing. Additionally, the delineation drawings should depict the limits of the proposed project alignment beneath the Hudson River with the linear length of the Hudson River crossing clearly labeled as well as the Federal Navigation Channels. The "Limit of Disturbance" boundary should extend along the project's proposed alignment on the New York side with the appropriate wetland acreage amount, if any, depicted. This will ensure the approved jurisdictional determination from this office has verified the entire proposed project alignment.

B. All wetland locations (wetland areas A-F) including data points, and waters of the United States (Penhorn Creek and Hudson River) situated within the "Limit of Disturbance" should be clearly labeled on the delineation drawings with their appropriate acreage amounts and/or linear lengths (Penhorn Creek, Hudson River) depicted. Any proposed wetlands within the "Limit of Disturbance" which are indicated in the report as isolated should be included on the drawing but not labeled as isolated, as this will addressed during the site investigation of the alignment, and if determined isolated by

SUBJECT: Draft Wetland Delineation Report, March 1, 2017 for the Proposed Gateway Hudson Tunnel Project Hudson Tunnel Project, NAN-2016-01166-WCA, Town of Secaucus, Township of North Bergen and Township of Weehawken, Hudson County, New Jersey, and City of New York, Kings County, New York.

this office, will be reflected in the approved jurisdictional determination verification letter. A table may additionally be provided depicting the acreage amount of each wetland or linear length of each waters of the United States situated within the projects "Limit of Disturbance".

C. All culverts and outfall structures which may convey waters entering or exiting the delineated wetlands or waterways within the "Limit of Disturbance" of the project alignment should be clearly labeled on the drawing requested above.

Your agency should note that in accordance with Regulatory Guidance Letter No. 07-01, dated June 5, 2017, this office is required to coordinate all isolated wetland determinations with the United States Environmental Protection Agency as well as the New York District Corps of Engineers Division Office for a minimum 21-day review period, if you agency's submitted materials are clear.

Jim Cannon of my staff will contact you in the future to schedule a date to investigate the proposed project alignment if we determine field work is needed to finalize the decision. It is requested that the individual(s) that delineated the wetlands and waters of the United States along the proposed project alignment be available and present during this office's site investigation, should questions arise regarding the delineation.

If any questions should arise concerning this matter, please contact Jim Cannon, of my staff, at (917) 790-8412.

Sincerely,

Christopher S. Mallery

for Stephan A. Ryba
Chief, Regulatory Branch

Cf: New Jersey Transit Corp.
C/o Mr. RJ Palladino, AICP/PP
Senior Program Manager
New Jersey Transit Capital Planning
One Penn Plaza East - 8th Floor
Newark, NJ 07105-2246

Chris Christie, Governor
Kim Guadagno, Lieutenant Governor
Richard T. Hammer, Commissioner
Steven H. Santoro, Executive Director

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

March 17, 2017

Steve Ryba
Chief, Regulatory Branch
NY District U.S. Army Corps of Engineers
26 Federal Plaza, Room 1937
New York, NY 10278

Re: **JD Request and Response to USACE March 3, 2017 Comments**
NAN-2016-01166-WCA, Hudson Tunnel Project,
Town of Secaucus, Township of North Bergen, Township of Weehawken, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York

Dear Mr. Ryba:

The Federal Railroad Administration (FRA) and New Jersey Transit (NJ TRANSIT) are preparing an Environmental Impact Statement (EIS) to evaluate the Hudson Tunnel Project ("the Project"). The EIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982); the Council on Environmental Quality regulations, Sec. 2 [42 U.S. Code § 4321]; and FRA Procedures for Considering Environmental Impacts (*Federal Register*, May 26, 1999, Vol. 64, No. 101). As described in the Hudson Tunnel Project Notice of Intent (*Federal Register*, May 2, 2016, Vol. 81, No. 84), the Proposed Action is intended to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River passenger rail crossing between New Jersey and New York and strengthen the resilience of the NEC. The NEC extends from Washington, D.C., in the south to Boston, Massachusetts, in the north. Amtrak, the nationwide intercity passenger rail operator, operates over the entire NEC and owns the majority of it, including the portion in New Jersey and the North River Tunnel. NJ TRANSIT operates an extensive commuter rail network in New Jersey that extends to Philadelphia, Pennsylvania; Orange and Rockland Counties in New York; and New York City. In New Jersey, NJ TRANSIT owns much of the commuter rail network that converges on the NEC. NJ TRANSIT's rail lines all include direct or connecting service to Pennsylvania Station New York (PSNY). The Project would consist of construction of a new rail tunnel under the Hudson River, including railroad infrastructure in New Jersey and New York connecting the new rail tunnel to the existing NEC, and rehabilitation of the existing NEC tunnel beneath the Hudson River.

On behalf of the Hudson Tunnel Project, NJ TRANSIT is requesting a Jurisdictional Determination (JD) from the US Army Corps of Engineers for wetlands and other waters of the US (WOUS) within the Limit of Disturbance (LOD) for the construction and staging areas, and temporary construction access for the Project in New Jersey and New York (see **Figure 1**). The LOD totals 60.5 acres along a 22,600-foot (4.28-acre) linear transportation corridor. During construction, staging areas would be located near the tunnel portal and at the ventilation shaft sites in New Jersey and New York. The construction staging locations would be used to access the tunnel and to remove rock and soil from the tunnel while it is being bored using Tunnel Boring Machine (TBM) technology. In addition, potential construction activities are expected to affect the Hudson River riverbed above a portion of the tunnel alignment.

The New York portion of the LOD in Manhattan is within developed areas and was not, therefore, included in the portion of the LOD included in the wetlands delineation study. Wetlands were delineated within the New Jersey portion of the LOD within the new surface alignment (Figure 2, Study Area 1) and in the vicinity of the fan plant/vent shaft in Hoboken (Figure 2, Study Area 2). Approximately 10.77 acres of wetlands were delineated within three wetlands within Study Area 1 in November 2016, and approximately 0.36 acres of wetlands were delineated within one wetland within Study Area 2 in December 2016.

Enclosed is the completed JD Request Checklist (see **Attachment 1**), JD Request Figures (**Attachment 2**), a Wetland Delineation Report (WDR) including photographs and Surveyed Wetland Delineation Drawings (see **Attachment 3**. The Surveyed Wetland Delineation Drawings have been revised to incorporate all items requested in comments A, B, and C of the March 1, 2017 letter.

Please let me know when you would be able to schedule a site inspection to confirm the boundaries of federal wetlands/waters along the project alignment, including study areas 1 and 2 in New Jersey corridor. I can be reached at 973-491-7017.

Thank you for your assistance in this matter.

Sincerely,

John A. Geitner, CHMM,
Sr. Director –Environment, Energy & Sustainability

cc: Christopher Mallery, Jim Cannon, Rosita Miranda (USACE)
Jeremy Colangelo-Bryan, RJ Palladino (NJ TRANSIT)
Amishi Castelli (FRA)
Mohammed Nasim, Marie Corrado (Amtrak)
Michael Petralia (PANYNJ)
Julie Cowing, Stephen Holley, Sandra Collins (AKRF)
Phil Rice, Mary Ann Mason, Tim Hand (GTHP)
Jason Levin (BAH)

Encl:

Attachment 1: JD Checklist Summary

Attachment 2: JD Request Figures

Attachment 3: *Hudson Tunnel Wetland Delineation Report*, March 15, 2017 (includes Figures, Photo Exhibit, Surveyed Wetland Delineation Drawings, and Wetland Determination Data Forms)

Attachment 1

CHECKLIST OF INFORMATION INCLUDED WITH REQUESTS FOR JURISDICTIONAL DETERMINATIONS (JD)

1. Name (including POC if a corporation or other entity), complete mailing addresses and phone numbers of the following:

Current Property Owners:
Names: **Amtrak, NJ TRANSIT**, and multiple private and public property owners along the proposed alignment (*property/easements to be acquired*).
Addresses: **Amtrak, 30th Street Station, 2955 Market Street – 4S-059, Philadelphia, PA 19104**
NJ TRANSIT, One Penn Plaza, Newark, NJ 07105
Phone Numbers: 973-856-0321 (Amtrak Contact Person, Mohammed Nasim, Senior Director Engineering Design, Gateway Program)
973-491-7017 (NJ TRANSIT Contact Person, John A. Geitner, CHMM, Sr. Director –Environment, Energy & Sustainability)

Applicant (Project Sponsor):
Name: **Mr. John A. Geitner, CHMM, NJ TRANSIT, Sr. Director – Environment, Energy & Sustainability**
Address: **One Penn Plaza East, 8th Floor, Newark, NJ 07105-2246**
Phone Number: **973-491-7017**

Wetland Consultant:
Name: **AKRF, Inc.**
Address: **440 Park Avenue South, 7th Floor, New York, NY 10016**
Phone Number: **646-388-9773**

2. 8½ x 11 Location Map showing:

- UTM Grid Coordinates
- Stream order and location
- Head and discharge coordinates of each stream
- Stream identification (TNWs, perennial RPWs, seasonal RPWs, or non-RPWs)

See Attachment 2: JD Request Figures.

<u>**Figure 1**</u> **shows the project corridor, including the Hudson River. The Tunnel Boring Machine would be employed to construct the tunnel under the river bottom. Therefore, no wetlands would be affected within the Hudson River.**

Hudson River (TNW, 7th Order stream)

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

<u>**Figure 2**</u> **shows the New Jersey portion of the tunnel corridor, specifically study areas 1 and 2.**

Attachment 1

Study area 1:

Delineated wetlands include monotypic stands of *Phragmites australis*, all tributary to Penhorn Creek, a TNW. Penhorn Creek is a 3rd Order stream, a tributary to the Hackensack River, a TNW and 4th Order stream.

Penhorn Creek (TNW, 3rd Order stream):

- **Head: 40.752045, -74.077529**
- **Discharge: 40.752045, -74.077529**

Study area 1:

Delineated wetlands include monotypic stands of *Phragmites australis*, all tributary to the Hudson River, a TNW. The Hudson River is a 7th Order stream.

Hudson River (TNW, 7th Order stream):

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

Figure 3 shows the New York portion of the corridor, including the Hudson River in relationship to the New York State Department of Environmental Conservation (NYSDEC) mapped littoral zone tidal wetland area within the LOD. The Tunnel Boring Machine would be employed to construct the tunnel under the river bottom. The tunnel ventilation structure and tunnel entrance would be constructed within upland areas. While the tunnel will be constructed below the river bottom, a 1.5-acre portion of the river bottom will receive soil improvement through jet grouting within the area indicated in Figure 3. The Hudson River is a 7th Order stream.

Hudson River (TNW, 7th Order stream):

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

3. Cover letter (included in report or to be provided) describing the purpose of the request, a general description of the proposed project, the size (acres) of the parcel, and the size of the limits of the project site or review area (if smaller than the parcel). **See Attached Cover Letter**.

4. Delineation report, including the following supporting information:

- Description of any current and/or historic land uses on the site. **The Proposed Project consists of existing and historic rail corridor and industrial uses.**
- DEC Wetlands Maps, NWI Maps, Soil Survey Maps. **See Attachement 3, AKRF Wetland Delineation Report, Figures.**
- Watershed size, drainage area size. **Wetlands/streams delineated within New Jersey in the study area 1 and 2 are tributary to Penhorn Creek and the Hudson River, respectively. Penhorn Creek is located within the Hackensack River Watershed; the Hackensack River Watershed is 197 square miles in size. The Lower Hudson River Watershed from the Troy Dam to New York Harbor, Upper Bay is 12,800 square miles in size.**
- Discussion of whether tributaries (streams) on the site are TNWs, perennial RPWs, seasonal RPWs, or non-RPWs. **Penhorn Creek is a TNW tributary to the Hackensack River, a TNM. The Hudson River is a TNM.**

- Description of whether each wetland on the site either abuts or is adjacent to a tributary, identify which tributary and provide a discussion of the justification for this determination.
  - <u>Study Area 1</u>**: Three vegetated freshwater wetlands (Wetlands A, B, and CD) were delineated in study area 1.**
    - **i. Wetland A is hydrologically connected to Penhorn Creek.**
    - **ii. Wetland B is an emergent seasonally flooded isolated wetland, located in the central portion of study area 1, and restricted to a depression below a billboard. The secondary hydrology indicator is "D4 Microtopographic Relief".**
    - **iii. Wetland CD is an emergent marsh wetland located in the eastern portion of study area 1, and adjacent to a tributary of Penhorn Creek.**
  - <u>Study Area 2</u>**: One wetland was delineated in Study Area 2, Wetland F. Wetland F is an emergent marsh located in the southern portion of Study Area 2, adjacent to the Hudson-Bergen Light Rail tracks. This wetland is adjacent/tributary to the Hudson River.**
- Description of tributary substrate composition (e.g. silts, sands, gravel, etc.). **The substrate of Penhorn Creek is primarily composed of silt and sand. The substrate of the lower Hudson River is primarily composed of silt and clay.**
- Description of tributary connections to a TNW for each aquatic resource on the site, including a discussion of wetland and/or other connections. **See descriptions above.**
- River miles to a TNW; aerial (straight) miles to a TNW. **Study Area 1-Wetland A is 0 feet from Penhorn Creek, Wetland B is 65 feet from Penhorn Creek, Wetland CD is 0 feet from Penhorn Creek. Study Area 2-Wetland F is 820 feet from Hudson River.**
- Identify potential pollutants. **Wetlands A, B, C, and F are located adjacent to rail corridors and industrial areas Potential pollutants within the wetlands have not been documented.**
- Identify potential habitat for species. **Approximately half of the LOD in New Jersey is located in an industrial and heavily urbanized landscape dominated by buildings, transportation infrastructure, and other impervious surfaces that offers minimal habitat for wildlife other than urban-adapted generalists that are ubiquitous throughout the metropolitan area. The remaining portions of the LOD in New Jersey are capable of supporting more rich and diverse communities of wildlife: the wetland complex associated with Penhorn Creek in the Meadowlands and the open water of the Hudson River. These habitats are still subjected to high levels of noise and other indirect and direct forms of human disturbance, however, and are further degraded by invasive species and pollution. As such, the wildlife communities in these areas are depauperate (i.e., lacking in number or diversity of species) and dominated by disturbance-tolerant species. On the basis of the wetland's size, the dominance of non-native common reed (*Phragmites australis*), and its isolation within a heavily urbanized area, the breeding bird community is expected to be composed of marsh birds, waterbirds, and land birds that are tolerant of degraded habitat conditions and ubiquitous in urban wetland habitats. Examples include red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), swamp sparrow (*Melospiza georgiana*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*), European starling (*Sturnus vulgaris*), yellow warbler (*Setophaga petechia*), barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), mallard (*Anas platyrhynchos*), American black duck (*Anas***

***rubripes*), Canada goose (*Branta canadensis*), green heron (*Butorides virescens*), and spotted sandpiper (*Actitus macularia*). Some additional species that nest elsewhere in the region may utilize this wetland as foraging habitat, including herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*). Mammals that are expected to occur in the marsh of the Meadowlands near Penhorn Creek include muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), meadow vole (*Microtus pennsylvanicus*), and occasionally, white-tailed deer (*Odocoileus virginianus*). Common reptile species with potential to occur in the wetlands around Penhorn Creek include snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), northern diamondback terrapin (*Malaclemys terrapin terrapin*), eastern garter snake (*Thamnophis setalis*), and northern water snake (*Nerodia sipedon*).**

- Justification for proposed "isolated" (SWANCC) or non-jurisdictional determinations on any wetlands or streams. **Wetland B in study area 2 is a depressional wetland dominated by *Phragmites australis* with no surface connections to other wetlands/waters. It appears to be "isolated", subject to inspection by the USACE.**
- Description of vegetative cover types on the site **See Attachment 3: Wetland Delineation Report.**
- Wetland Delineation Forms for each cover type. **See Attachment 3: Wetland Delineation Report.**
- Color photographs of all representative areas of the site including any connections between tributaries or between tributaries and wetlands. **See photo exhibit in Attachment 3: Wetland Delineation Report.**

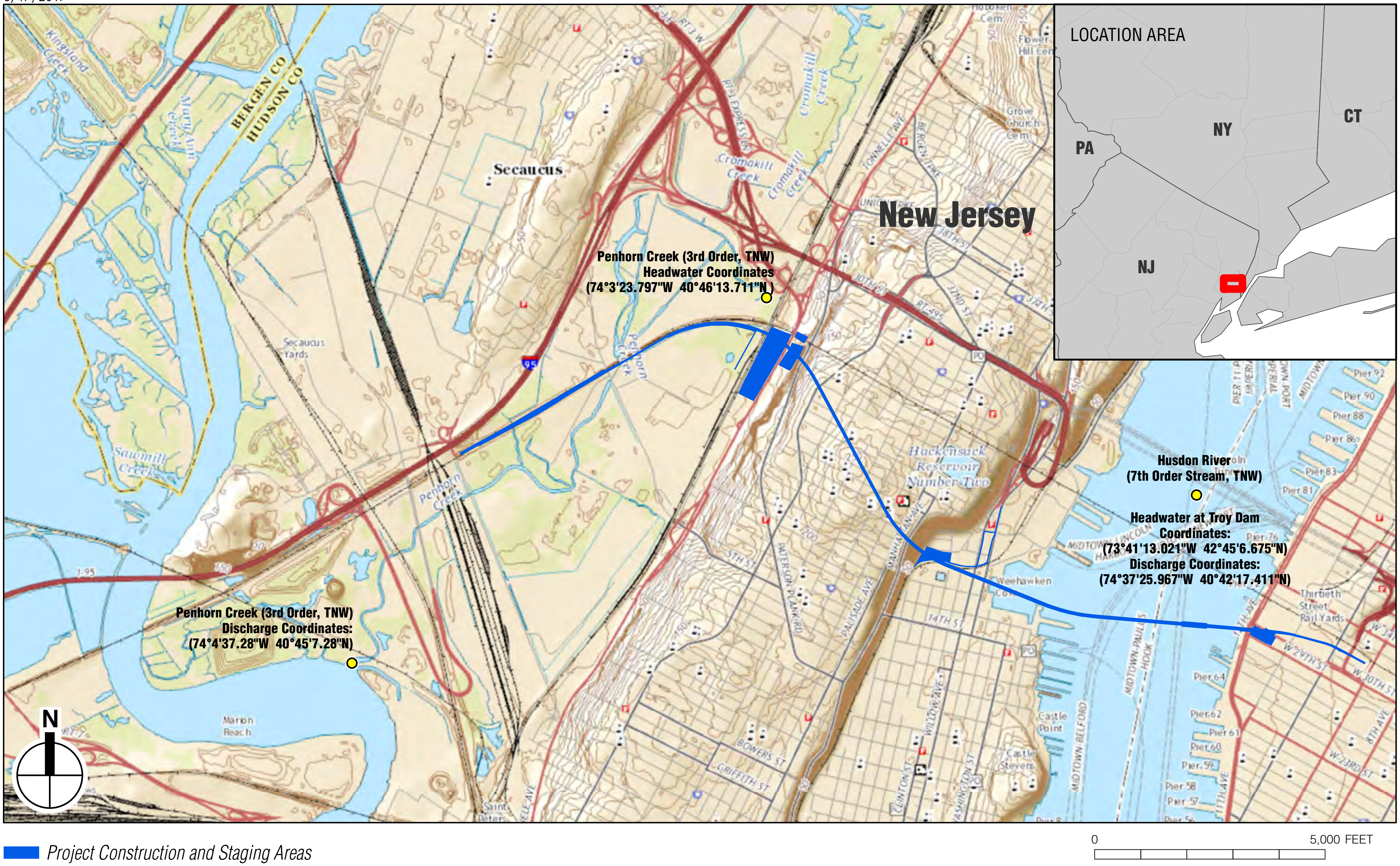
5. Surveyed delineation drawing, including the following:

- Title block, including drawing date, scale, revision dates, north arrow, existing topographic contours (if available), benchmarks, and the stamp of a licensed surveyor or a narrative describing how the GPS data were obtained
- Boundary lines of the parcel, AND of the project site, clearly marked with the acres shown on the drawing.
- Delineation flags shown as points that are connected by straight lines (or extend off-site at parcel boundaries), and are identified on the drawing with the corresponding number and/or letter that is written on the flag in the field.
- Appropriate hatching and/or shading to identify the extent of waters of the US, including jurisdictional wetlands, and any "isolated" or non-jurisdictional waterbodies or wetlands
- All defined tributaries on the site, identified either via flagging or a standard tributary symbol that is in the legend, and locations of any other connections between waters (e.g. culverts, ditches and/or swales)
- Table outlining the acres of the waters of the US, and "isolated" or non-jurisdictional waters, in addition to the linear feet of all tributaries within the boundaries of the project site or parcel

See Surveyed Wetland Delineation Drawings, included as part of Attachment 3, Wetland Delineation Report.

3/17/2017

ATTACHMENT 2

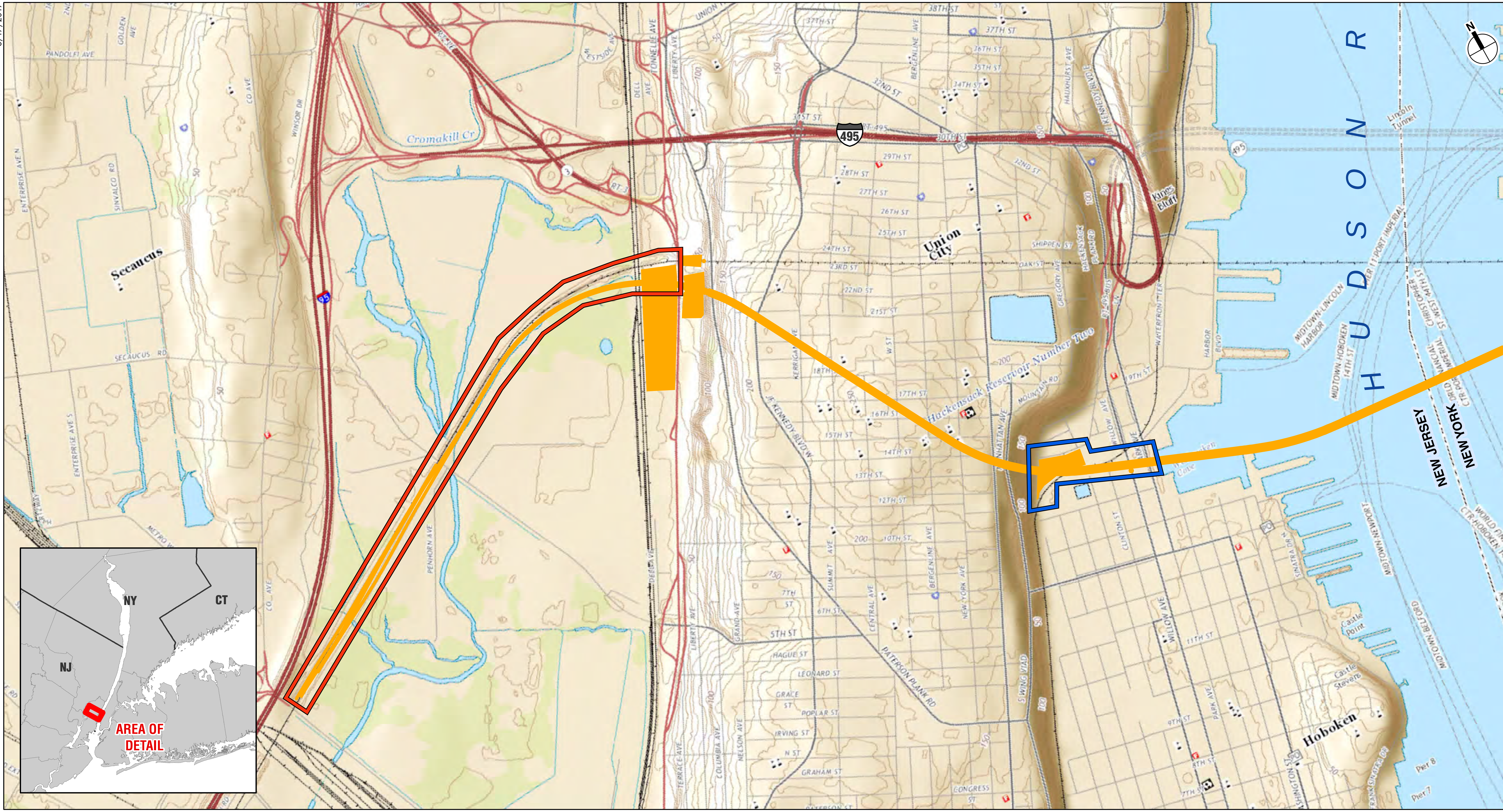


Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

HUDSON TUNNEL PROJECT

3/17/2017

ATTACHMENT 2



Study Area 1

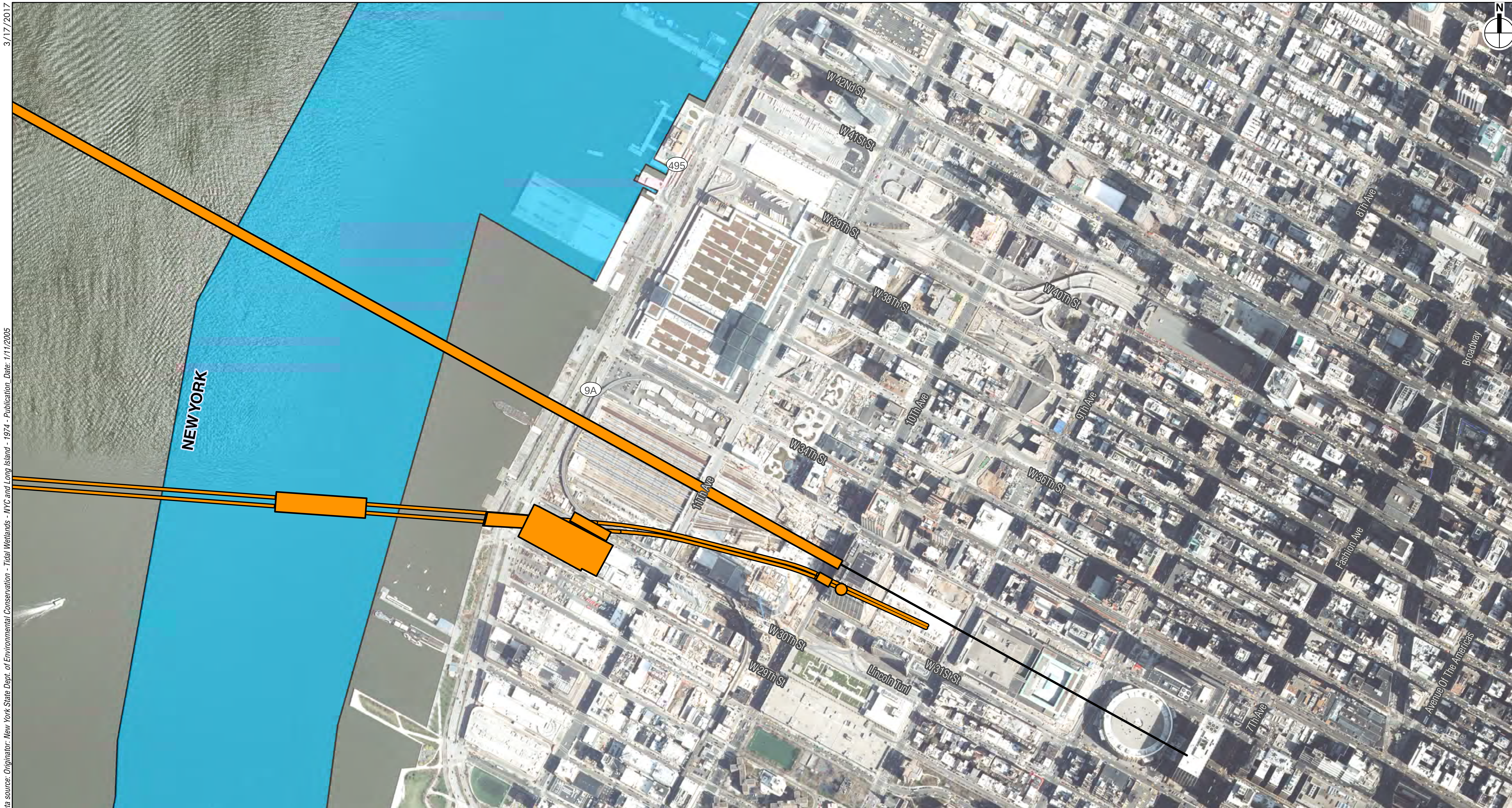
Study Area 2

Approximate coordinates of Project Site:
74°2'33"W 40°45'56"N

USGS 7.5 Minute Topographic Map
Weekhawken Quad
Figure 2

HUDSON TUNNEL PROJECT

3/17/2017



Data source: Originator: New York State Dept. of Environmental Conservation - Tidal Wetlands - NYC and Long Island - 1974 - Publication_Date: 1/11/2005

0 5,000 FEET

Project Construction and Staging Areas

Project Alignments

Tidal Wetlands: Littoral Zone

HUDSON TUNNEL PROJECT

NYSDEC Littoral Zone Tidal Wetlands

Figure 3

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

MAY 09 2017

Regulatory Branch

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

AMTRAK
ATTN: Mohammed Nasim, P.E.
Senior Director of Engineering and Design
30th Street Station
2955 Market Street – 4S-059
Philadelphia, Pennsylvania 19104

New Jersey Transit Corp.
ATTN: John Geitner, CHMM
Senior Director of Environment, Energy, and Sustainability
One Penn Plaza East
Newark, New Jersey 07105

Dear Sirs:

On March 17, 2017, the New York District of the U.S. Army Corps of Engineers received a request for a Department of the Army jurisdictional determination for the proposed Hudson Tunnel Project. This request was made by Amtrak and the New Jersey Transit Corporation. The proposed 4.28 mile Hudson Tunnel Project alignment would generally extend east along Amtrak's Northeast Corridor (NEC) rail line from County Road in the Town of Secaucus, through a new tunnel portal in the Palisades near Tonnelle Avenue in the Borough of North Bergen, and continue beneath the Hudson River and two federal navigation channels, terminating below the Penn Station Rail Complex in New York City, New York. The proposed Hudson Tunnel Project would consist of two (2) separate single-track tunnels, two (2) tunnel ventilation buildings, modifications to the existing New Jersey side NEC rail line to connect the NEC to the new tunnels, and modifications to the existing Penn Station Rail Complex in New York City. The proposed project alignment would extend through the Hackensack River and Hudson River watersheds, located in the Town of Secaucus, the Township of North Bergen, and the City of Hoboken, Hudson County, New Jersey, and the City of New York, New York County, New York.

In the document entitled "Hudson Tunnel Wetland Delineation Report", dated March 15, 2017, and received on March 17, 2017, your office submitted a proposed delineation of the extent of waters of the United States within the "Limit of Disturbance" along the proposed Hudson Tunnel Project alignment. A site inspection was conducted by representatives of this office on April 12, 2017, in which it was agreed that changes would be made to the delineation and that the modified delineation would be submitted to this office. On April 28, 2017, this office received the modified delineation.

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

Based on the material submitted and the observations of the representatives of this office during the site visit, this site has been determined to contain jurisdictional waters of the United States based on: the presence of wetlands determined by the occurrence of hydrophytic vegetation, hydric soils and wetland hydrology according to criteria established in the 1987 "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 that are either adjacent to or part of a tributary system; the presence of a defined water body (e.g. stream channel, lake, pond, river, etc.) which is part of a tributary system; and the fact that the location includes property below the ordinary high water mark, high tide line or mean high water mark of a water body as determined by known gage data or by the presence of physical markings including, but not limited to, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter or debris or other characteristics of the surrounding area.

Based on the above, it has been determined that the drawings entitled "Amtrak, Hudson Tunnel Project, U.S. Army Corps of Engineers, Jurisdictional Determination Plans, Contract # 9500001023, Figures W-1 through W-31, prepared by Amtrak and the Gateway Trans-Hudson Partnership, and dated April 28, 2017, accurately depict the extent of waters of the United States situated within the "Limit of Disturbance" located along the proposed Hudson Tunnel Project alignment. These drawings indicate that there are five (5) principal jurisdictional areas located within the "Limit of Disturbance" depicted on the referenced drawings. These jurisdictional areas are depicted as Wetland Areas A, B, C/D, F, and the Hudson River. Wetland areas A, B, and C/D, occupy approximately 11.42 acres and consist of open water and emergent wetlands that are situated adjacent to Penhorn Creek. Penhorn Creek is a tributary of the Hackensack River, a navigable water way. Wetland F, occupies approximately 0.36 acres and is located adjacent to the Hudson River. Approximately 5,569 linear feet of the proposed Hudson Tunnel would extend beneath the Hudson River, a navigable water way. These jurisdictional areas are considered to be part of a tributary system, and are considered to be waters of the United States under the jurisdiction of the Corps of Engineers.

This determination regarding the delineation shall be considered valid for a period of five years from the date of this letter unless new information warrants revision of the determination before the expiration date.

This determination was documented using the Approved Jurisdictional Determination Form, promulgated by the Corps of Engineers in June 2007. A copy of that document is enclosed with this letter, and will be posted on the New York District website at:
http://www.nan.usace.army.mil/Missions/Regulatory/JurisdictionalDeterminations/RecentJurisdictionalDeterminations.aspx

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

This delineation/determination has been conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed is a combined Notification of Appeal Process (NAP) and Request For Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the North Atlantic Division Office at the following address:

James W. Haggerty, Regulatory Program Manager, CENAD-PD-OR
North Atlantic Division, U.S. Army Engineer Division
Fort Hamilton Military Community
General Lee Avenue, Building 301
Brooklyn, New York 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Park 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by JUL 0 9 2017. It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

It is strongly recommended that the development of the site be carried out in such a manner as to avoid as much as possible the discharge of dredged or fill material into the delineated waters of the United States. If the activities proposed for the site involve such discharges, authorization from this office may be necessary prior to the initiation of the proposed work. The extent of such discharge of fill will determine the level of authorization that would be required.

In order for us to better serve you, please complete our Customer Service Survey located at http://www.nan.usace.army.mil/Missions/Regulatory/CustomerSurvey.aspx.

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

If any questions should arise concerning this matter, please contact Jim Cannon, of my staff, at (917) 790-8412.

Sincerely,

Stephan A. Ryba
Chief, Regulatory Branch

Enclosures

Cf: NJDEP
NJSEA

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Amtrak and New Jersey Transit	File Number: NAN-2016-01166		Date MAY 09 2017
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
X	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Mr. Stephan A. Ryba Chief, Regulatory Branch (CENAN-OP-R) NY District, U.S. Army Corps of Engineers 26 Federal Plaza, Room 1937 New York, NY 10278-0090 Telephone number: 917-790-8512	Mr. James W. Haggerty Regulatory Program Manager (CENAD-PD-OR) U.S. Army Corps of Engineers Fort Hamilton Military Community General Lee Avenue, Building 301 Brooklyn, New York 11252-6700 Telephone number: 347-370-4650

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.	Date:	Telephone number:

APPENDIX B

Approved JD Form

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): MAY 09 2017

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: New York District of the U.S. Army Corps of Engineers, Amtrak and the New Jersey Transit Corporation, Hudson Tunnel Project, NAN-2016-01166-WCA

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: New Jersey County/parish/borough: Hudson County, New Jersey City: Town of Secaucus, Township of North Bergen, City of Hoboken, New Jersey

Center coordinates of site (lat/long in degree decimal format): Lat. 40.7704° N, Long. -74.0548° W.

Universal Transverse Mercator:

Name of nearest waterbody: Penhorn Creek

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Penhorn Creek

Name of watershed or Hydrologic Unit Code (HUC): Penhorn Creek (02030103180)

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

☒ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): April 12, 2017

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☒ Waters subject to the ebb and flow of the tide.

☒ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: The wetlands and waters of the United Stated located within the project area are part of a surface water tributary system that is adjacent to Penhorn Creek. This surface water tributary system, which is adjacent Penhorn Creek, is situated behind an existing tide gate. This tide gate is situated within Penhorn Creek, approximately 4,700 feet south of the project site. The portion of Penhorn Creek situated below the tide gate is a tidal. Penhorn Creek is a tributary of the Hackensack River, also a navigable water way. Pursuant to Title 33 of the Code of Federal Regulations, Section 329, the onsite waters of the United States and associated adjacent wetlands are considered "Navigable in Law" and are under the juridiction of the U.S. Army Corps of Engineers.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☒ TNWs, including territorial seas
      ☒ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: 14.42 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.

[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: **Penhorn Creek.**

Summarize rationale supporting determination: The on-site waters of the United Stated, including wetlands, are located above an existing tide gate. This tide gate is situated within Penhorn Creek, located approximately 4,700 feet south of the site. The portion of Penhorn Creek situated below the tide gate is a tidal. Penhorn Creek is a tributary of the Hackensack River, also a navigable water way. Pursuant to Title 33 of the Code of Federal Regulations, Section 329, the onsite waters of the United States and associated adjacent wetlands are considered "Navigable in Law" and are under the juridiction of the U.S. Army Corps of Engineers.

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": The on-site wetlands met the hydrophytic vegetation, hydric soils and wetland hydrology criteria established in the 1987 "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1. The 14.42 acres of on-site waters of the United States, including wetlands, which include Wetland Areas A, B, and C/D, are considered adjacent to a TNW. Therefore, the wetlands are part of a surface water tributary system of a navigable water of the United States.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

☐ other (list):

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: .

Identify specific pollutants, if known: .

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List**.

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☒ Wetlands adjacent to TNWs: 14.42 acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Amtrak and NJ Transit March 17, 2017 submittal.
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☒ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Weehawken, NJ.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Soils, Figure 4a & 4b (March 17, 2017 submittal).
☒ National wetlands inventory map(s). Cite name:National Wetland Inventory Map, Figure 2 (March 17, 2017 submittal).
☒ State/Local wetland inventory map(s):NJ State Dept. Environmental Protection Wetands, Figure 3 (March 17, 2017 submittal).
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Provided in March 17, 2017 submittal.
☐ Previous determination(s). File no. and date of response letter:NAN-2008-00874, July 31, 2009 included a portion of the project site.
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☒ Other information (please specify):entitled "Amtrak, Hudson Tunnel Project, U.S. Army Corps of Engineers, Jurisdictional Determination Plans, Contract # 9500001023, Figures W-1 through W-31, prepared by Amtrak and the Gateway Trans-Hudson Partnership, and dated April 28, 2017, and Site Inspection Report dated April 12, 2017.

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

HUDSON TUNNEL

APPENDIX 11-2

Wetland Delineation Report

Submitted to:
New York District,
U.S. Army Corps of Engineers
Regulatory Branch
26 Federal Plaza
New York, NY 10278

HUDSON TUNNEL

WETLAND DELINEATION REPORT

March 15, 2017

Prepared by AKRF, Inc.

On Behalf of:

NJ TRANSIT

INTRODUCTION

The Federal Railroad Administration (FRA) and NJ TRANSIT are preparing an Environmental Impact Statement (EIS) to evaluate the Hudson Tunnel Project (the "Proposed Action" or the "Project"). As described in the Hudson Tunnel Project Notice of Intent (Federal Register, May 2, 2016, Vol. 81, No. 84), the Proposed Action is intended to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC. The Project would consist of construction of a new rail tunnel under the Hudson River; including railroad infrastructure in New Jersey and New York connecting the new rail tunnel to the existing NEC, and rehabilitation of the existing NEC tunnel beneath the Hudson River (see **Figure 1**).

The Project is anticipated to include the following elements: a new NEC rail tunnel beneath the Hudson River, extending from a new tunnel portal in North Bergen, New Jersey to the Penn Station New York (PSNY) rail complex in New York City (NYC), New York; modifications to the existing NEC tracks in New Jersey and additional track on the NEC in New Jersey to connect the new tunnel to the NEC; modifications to connecting rail infrastructure at PSNY to connect the new tunnel's tracks to the existing tracks at PSNY; new ventilation shaft buildings above the new tunnel on both sides of the Hudson River; and rehabilitation of the existing North River Tunnel. During construction, staging areas would be located near the tunnel portal and at the ventilation shaft sites in New Jersey and New York. The construction staging locations would be used to access the tunnel and to remove rock and soil from the tunnel while it is being bored using Tunnel Boring Machine (TBM) technology. In addition, potential construction activities are expected to affect the Hudson River riverbed above a portion of the tunnel location.

Once the North River Tunnel rehabilitation is complete, both the old and new tunnels would be in service, providing operational redundancy and increased operational flexibility for Amtrak and NJ TRANSIT, as well as for emergency conditions and maintenance functions. The new tunnel will connect with the existing track infrastructure leading into PSNY, which operates at capacity during peak hours and cannot accommodate any additional train service

Wetlands were delineated within the New Jersey portion of the Project site, within the new surface alignment that would connect to the existing NEC tracks, east of Secaucus Junction Station and County Road, to the new tunnel portal at Tonnelle Avenue (study area 1), and within the temporary construction access adjacent to the proposed shaft and fan plant site in Hoboken, New Jersey (study area 2). Study area 1 comprises 10.77 acres of wetlands and study area 2 comprises 0.36 acres of wetlands. The areas that would be permanently and/or temporarily disturbed by Project construction or operation, including staging areas and temporary haul routes, correspond to the Limits of Disturbance for the Project, which were determined in coordination with the project engineers, and are shown on the attached **Surveyed Wetland Delineation Drawings**. For study area 1, wetlands were delineated south of the existing NEC tracks where the new alignment will be constructed. AKRF delineated three wetlands within study area 1 in November 2016 and one wetland within study area 2 in December 2016. This memorandum presents the results these wetland delineations.

METHODOLOGY

Prior to the wetland delineation, United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (see **Figure 2**) and New Jersey Department of Environmental Protection (NJDEP) (see **Figure 3**) maps were reviewed to determine locations of state-mapped and/or NWI-mapped wetlands on and in the vicinity of the study areas. The Natural Resources Conservation Service (NRCS) soils maps (see **Figures 4a and 4b**) were also reviewed to determine soil types within the study areas, particularly with respect to soil series identified as hydric. AKRF wetland scientists conducted wetland delineations of study area 1 on November 1 and 3, 2016 and study area 2 on December 19, 2016, using the United States

Army Corps of Engineers (USACE) wetland delineation methodology.[1] Methodology pertaining to the three USACE wetland indicators (i.e., hydrology, hydric soils, and hydrophytic vegetation) is described below. The attached USACE *Wetland Determination Data Form – Northcentral and Northeast Region* (2012) was used to document the wetlands observed on the project site. Photographs were taken of the delineated wetlands (see **Figures 5a, 5b** and **6a through 6d**).

HYDROLOGY AND SOILS

The hydrology of the study area was characterized using aerial photographs, site observations, and an auger to determine soil saturation and/or a high water table. Soils were characterized with the use of an auger and a Munsell Soil Color Chart. During the wetland delineation, both hydrology and soils observations were made during a period of dry weather.

VEGETATION

The USACE *Northcentral and Northeast 2016 Regional Wetland Plant List* was used to determine the wetland/upland status[2] of the plant species identified within the study area. Percent cover was documented in the tree, woody vine, sapling/shrub, and herbaceous strata. In most instances, a 30-foot (ft) radius plot was established to document plant species percent cover in the tree and vine strata. Within this 30-ft plot, a 15-ft radius plot was established for the measurement of percent cover of shrubs and saplings. For species in the herbaceous stratum, a 5-ft radius plot was established within the 30-ft radius plot. Some areas of the project site are constrained to narrow bands by the surrounding topography. Thus, the 15-ft and 30-ft radius plots typically used in the standard USACE methodology for the documentation of saplings/shrubs and trees/woody vines, respectively, would have resulted in overlap between the upland and wetland sampling areas. As such, the standard methodology for sampling vegetation was adapted to fit the site conditions by sampling elongated rectangular plots within these communities, following the USACE recommendations in the methodology.

EXISTING CONDITIONS

MAPPING

National Wetlands Inventory-Mapped Wetlands

NWI wetland maps indicate that three freshwater wetlands and four tidal wetlands occur within the vicinity of study area 1 (see **Figure 2**), no NWI-mapped wetlands occur within the vicinity of study area 2. The NWI-mapped freshwater wetlands in study area 1 include: three riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (R5UBH). The NWI-mapped tidal wetlands include: an estuarine intertidal wetland dominated by emergent *Phragmites australis* that is irregularly flooded and oligohaline (E2EM5P6), an estuarine intertidal wetland dominated by emergent *Phragmites australis* that is irregularly flooded, has been partially drained/ditched and is oligohaline

[1] Environmental Laboratory. 1987. “Corps of Engineers Wetlands Delineation Manual,” Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss; U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[2] Wetland/upland statuses for plant species include Obligate (OBL; occurring in wetlands greater than or equal to 99 percent of the time), Facultative Wetland (FACW; occurring in wetlands between 67 and 99 percent of the time), Facultative (FAC; occurring in wetlands between 34 and 66 percent of the time), Facultative Upland (FACU; occurring in wetlands between 1 and 33 percent of the time), and Upland (UPL; occurring in wetlands less than or equal to 1 percent of the time). Dominant species indicative of wetlands include species rated as OBL, FACW, and FAC.

(E2EM5Pd6), an estuarine subtidal wetland with an unconsolidated bottom that is permanently flooded, oligohaline and has been excavated (E1UBLx6), and an estuarine subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). Site inspection conducted during the wetlands delineation survey confirms these mapped wetland types and approximate locations.

New Jersey Department of Environmental Protection-Mapped Wetlands

NJDEP wetland maps indicate that three wetlands occur within the vicinity of study area 1 (see **Figure 3**) and no NJDEP-mapped wetlands occur within the vicinity of study area 2. The three NJDEP-mapped wetlands as labeled with the land use/land cover code of *Phragmites* Dominate Interior Wetlands. Site inspection conducted during the wetlands delineation survey confirms these mapped wetland types and approximate locations.

Natural Resources Conservation Service -Mapped Soils

Within study area 1 soils are mapped as "SecA – Secaucus artifactual fine sandy loam, 0 to 3 percent slopes," "URTILB – Urban land, till substratum, 0 to 8 percent slopes," "URWETB – Urban land, wet substratum 0 to 8 percent slopes," and "WectA – Westbrook mucky peat, 0 to 2 percent slopes, very frequently flooded" by NRCS (see **Figure 4a**). Within study area 2 soils are mapped as "LagA – Laguardia artifactual coarse sandy loam, 0 to 3 percent slopes," "URBEDB – Urban land, bedrock substratum, 0 to 8 percent slopes," and URWETB (see **Figure 4b**). The NRCS lists one of the series mapped for the project site as hydric: WectA, however URWETB contains hydric soil components. Hydric soil is one of the three parameters that define a wetland according to the USACE methodology.

ONSITE DELINEATION

A total of three wetlands (A, B, CD) and one unvegetated stormwater detention basin (E) were delineated in November 2016 within study area 1 and one wetland (F) was delineated in December within study area 2 (see **Surveyed Wetland Delineation Drawings**). These wetlands were flagged as follows:

- Wetland A: A1 to A46;
- Wetland B: B1 to B4;
- Wetland CD: C1 to C24 and D1 to D59;
- Wetland F: F1 to F27; and
- Detention Basin E: E1 to E5.

Wetland A

Wetland A is an emergent marsh wetland located in the western portion of study area 1, east of County Road and south of the NEC (see **Figure 6a, Photograph 1**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland A are described below.

The Data Form for Wetland A depicts the dominant species associated with this wetland. These species include common reed (*Phragmites australis*) (FACW) for the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland are significantly disturbed, made lands. Ceramic fragments and other evidence of fill material are found 12 inches below the soil surface, and supports the NRCS soil mapping of the "URWETB – Urban land, wet substratum, 0 to 8 percent slope" soil map unit. However Wetland A is located in an appropriate landscape setting (concave surface adjacent to Penhorn Creek) and is the soils are considered to be under a problematic soil situation. The primary hydrology indicators are "A2 High Water Table" at a depth of 10 inches below the soil surface and "A3 Saturation" at the soil surface (see Data Form A). Wetland A is hydrologically connected to Penhorn Creek.

Wetland B

Wetland B is an emergent seasonally flooded isolated wetland, located in the central portion of study area 1, and restricted to a depression below a billboard (see **Figure 6a, Photograph 2**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland B are described below.

The Data Form for Wetland B depicts the dominant species associated with this wetland. These species include common reed (FACW) for the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland meet the criteria of "F6 Redox Dark Surface." The primary hydrology indicators are "A3 Saturation" at a depth of 11 inches below soil surface and "C3 Oxidized Rhizospheres on Living Roots." The secondary hydrology indicator is "D4 Microtopographic Relief" (see Data Form B).

Wetland CD

Wetland CD is an emergent marsh wetland located in the eastern portion of study area 1, and adjacent to a tributary of Penhorn Creek (see **Figure 6b, Photograph 3**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland CD are described below.

The Data Form for Wetland CD depicts the dominant species associated with this wetland. These species include common reed (FACW) and common boneset (*Eupatorium perfoliatum*) (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland meet the criteria of "TF12 Very Shallow Dark Surface." The primary hydrology indicators are "A2 High Water Table" at a depth of 7 inches below the soil surface and "A3 Saturation" at the soil surface (see Data Form D).

Detention Basin E

In addition to wetlands, an unvegetated detention basin was flagged within the project site east of Wetland CD. This linear feature flagged in the field as Detention Basin E. Detention Basin E is approximately 10 feet wide at the eastern end and 1 foot wide at the western end (see **Figure 6b, Photograph 4**). The feature runs in the east-west direction and connects to a culvert on the eastern end.

Study Area 1Upland

The area north/northwest of the delineated wetlands in study area 1 is the railroad track and rock ballast. The upland area located between Wetland A and Wetland B is representative of the uplands within the project site. The dominant vegetation within the sampling area was common boneset (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point. There were no wetland hydrology indicators or hydric soil indicators within this area (see Data Form C).

Wetland F

Wetland F is an emergent marsh located in the southern portion of study area 2, adjacent to the Hudson-Bergen Light Rail (HBLR) tracks (see **Figure 6c, Photographs 5 and 6**). A culvert is located within Wetland F and may connect to a tide gate, located approximately 1,250 feet east of the culvert. The hydric soils, hydrology, and hydrophytic vegetation of Wetland F are described below.

The Data Form for Wetland F depicts the dominant species associated with this wetland. These species include common reed (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils within this wetland were frozen on the date that the wetland delineation occurred, and as such soils were not sampled to an adequate depth to meet the criteria of hydric soil indicators. However, the wetland is located at the toe of slope in a swale (concave surface), which is an appropriate landscape setting to collect/concentrate water. It is anticipated that if soils were sampled at this location to an adequate depth that they would meet the criteria of a hydric soil indicator. The primary hydrology indicators are "A1 Surface Water" at a depth of 3 inches, "A2 High Water Table" at 0.5 inches below the soil surface, "A3 Saturation" at the soil surface, "B4 Algal Mat or Crust," "B7 Inundation Visible on Aerial Imagery," and "B9 Water-Stained Leaves" (see Data Form F).

Study Area 2 Upland

The area south of the delineated wetland in study area 2 is the railroad track and rock ballast. The upland area located north of the delineated wetland in study area 2 is an urban vacant lot (see **Figure 6d, Photograph 7**). The dominant vegetation within the sampling areas was eastern cottonwood (*Populus deltoids*) (FAC) in the tree layer, crabgrass (*Digitaria* sp.) (FACU) in the herbaceous layer, and Asiatic bittersweet (*Celastrus orbiculatus*) (UPL) and poison ivy (*Toxicodendron radicans*) (FAC) in the woody vine layer. There was not a sapling/shrub layer within the sampling point. There were no wetland hydrology indicators or hydric soil indicators within this area (see Data Form E).

CONCLUSIONS AND RECOMMENDATIONS

As described above, three vegetated freshwater wetlands (Wetlands A, B, and CD) were delineated in study area 1, and one vegetated freshwater wetland (Wetland F) was delineated in study area 2, per the USACE wetland delineation methodology. Due to the frozen soils encountered within Wetland F and the inability to sample soils to an adequate depth, it is recommended that Wetland F be re-investigated during the growing season. In order to confirm that these delineated boundaries are accurate/official, it is recommended that the boundaries be confirmed by USACE during an onsite field inspection as part of a "jurisdictional determination" (JD), and that the boundaries be verified by the NJDEP Land Use Regulation Program. Once the wetland/waters boundaries are confirmed by the USACE, they are valid for a period of five (5) years. Any impacts to federally- or state-mapped wetlands are subject to Section 401 and 404 permits under the Clean Water Act, the Freshwater Wetlands Protection Act, and the Wetlands Act of 1970, and mitigation in consultation with the USACE and/or NJDEP. For this reason, it is recommended that coordination regarding this wetland delineation commence with NJDEP and USACE.

Figures:

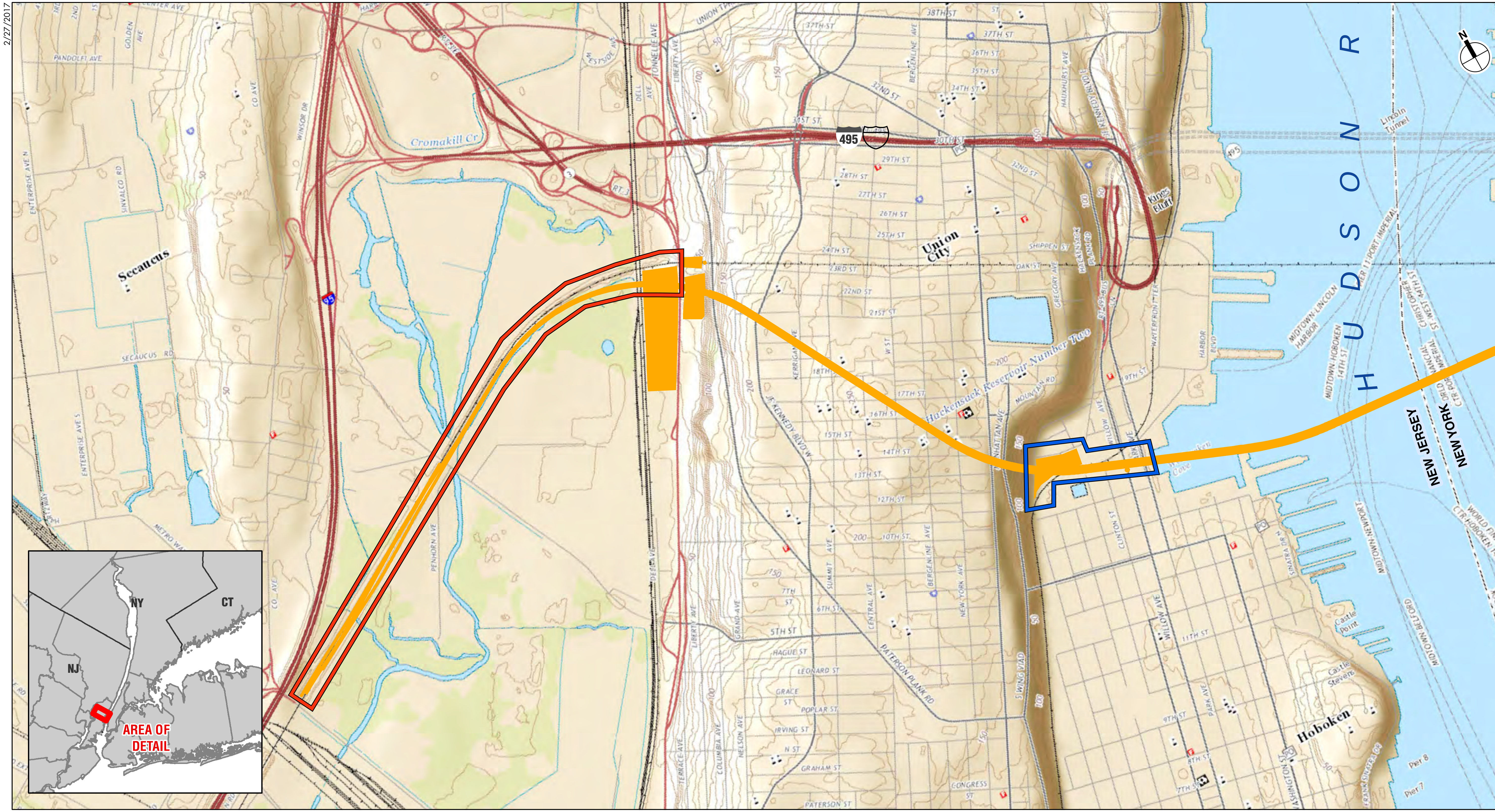
1. USGS Topographic Map
2. NWI Wetlands
3. NJDEP Wetlands
4. NRCS Soils
5. Photograph Key
6. Representative Site Photographs

Attachments:

Surveyed Wetland Delineation Drawings

USACE Wetland Determination Data Forms

2/27/2017



Study Area 1

Study Area 2

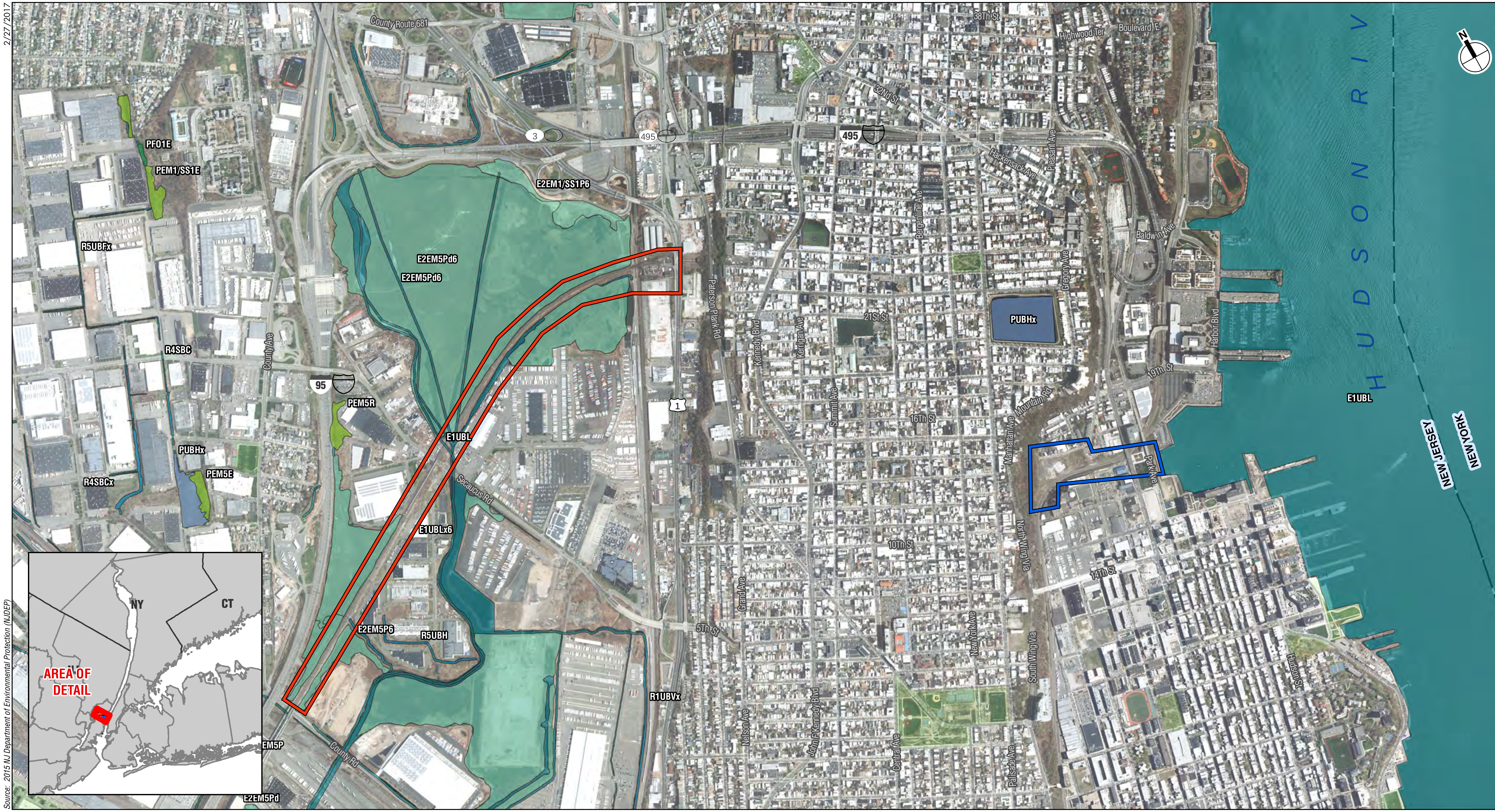
Approximate coordinates of Project Site:
74°2'33"W 40°45'56"N

0 5,000 FEET

HUDSON TUNNEL PROJECT

USGS 7.5 Minute Topographic Map
Weekhawken Quad
Figure 1

2/27/2017



Source: 2015 NJ Department of Environmental Protection (NJDEP)

Study Area 1
Study Area 2

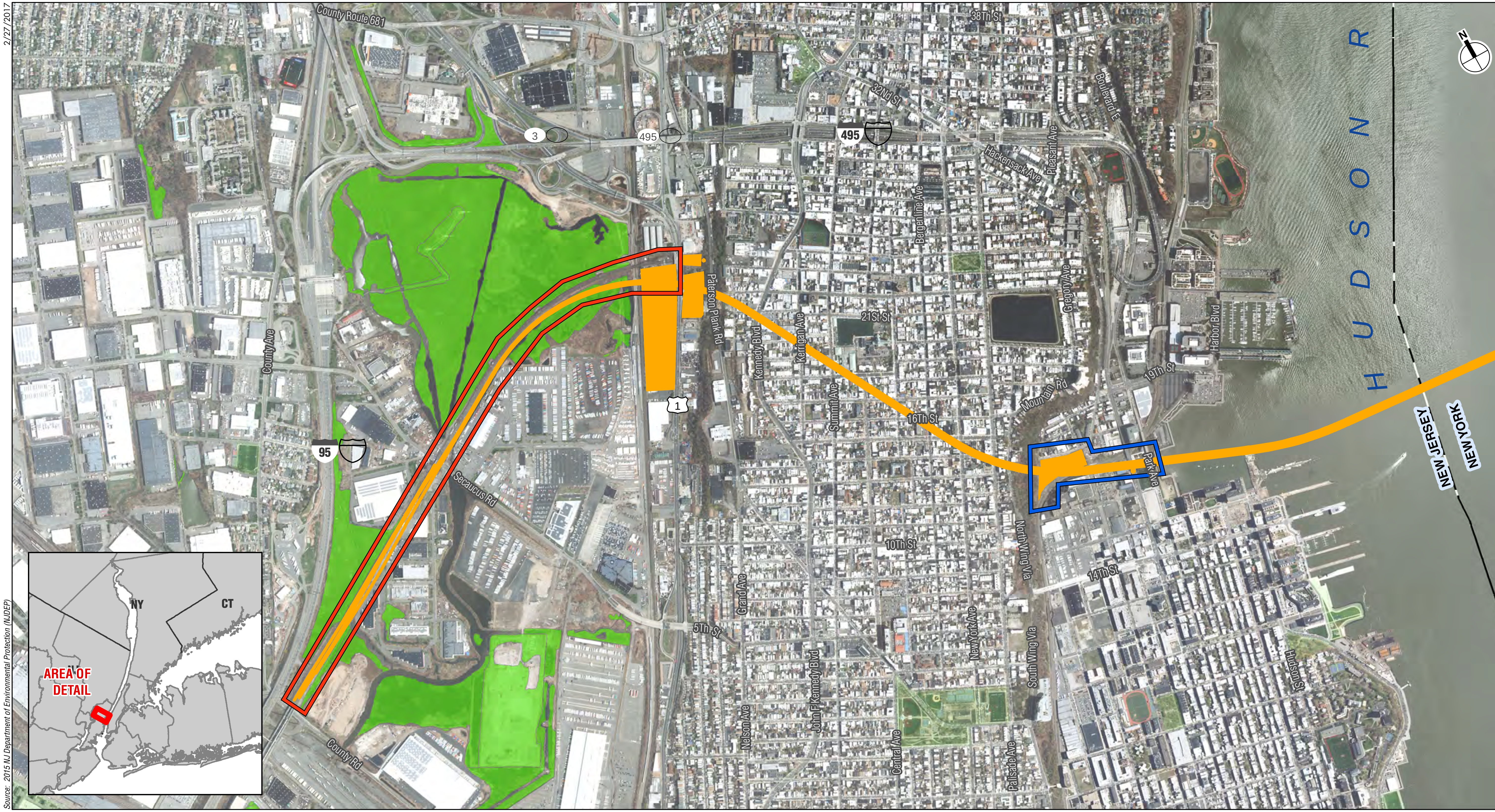
WETLAND_TY
- Freshwater Forested/Shrub Wetland (PFO, PSS)
- Freshwater Emergent Wetland (PEM)
- Freshwater Pond (PUB, PAB)
- Estuarine and Marine Wetland (E2, M2)
- Riverine (R)
- Estuarine and Marine Deepwater (E1, M1)

0 5,000 FEET

HUDSON TUNNEL PROJECT

National Wetlands Inventory
Figure 2

2/27/2017



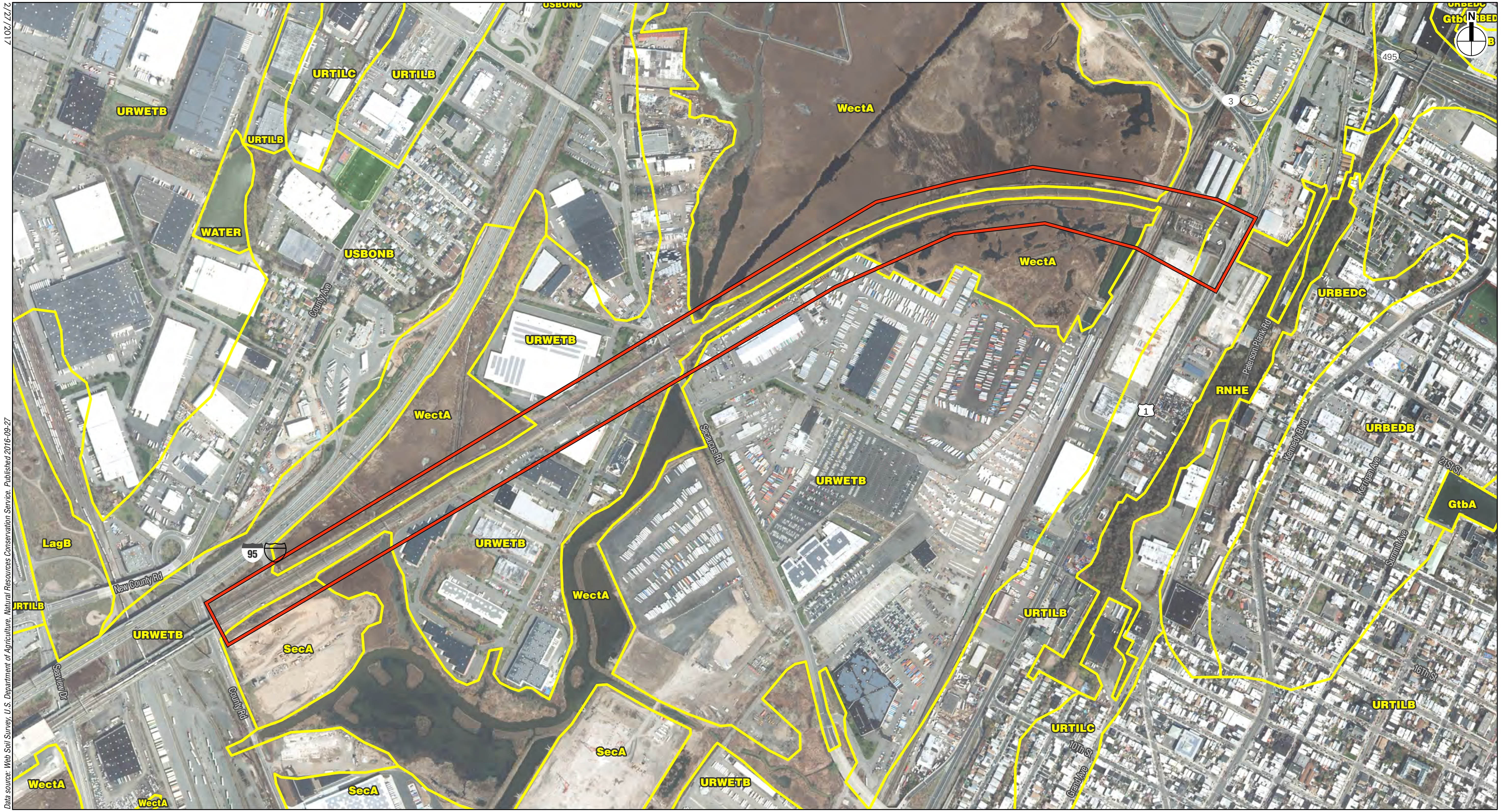
Source: 2015 NJ Department of Environmental Protection (NJDEP)

Study Area 1
Wetlands
Study Area 2

0 5,000 FEET

HUDSON TUNNEL PROJECT

New Jersey Dept. of Environmental Protection Wetlands
Figure 3



Study Area 1

Map unit symbol

0 5,000 FEET

2/27/2017

Data source: Web Soil Survey, U.S. Department of Agriculture, Natural Resources Conservation Service. Published 2016-09-27

HUDSON TUNNEL PROJECT

NRCS Soils

Figure 4a

2/27/2017

Data source: Web Soil Survey, U.S. Department of Agriculture, Natural Resources Conservation Service. Published 2016-09-27

0 5,000 FEET

Study Area 2

Map unit symbol

HUDSON TUNNEL PROJECT

NRCS Soils

Figure 4b

Study Area 1

Photograph Direction and Reference Number

0 5,000 FEET

HUDSON TUNNEL PROJECT

Photograph Key (Study Area 1)

Figure 5a

2/27/2017

Study Area 2

Photograph Direction and Reference Number

0 5,000 FEET

HUDSON TUNNEL PROJECT

Photograph Key (Study Area 2)

Figure 5b

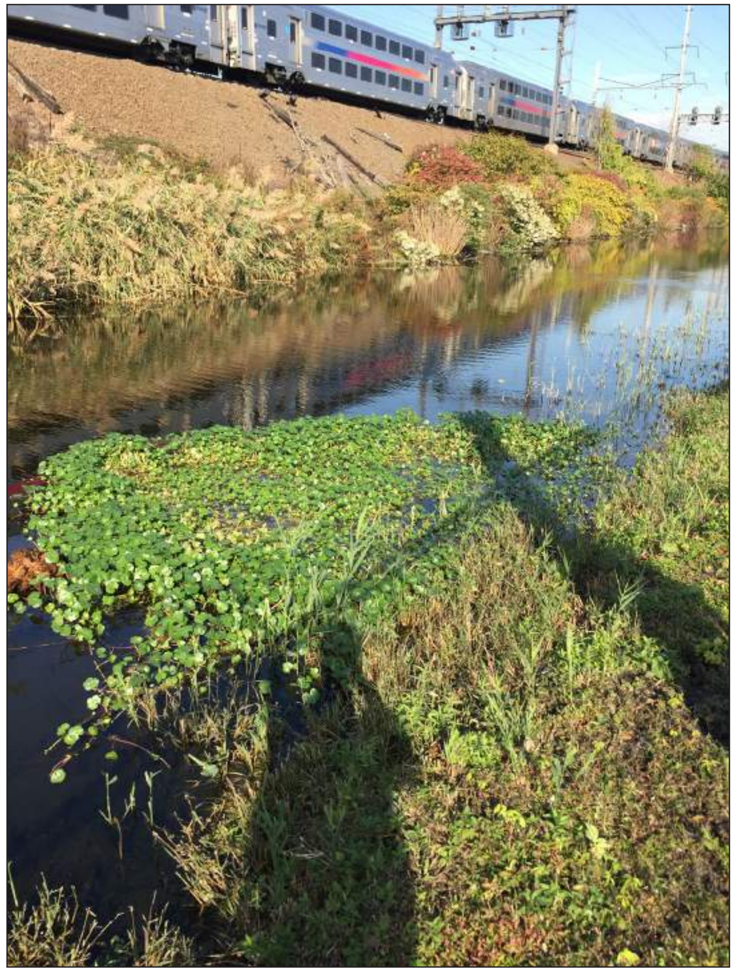
View of Wetland A and Penhorn Creek, facing south. **1**

View of Wetland B (located beneath the billboard), facing north. **2**

HUDSON TUNNEL PROJECT

Representative Site Photographs

Figure 6a



View of Wetland CD, facing north. **3**

View of Detention Basin E, facing west. **4**

HUDSON TUNNEL PROJECT

Representative Site Photographs

Figure 6b

View of Wetland F, facing east. **5**

View of Wetland F, facing west. **6**

View of the Upland in Study Area 2, facing south. **7**

Attachment 1:

Wetlands Survey Drawings

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HUDSON TUNNEL PROJECT

U.S. Army Corps of Engineers Jurisdictional Determination Plans

Contract # 9500001023

April 28, 2017

Submitted to:

US Army Corps of Engineers®
New York District

Submitted by:

The Gateway Trans-Hudson Partnership

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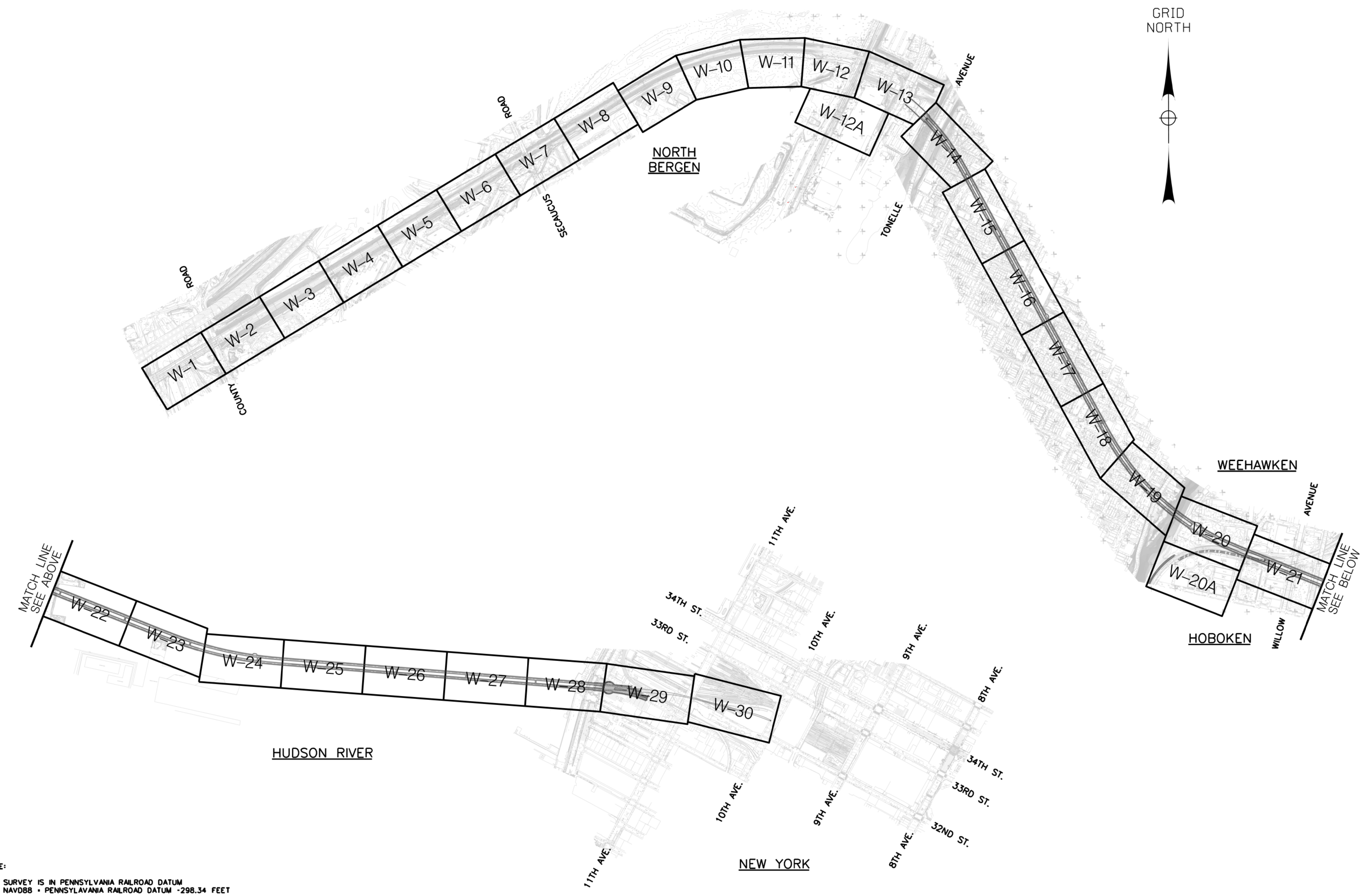

NOTE:

1. SURVEY IS IN PENNSYLVANIA RAILROAD DATUM
NAVD88 = PENNSYLAVANIA RAILROAD DATUM -298.34 FEET

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PLAN INDEX

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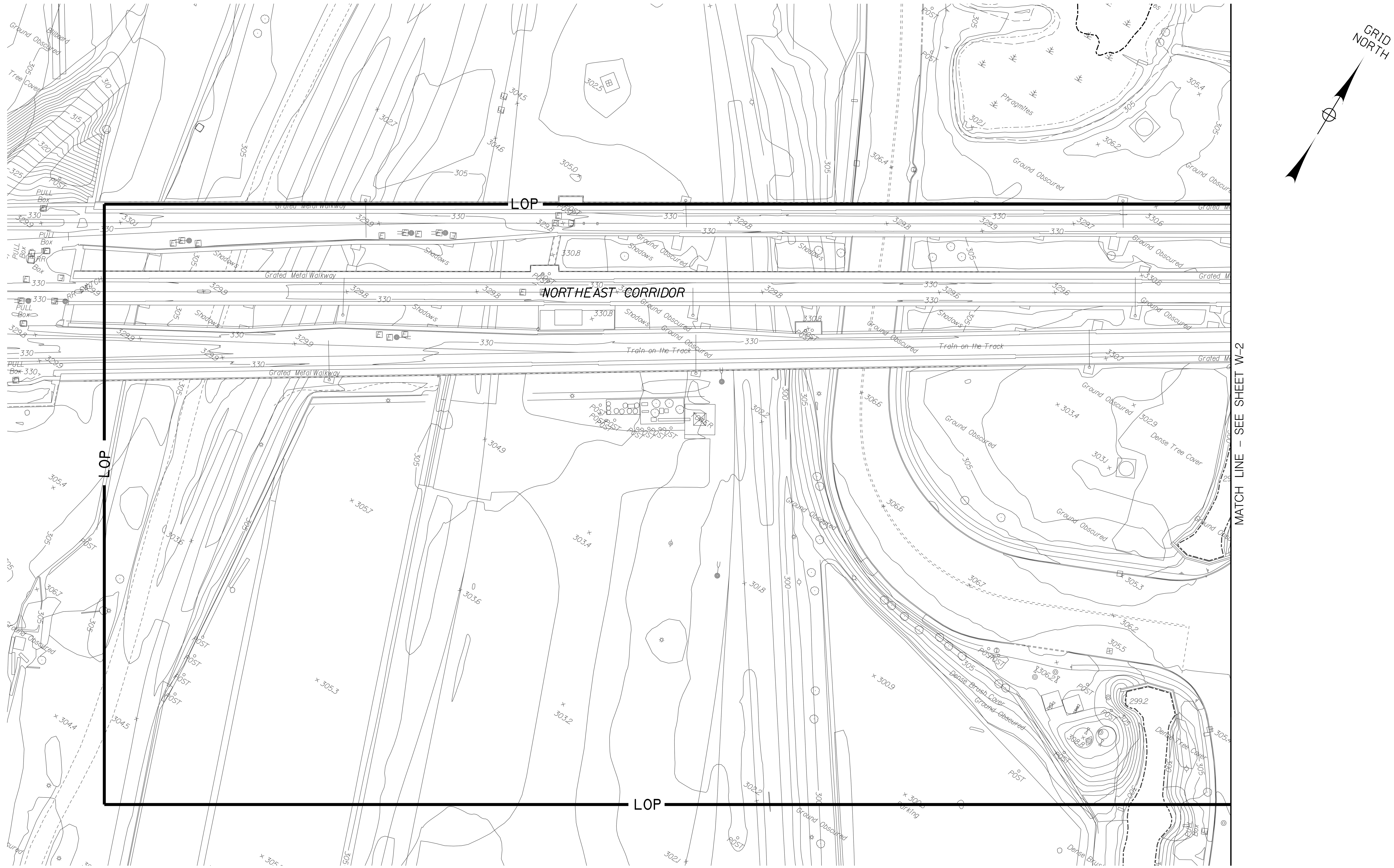

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LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0.06 ACRES
LINEAR LENGTH OF STREAM	147 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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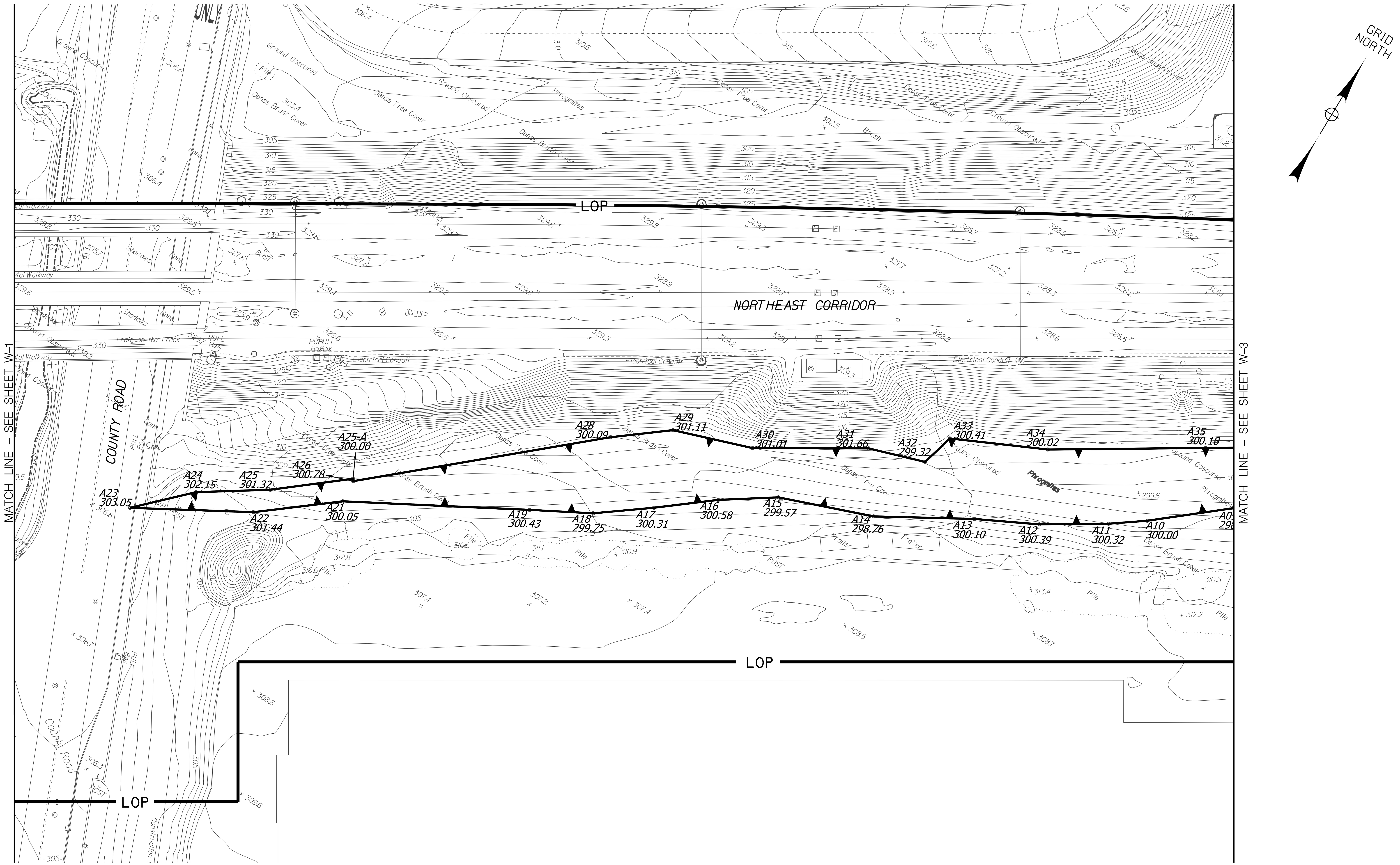

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LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.47 ACRES
OPEN WATERS	0.03 ACRES
LINEAR LENGTH OF STREAM	200 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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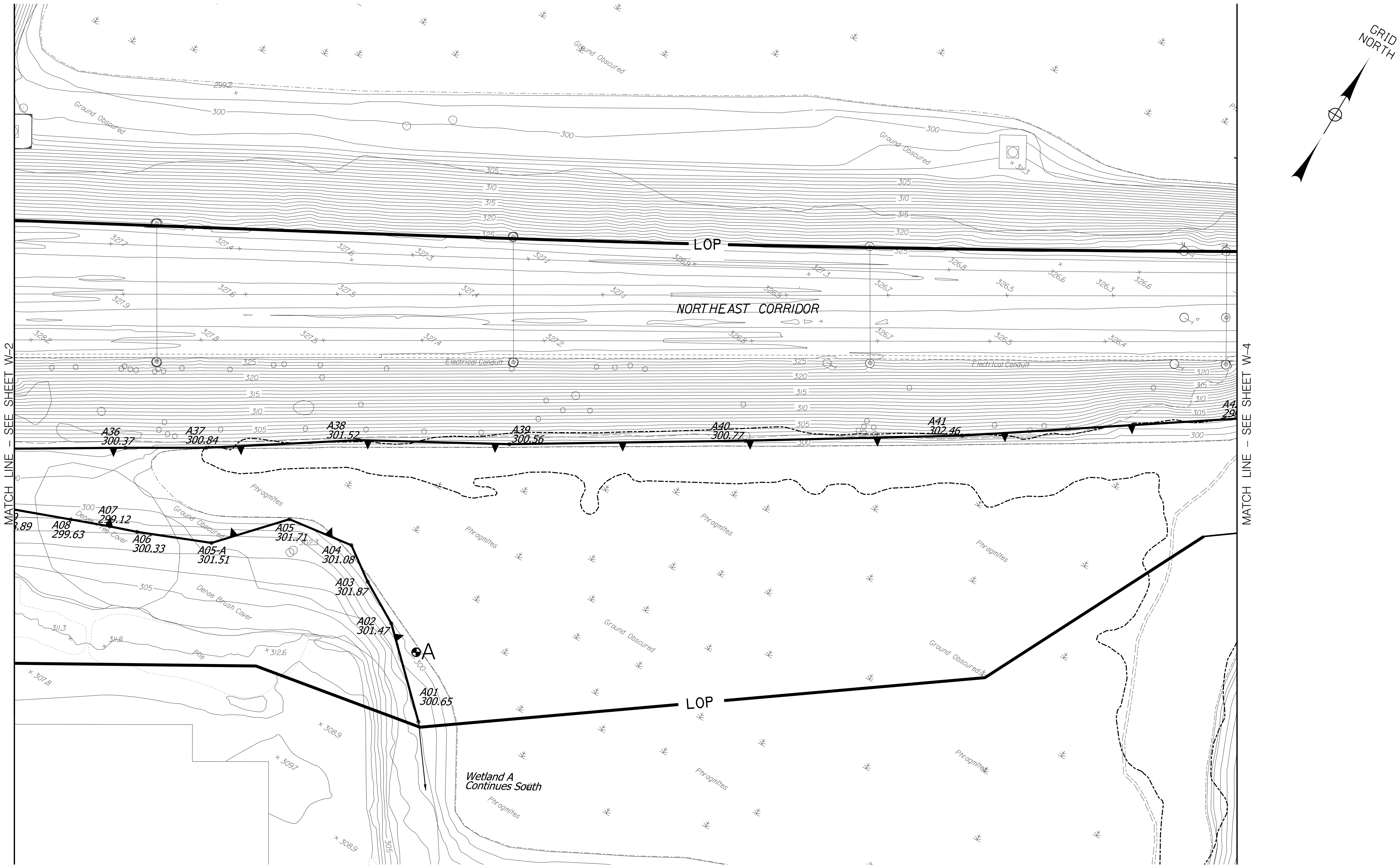

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LEGEND:

- LOP - LIMIT OF PROJECT
- A1 A2 A3 A4 - WETLANDS
- A - WETLAND DATA POINT SYMBOL
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	1.44 ACRES
OPEN WATERS	0.43 ACRES
LINEAR LENGTH OF STREAM	650 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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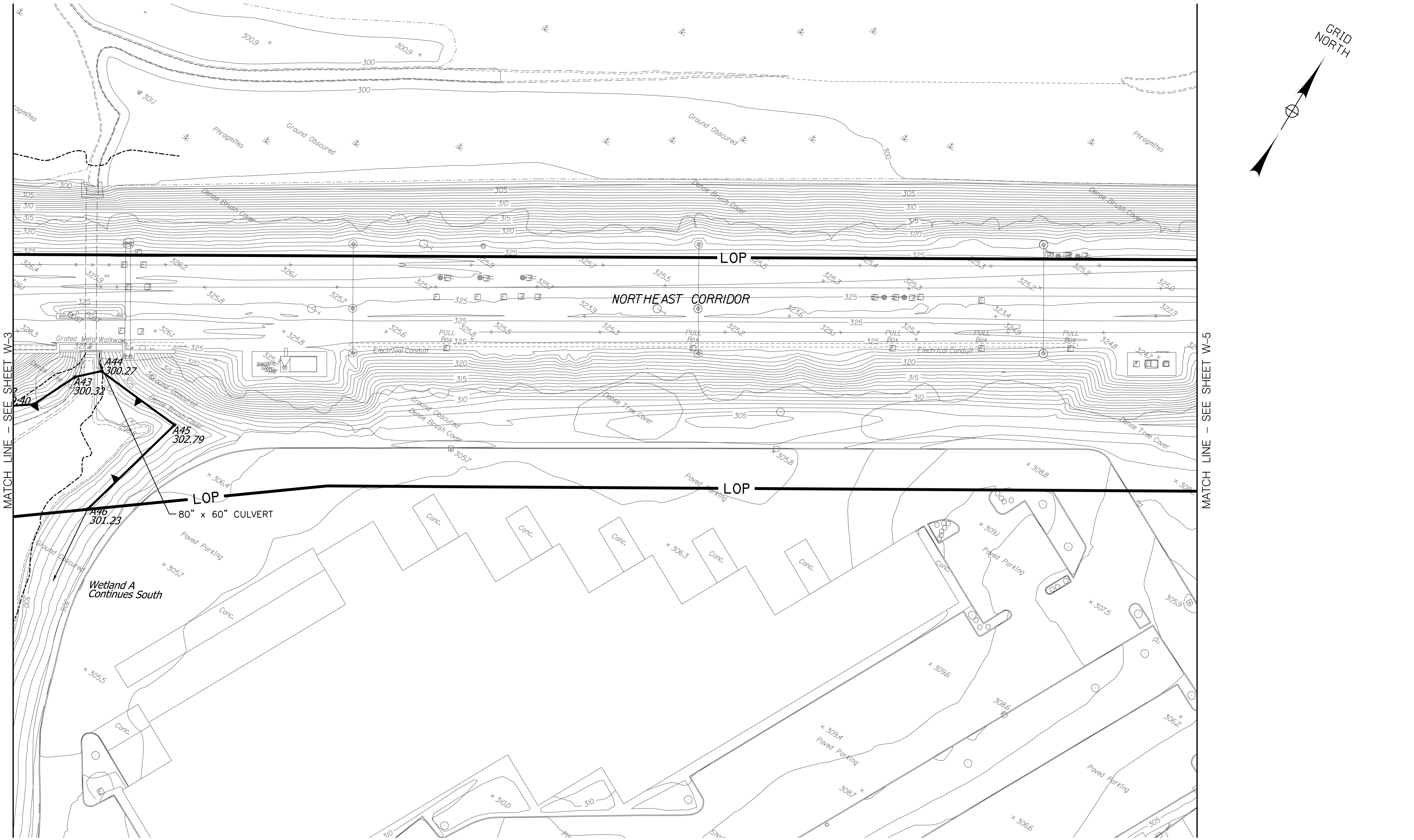

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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- - - - - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.05 ACRES
OPEN WATERS	0.075 ACRES
LINEAR LENGTH OF STREAM	77 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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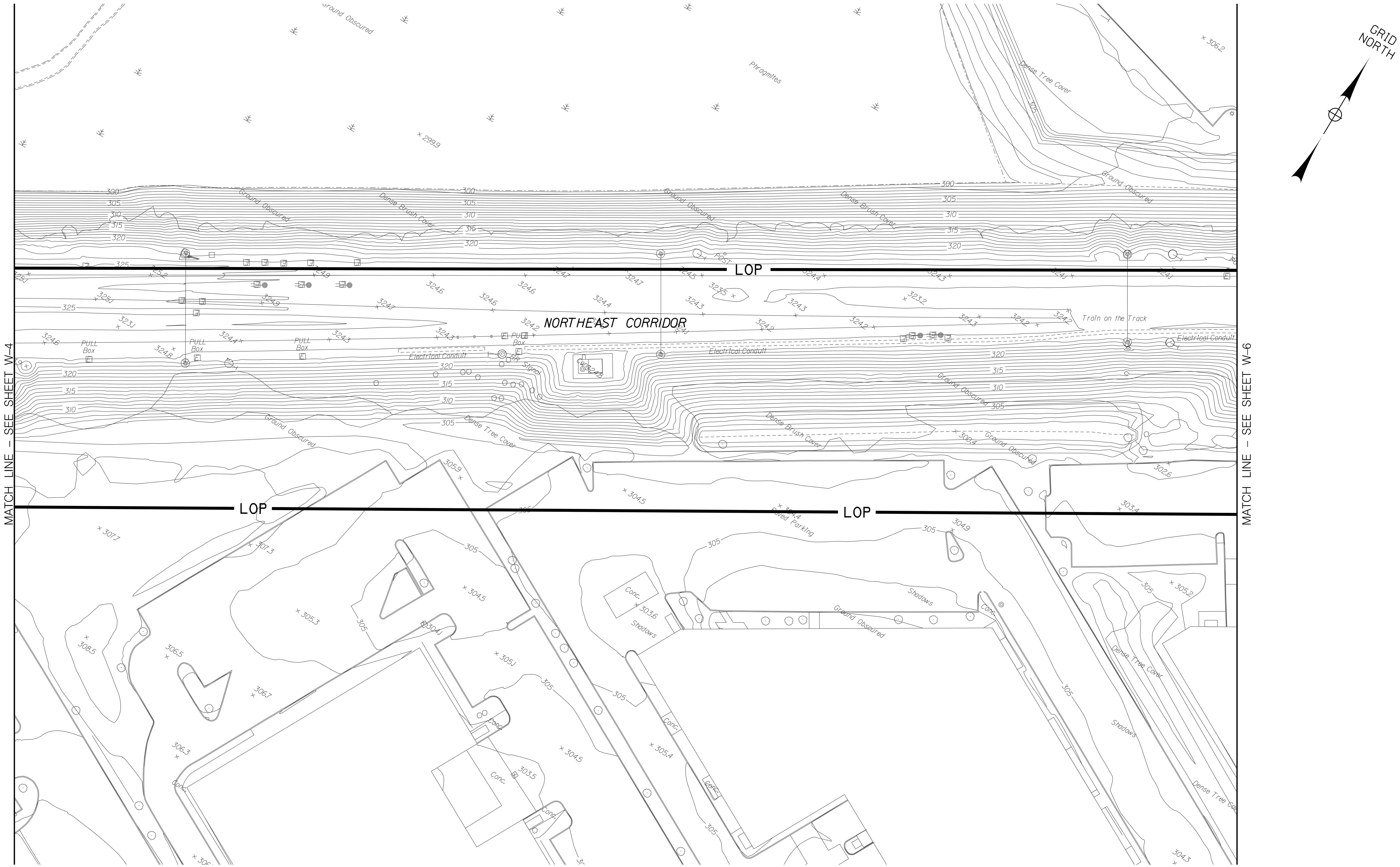

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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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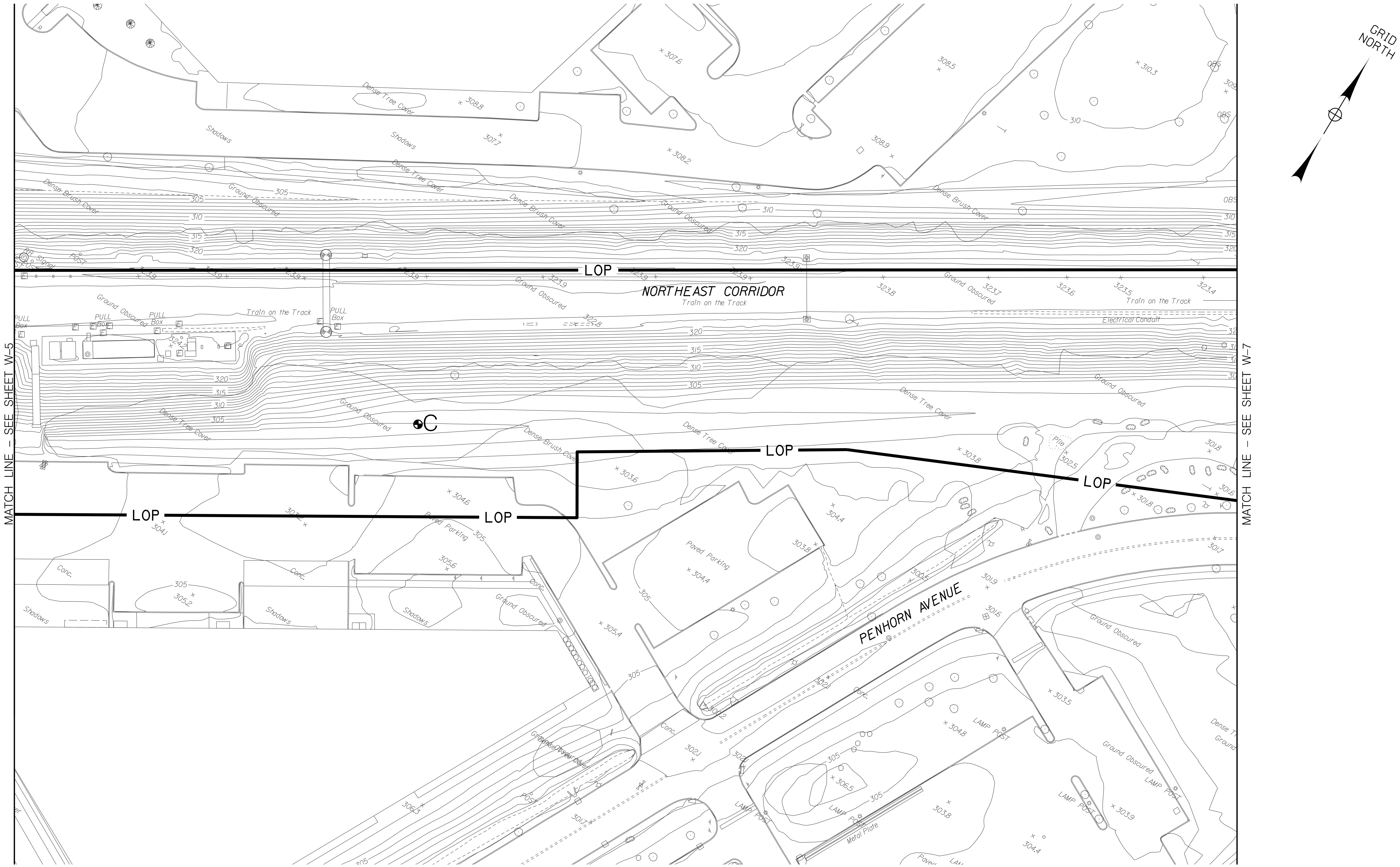

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LEGEND:

LOP - LIMIT OF PROJECT

C - WETLAND DATA POINT SYMBOL

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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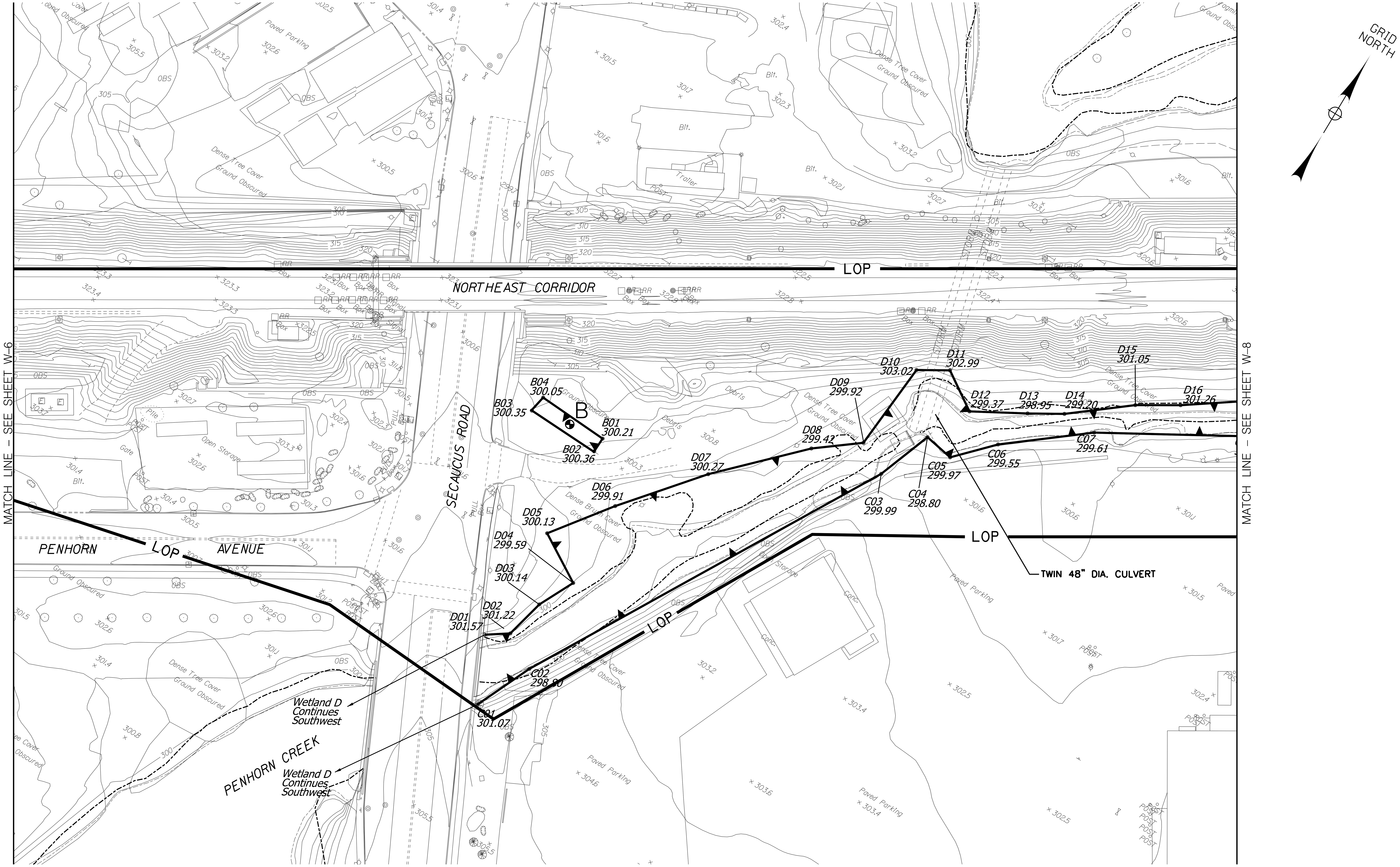

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LEGEND:

- —LOP— – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- B – WETLAND DATA POINT SYMBOL
- - - - - - – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.18 ACRES
OPEN WATERS	0.21 ACRES
LINEAR LENGTH OF STREAM	483 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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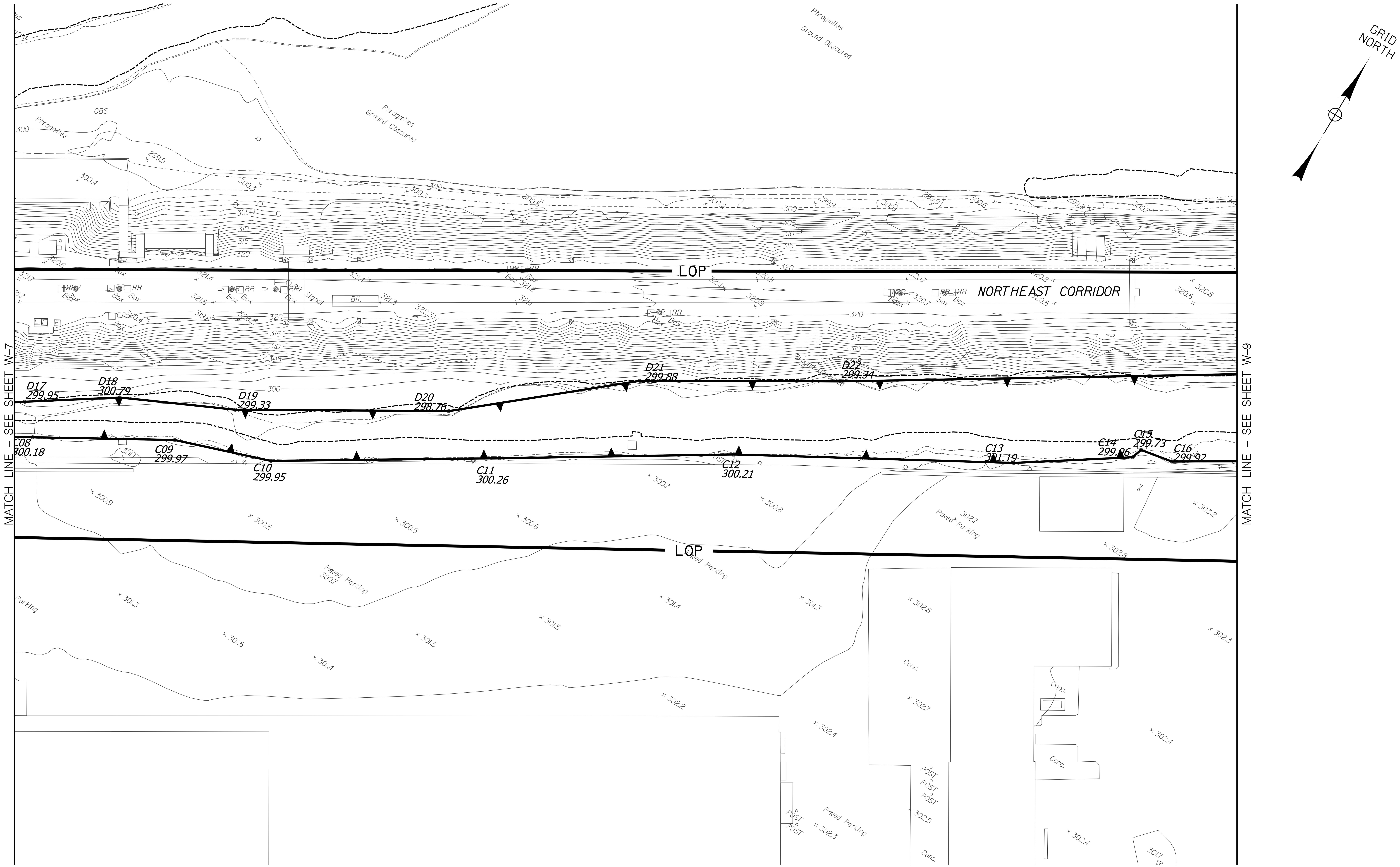

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LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.19 ACRES
OPEN WATERS	0.47 ACRES
LINEAR LENGTH OF STREAM	720 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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Dwg. No. W-8

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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.80 ACRES
OPEN WATERS	0.76 ACRES
LINEAR LENGTH OF STREAM	690 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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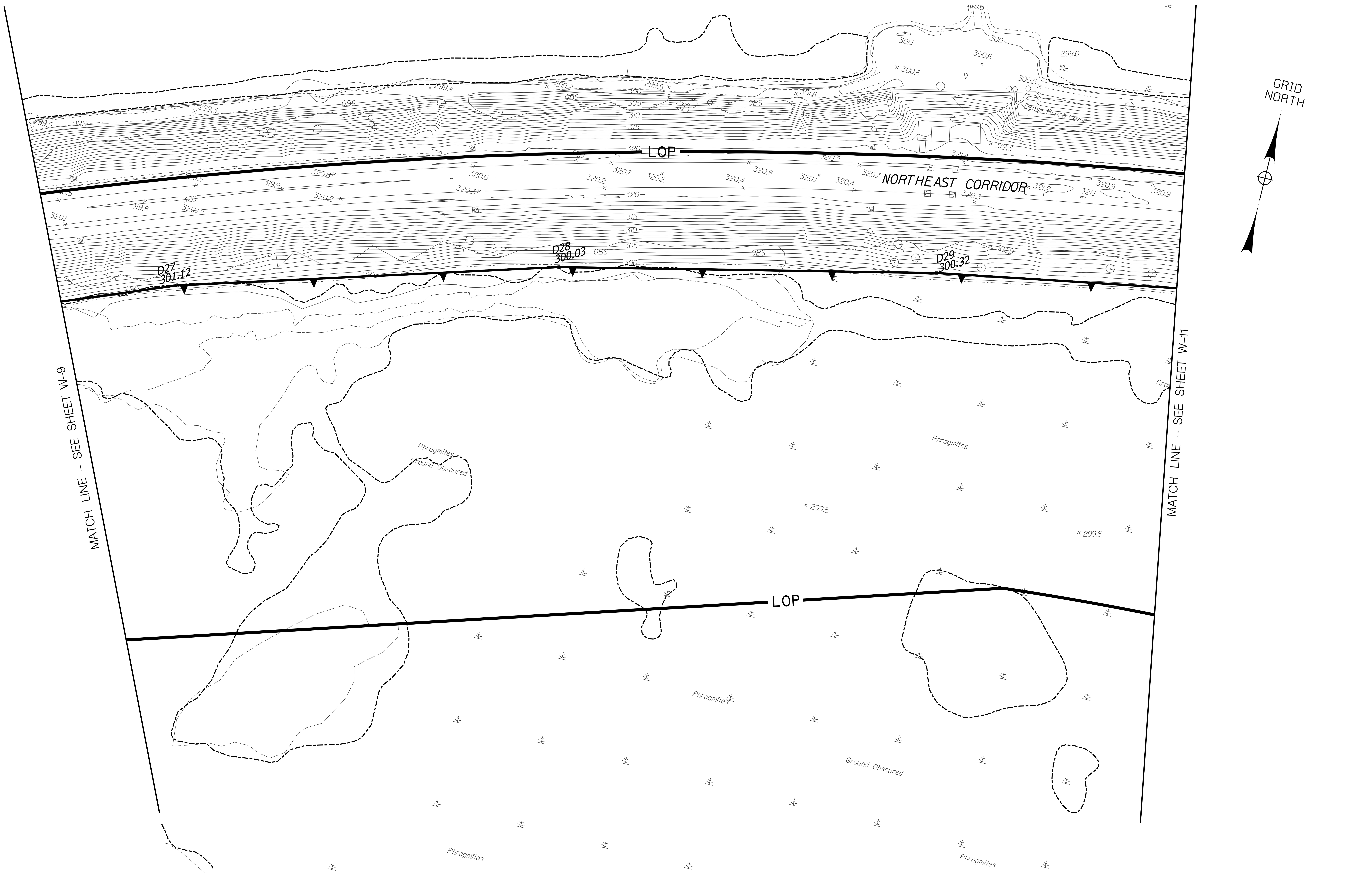

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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	1.93 ACRES
OPEN WATERS	0.85 ACRES
LINEAR LENGTH OF STREAM	890 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

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PRELIMINARY ENGINEERING
USACE JURISDICTIONAL
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Contract No.
Sheet No. OF
Dwg. No. W-10

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	2.83 ACRES
OPEN WATERS	0.48 ACRES
LINEAR LENGTH OF STREAM	937 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

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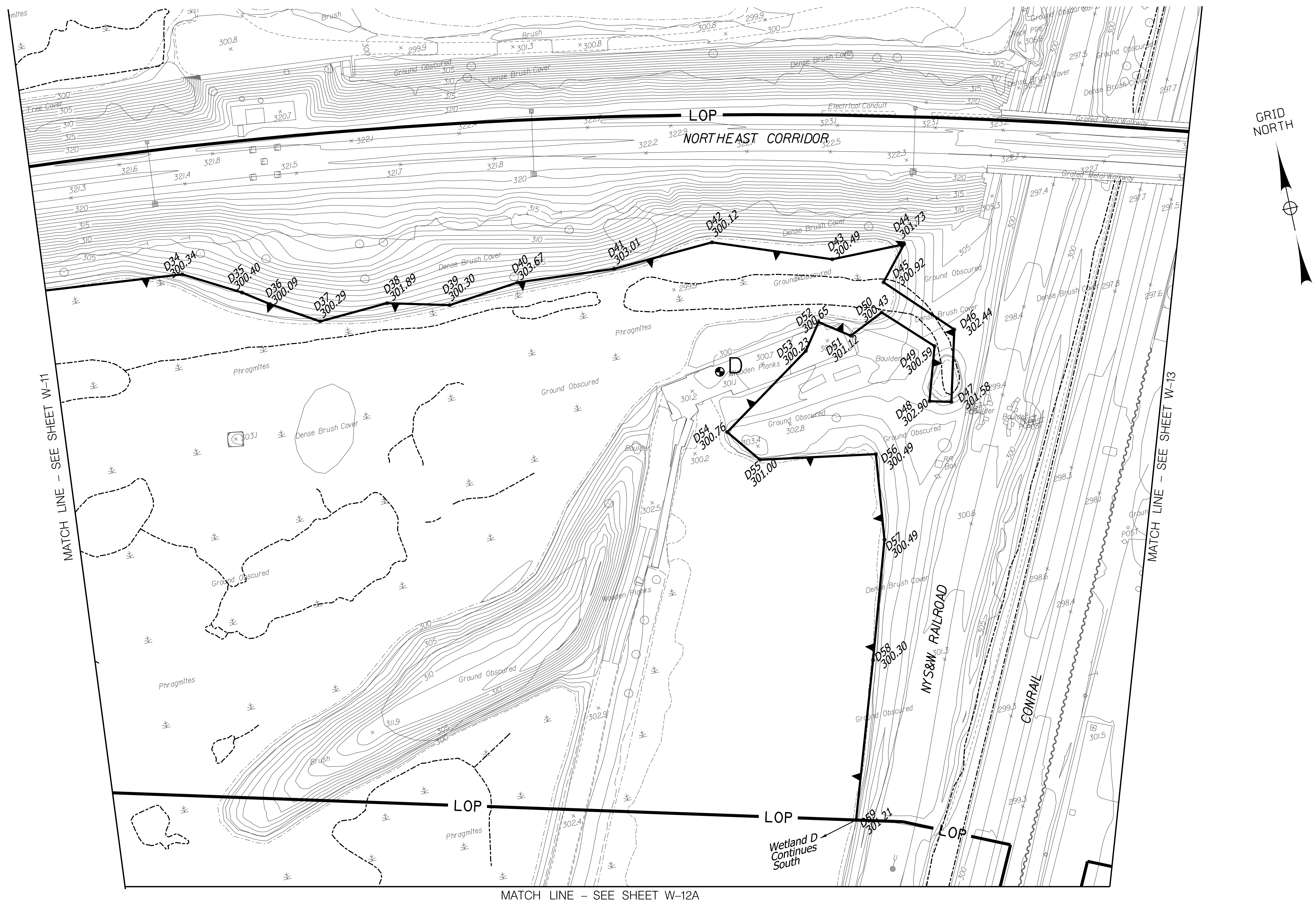
Contract No.
Sheet No. OF
Dwg. No. W-11



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP - LIMIT OF PROJECT

D - WETLAND DATA POINT SYMBOL

A1 A2 A3 A4 - WETLANDS

OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	2.85 ACRES
OPEN WATERS	0.40 ACRES
LINEAR LENGTH OF STREAM	956 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	EXTEND LOP LINE	4/24/17	TH
1	ADDED TABLE AND DATA POINT	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-12

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

– OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.000 ACRES
OPEN WATERS	0.000 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By

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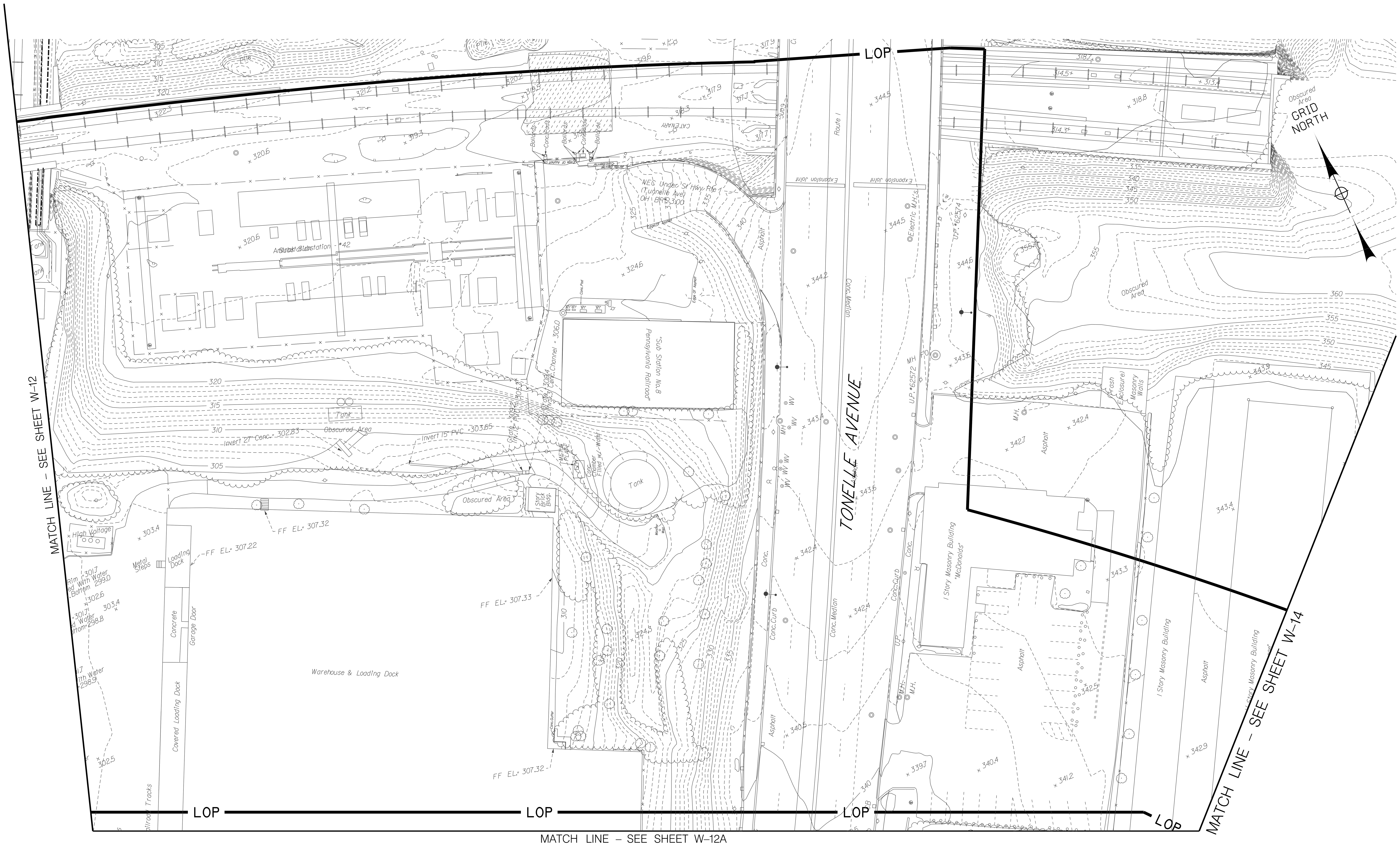
Contract No.

Sheet No. OF

Dwg. No. W-12A



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

—LOP— - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.000 ACRES
OPEN WATERS	0.005 ACRES
LINEAR LENGTH OF STREAM	66 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	REMOVED WETLAND E PER USACE GUIDANCE	4/17/17	RB
1	ADDED TABLE	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-13

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.
Sheet No. OF
Dwg. No. W-14

MATCH LINE – SEE SHEET W-14

MATCH LINE – SEE SHEET W-16

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

—LOP— – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-15

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
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LEGEND:

- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.
Sheet No. OF
Dwg. No. W-16

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-17

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Designed THH | Drawn RCRC | Checked MMM | Date 3/01/2017

Contract No.

Sheet No. OF

Dwg. No. W-18

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

—LOP— – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

- - - - - - – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-19

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP — LIMIT OF PROJECT
- E,F — WETLAND DATA POINTS SYMBOL
- A1 A2 A3 A4 — WETLANDS
- - - - - - — OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.16 ACRES
OPEN WATERS	0.06 ACRES
LINEAR LENGTH OF STREAM	770 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	ADDED CALLOUT TO CULVERT AND OPEN WATER	4/17/17	RB
1	ADDED TABLE AND DATA POINTS	3/15/17	TH

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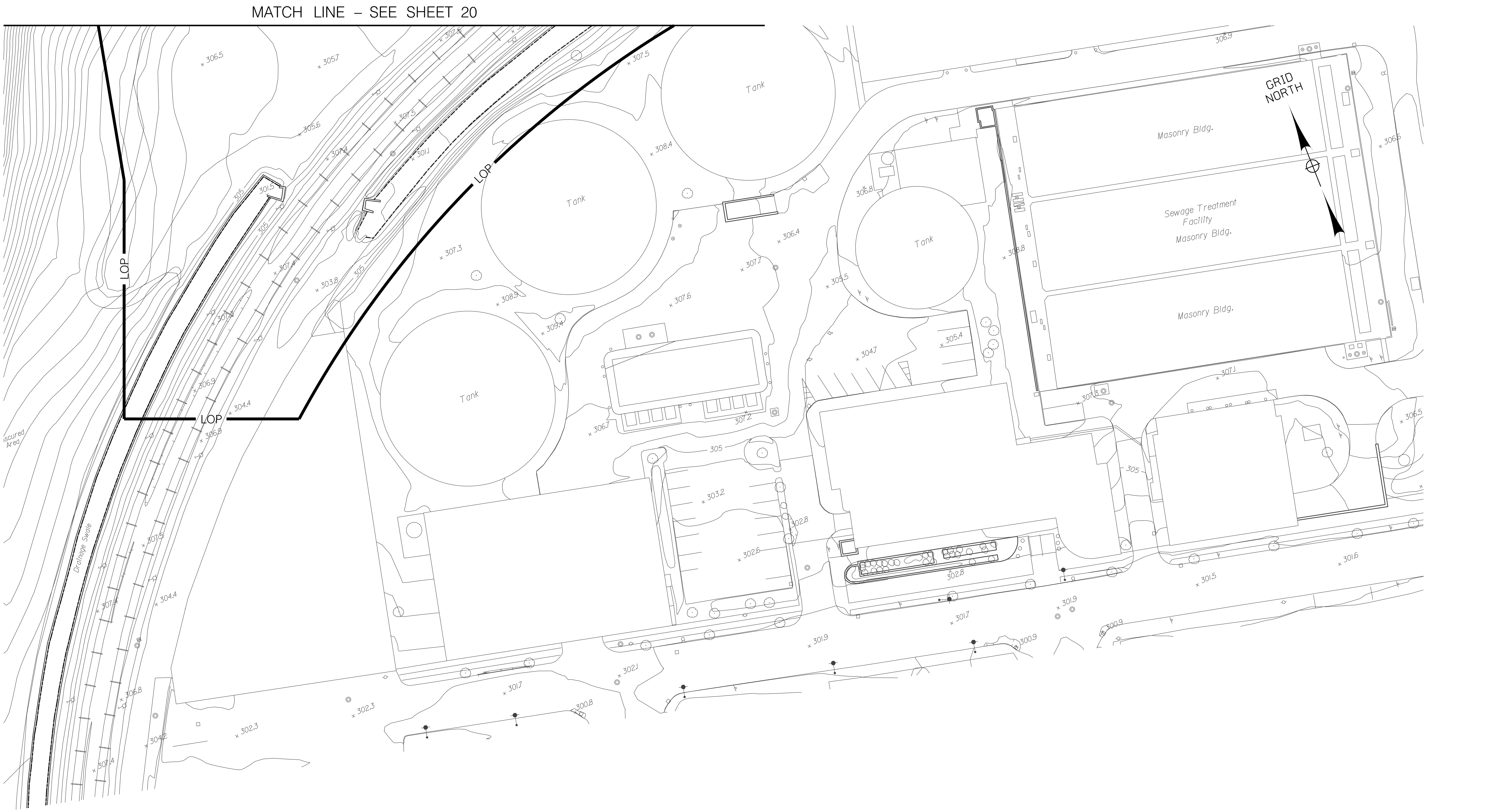
Contract No.
Sheet No. OF
Dwg. No. W-20



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LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

– OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0.07 ACRES
LINEAR LENGTH OF STREAM	190 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.
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Dwg. No. W-20A

NOTES:

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LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

– OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.10 ACRES
OPEN WATERS	0.13 ACRES
LINEAR LENGTH OF STREAM	520 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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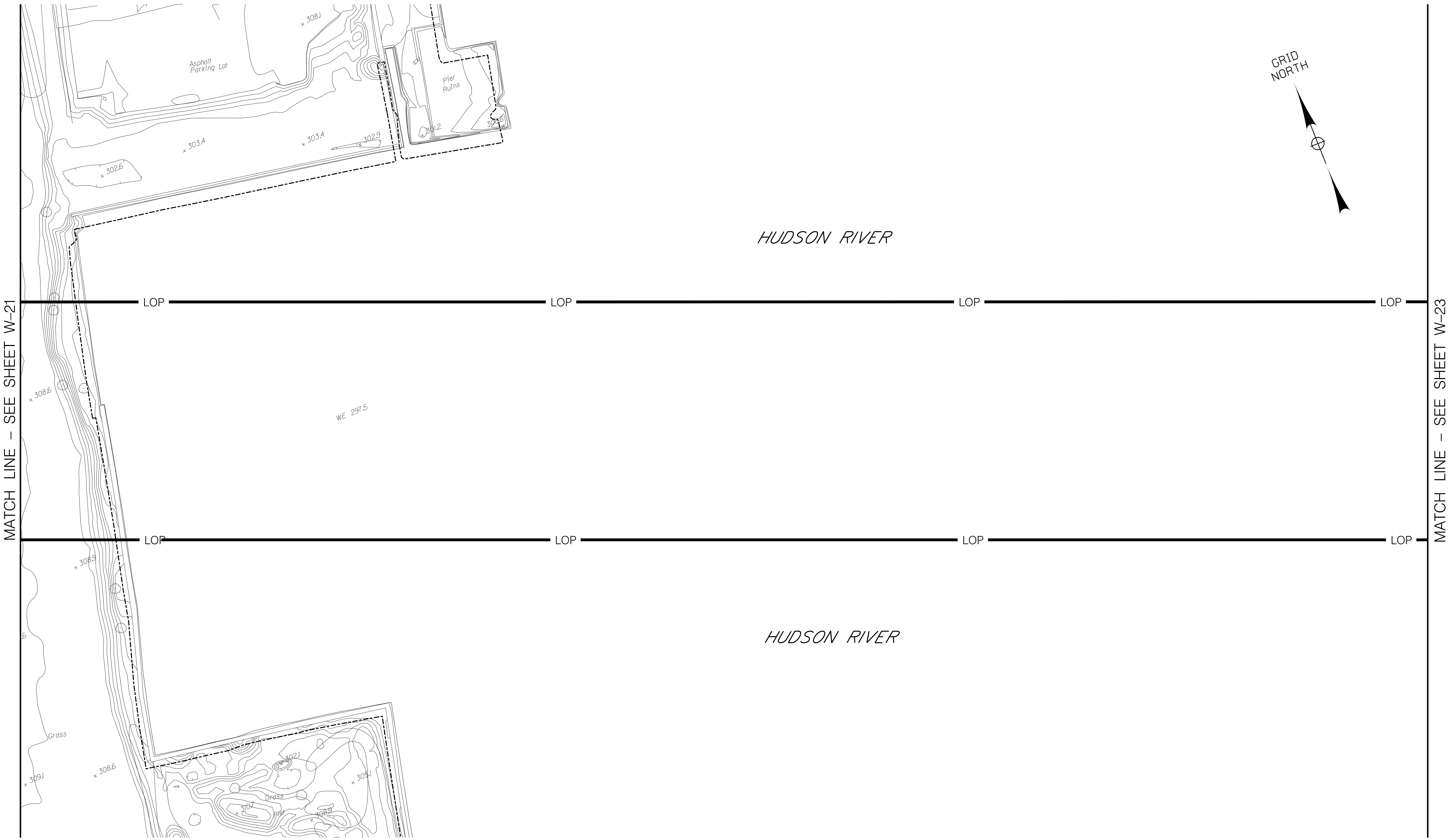
Sheet No. OF
Dwg. No. W-21



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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.68 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.

Sheet No. OF

Dwg. No. W-22

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
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LEGEND:

—LOP— - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.80 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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Contract No.
Sheet No. OF
Dwg. No. W-23

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	153 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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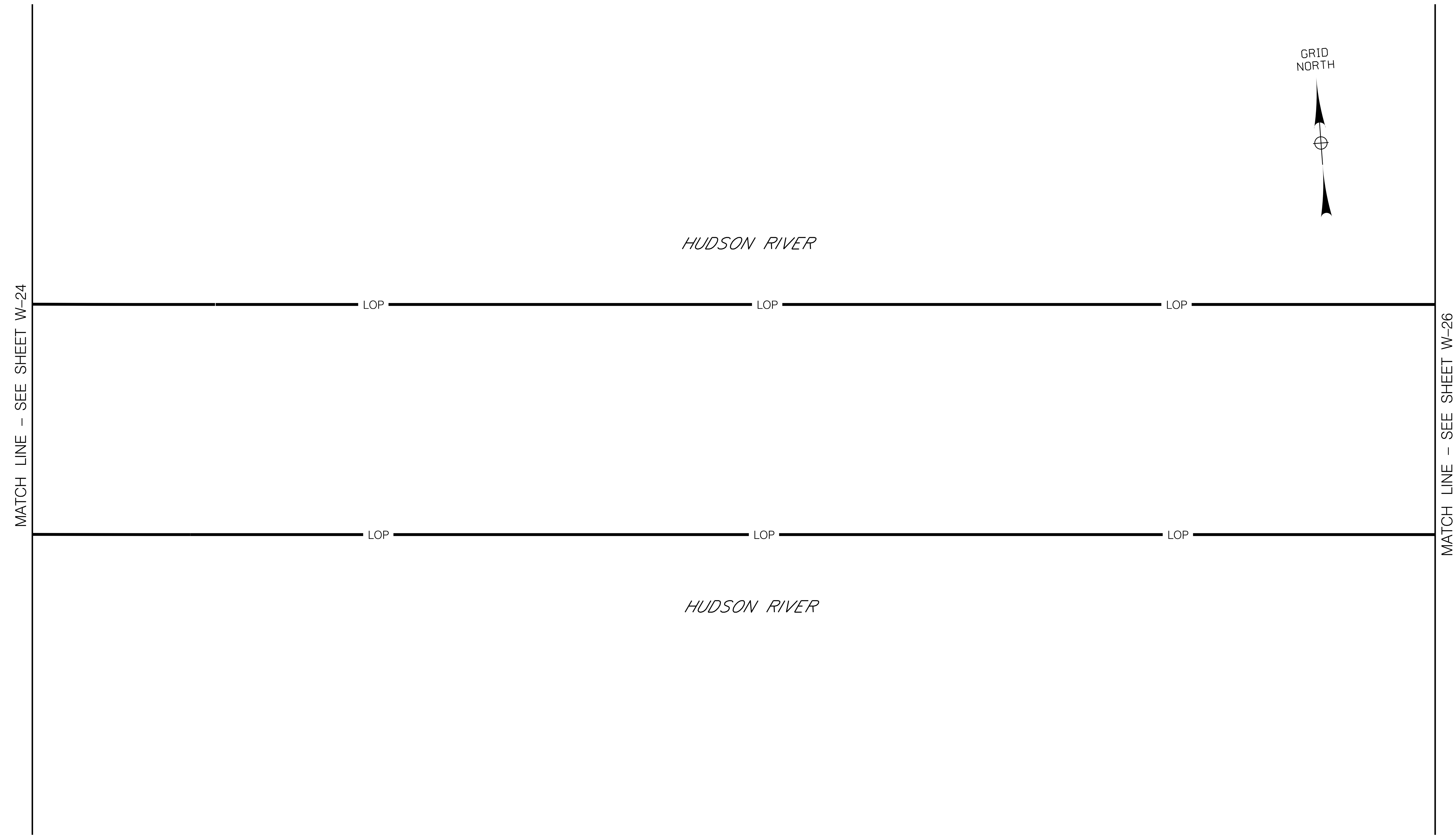

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2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP - LIMIT OF PROJECT
A1 A2 A3 A4 - WETLANDS
- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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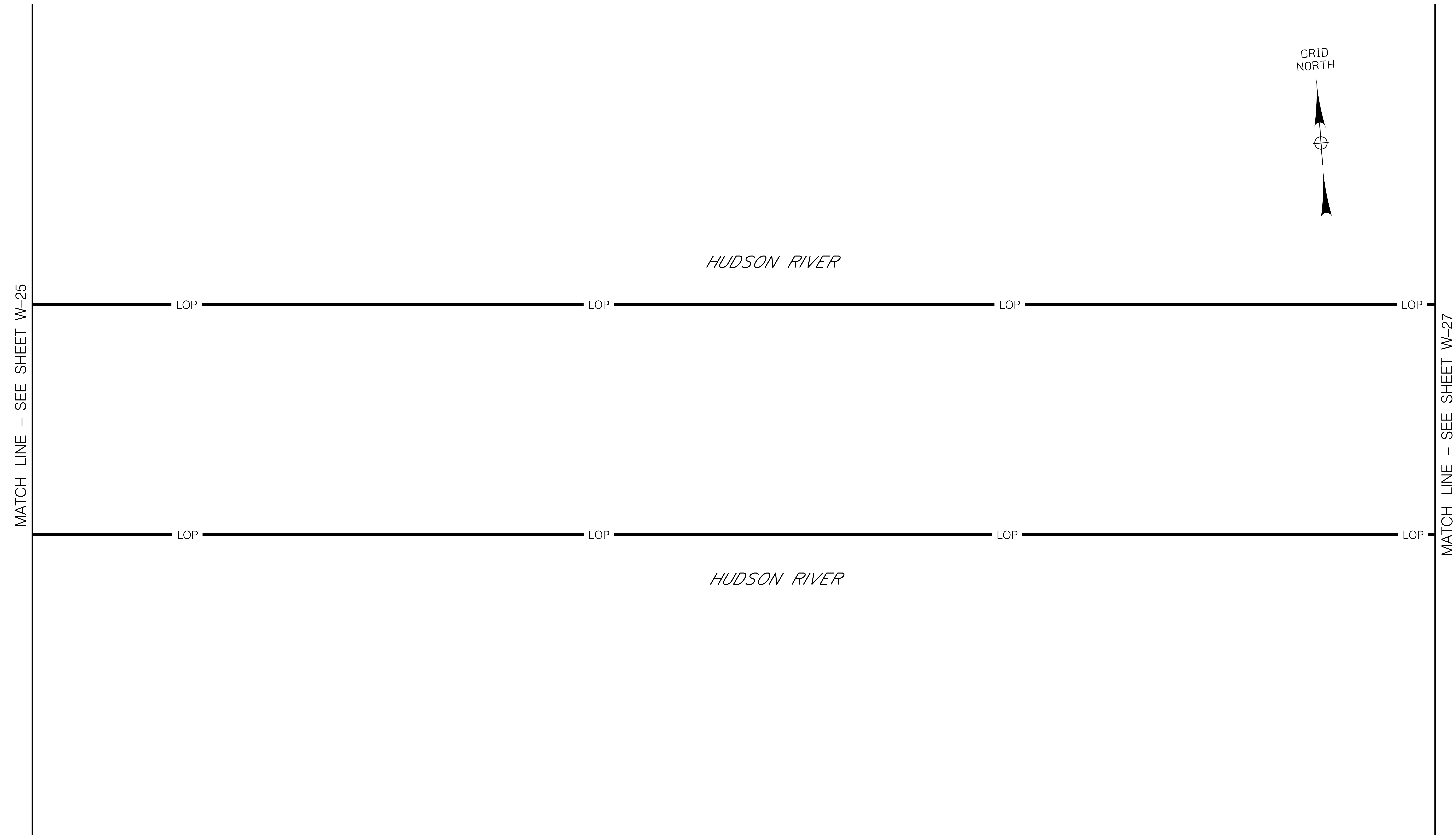
HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-25



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

– OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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STRUCTURES
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30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership

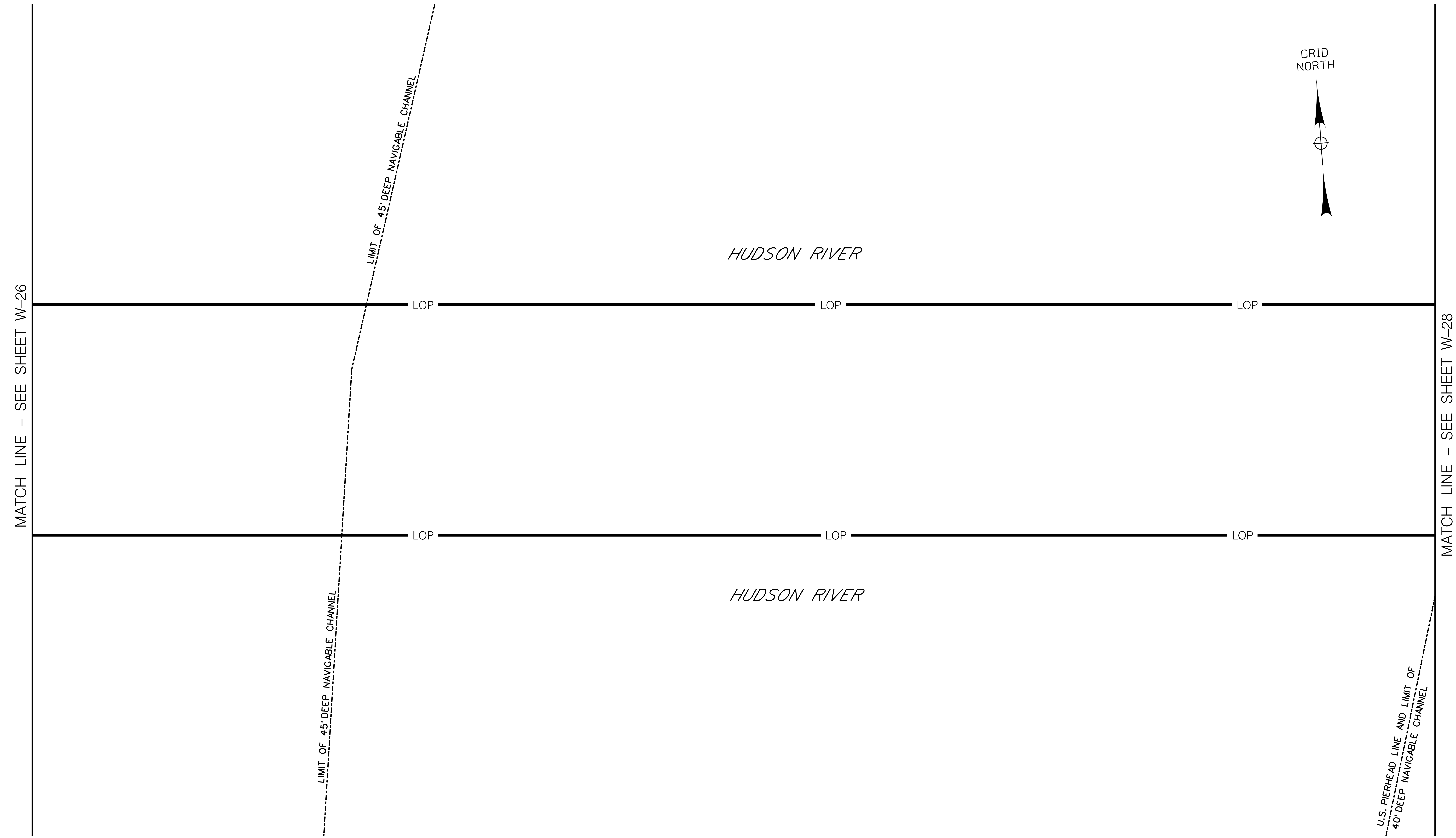
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL
DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-26



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LEGEND:

LOP - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

- OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET

30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND NAVIGABLE CHANNEL	3/15/17	TH

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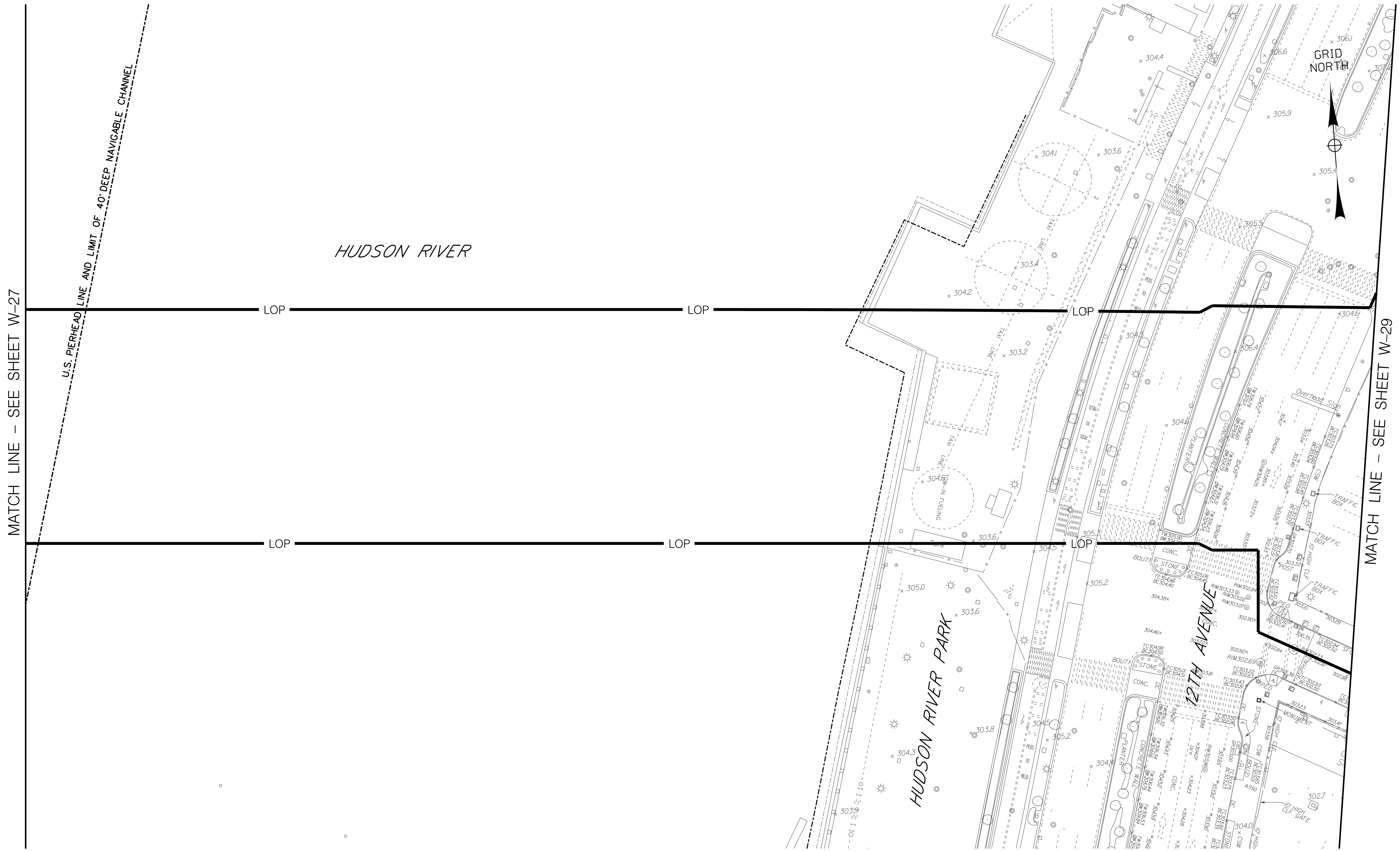
Contract No.

Sheet No. OF

Dwg. No. W-27



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LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

- - - - – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	1.65 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND NAVIGABLE CHANNEL	3/15/17	TH

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DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.

Sheet No. OF

Dwg. No. W-28

NOTES:

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LEGEND:

- LOP - LIMIT OF PROJECT
- A1 A2 A3 A4 - WETLANDS
- ---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

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Contract No.
Sheet No. OF
Dwg. No. W-29

NOTES:

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LEGEND:

- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

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	AREA OF WETLANDS WITHIN THE LIMIT OF PROJECT (Acres)	AREA OF OPEN WATERS WITHIN THE LIMIT OF PROJECT (Acres)	MEAN HIGH WATER ELEVATION (Feet)	SPRING HIGH WATER ELEVATION (Feet)
A	1.96	0.51	2.38	2.70
B	0.01	0.00	N/A	N/A
C/D	8.77	3.17	2.38	2.70
F	0.30	0.06	1.96	2.28
TOTAL	11.04	3.74		

NOTES:

1. THE PROPOSED HUDSON TUNNEL WILL EXTEND 5,569 LINEAR FEET BENEATH THE HUDSON RIVER FROM THE BULKHEAD IN HOBOKEN, NEW JERSEY TO THE BULKHEAD IN MANHATTAN, NEW YORK.

2. WITHIN THE HUDSON RIVER, THE SPRING HIGH WATER ELEVATION IN THE PROJECT AREA IS 2.28 FEET (NAVD 88)

No.	Revisions	Date	By

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Contract No.

Sheet No. OF

Dwg. No. W-31

Attachment 2:

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: A

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range:

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

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope; WectA – Westbrook mucky peat, 0-2% slopes, very frequently flooded NWI classification: E2EMM5P6

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

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

Are Vegetation N , Soil N , or Hydrology N 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 X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Soils are made land as evidenced by the amount of ceramic and other non-soil, non-organic materials in the soils.

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	
X Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches):
Water Table Present?	Yes X	No ____	Depth (inches): 10
Saturation Present?	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? Yes X **No**

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: A

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	80	Y	FACW
2. *Eupatorium perfoliatum*	15	N	FACW
3. *Phytolacca americana*	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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

Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: A

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/1	100					Silt clay	
12-17	10YR 3/4	100					Loamy sand	Ceramic

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

Hydric Soil Indicators:

____ Histosol (A1)
____ Histic Epipedon (A2)
____ Black Histic (A3)
____ Hydrogen Sulfide (A4)
____ Stratified Layers (A5)
____ Depleted Below Dark Surface (A11)
____ Thick Dark Surface (A12)
____ Sandy Mucky Mineral (S1)
____ Sandy Gleyed Matrix (S4)
____ Sandy Redox (S5)
____ Stripped Matrix (S6)
____ Dark Surface (s7) (**LRR, MLRA, 149B**)
____ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
____ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
____ Loamy Mucky Mineral (F1) (**LRR K, L**)
____ Loamy Gleyed Matrix (F2)
____ Depleted Matrix (F3)
____ Redox Dark Surface (F6)
____ Depleted Dark Surface (F7)
____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

____ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
____ Coast Prairie Redox (A16) (**LRR K, L, R**)
____ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
____ Dark Surface (S7) (**LRR, K, L**)
____ Polyvalue Below Surface (S8) (**LRR K, L**)
____ Thin Dark Surface (S9) (**LRR K, L**)
____ Iron-Manganese Masses (F12) (**LRR K, L, R**)
____ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
____ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
Red Parent Material (F21)
____ Very Shallow Dark Surface (TF12)
X Other (explain in Remarks)

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

Field Observations:
Type: ________
Depth (inches): ________

Hydric Soil Present? **Yes** X **No**

Remarks:

Soils are significantly disturbed made land. Although the hydric soil indicators listed above are not present, hydrophytic vegetation and wetland hydrology indicators are present. Thus under undisturbed conditions, soils would show hydric soil indicators.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel   City/County: Secaucus/Hudson County   Sampling Date: November 3, 2016

Applicant/Owner: Amtrak   State: NJ   Sampling Point: B

Investigator(s): Jesse Moore and Kurt Philipp   Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Depression   Local relief (concave, convex, none): Concave   Slope (%): ____

Subregion (LRR or MLRA): LRR R   Lat: 40.76949   Long: -74.05695   Datum: ____

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope   NWI classification: None

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

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

Are Vegetation N, Soil N, or Hydrology N 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 X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Soils are made land as evidenced by the amount of ceramic and other non-soil, non-organic materials in the soils.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- X 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)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on 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)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____	
Water Table Present?	Yes ____	No X	Depth (inches): ____	
Saturation Present?	Yes X	No ____	Depth (inches): 11	**Wetland Hydrology Present? Yes** X **No**

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: B

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation
X 2 – Dominance Test is >50%
___ 3 – Prevalence Index is #3.0[1]
___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: B

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/1	95	10YR 3/6	5	C	PL	Silt loam	Redox
11-24	10YR 3/1	85	2.5YR 3/6	15	C	M	Clay	Redox

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

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

Field Observations:
Type: ______
Depth (inches): ______

Hydric Soil Present? **Yes** X **No**

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: C

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ____

Subregion (LRR or MLRA): LRR R Lat: 40.76886 Long: -74.05855 Datum: ____

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope NWI classification: None

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

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

Are Vegetation N, Soil N, or Hydrology N 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 X	No	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** X
Hydric Soil Present?	Yes	No X		
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

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)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on 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)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? Yes ____ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: C

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Eupatorium perfoliatum*	5	Y	FACW
2. *Carex annectens*	1	N	FACW
3. *Solanum dulcamara*	1	N	FAC
4. *Phytolacca americana*	2	N	FACU
5. *Lythrum salicaria*	1	N	OBL
6. *Phragmites australis*	1	N	FACW
7.			
8.			
9..			
10.			
11.			
12.			
	11	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index Worksheet:

Total % Cover of:		Multiply by
OBL species		x1=
FACW species		x2=
FAC species		x3=
FACU species		x4=
UPL species		x5=
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation
X 2 – Dominance Test is >50%
___ 3 – Prevalence Index is #3.0[1]
___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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

Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: C

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Silt loam	Brick fragments

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

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ____ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ____ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ____ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ____ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ____ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ____ Dark Surface (S7) (**LRR, K, L**)
- ____ Polyvalue Below Surface (S8) (**LRR K, L**)
- ____ Thin Dark Surface (S9) (**LRR K, L**)
- ____ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ____ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ____ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (explain in Remarks)

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

Field Observations:
Type: ____________________
Depth (inches): ____________________

Hydric Soil Present? **Yes** **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: D

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR or MLRA): LRR R Lat: 40.77206 Long: -74.04547 Datum: ______

Soil Map Unit Name: WectA – Westbrook mucky peat, 0-2% slopes, very frequently flooded NWI classification: E2EM5Pd6

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

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation N , Soil N , or Hydrology N 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 X	No	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ______
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	
X Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ______	No X	Depth (inches): ______
Water Table Present?	Yes X	No ______	Depth (inches): 7
Saturation Present?	Yes X	No ______	Depth (inches): 0

Wetland Hydrology Present? Yes X **No**

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: D

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. Phragmites australis	25	Y	FACW
2. *Typha angustifolia*	5	N	OBL
3. *Eupatorium perfoliatum*	7	Y	FACW
4. *Baccharis halimifolia*	3	N	FACW
5. *Lythrum salicaria*	1	N	OBL
6. *Panicum sp*	1	N	
7. Panicum virgatum	5	N	FAC
8. Setaria parviflora	2	N	FAC
9.. *Euthamia graminifolia*	1	N	FAC
10. Alisma plantago-aquatica	3	N	OBL
11. Echinocloa walteri	2	N	OBL
12. Persicaria lapathifolia	1	N	FACW
	56	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=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		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation
X 2 – Dominance Test is >50%
___ 3 – Prevalence Index is #3.0[1]
___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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

Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: D

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
0-7	7.5YR 2.5/1	100					Sandy silt	Grey stone, refusal >7 inches

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- X Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

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

Field Observations:
Type: Refusal
Depth (inches): 7

Hydric Soil Present? **Yes** X **No**

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel – Ventilation Shaft City/County: Hoboken/Hudson County Sampling Date: December 19, 2016

Applicant/Owner: NJ TRANSIT, Hudson-Bergen Light Rail State: NJ Sampling Point: E

Investigator(s): Jesse Moore Section, Township, Range: Hoboken

Landform (hillslope, terrace, etc.): Level Local relief (concave, convex, none): None Slope (%): ______

Subregion (LRR or MLRA): LRR R Lat: 40.758324 Long: -74.031288 Datum: ______

Soil Map Unit Name: LagA – Laguardia artifactual coarse sandy loam, 0-3 percent slopes NWI classification: None

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

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

Are Vegetation N , Soil N , or Hydrology N 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 X	No ____	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No ____		
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

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

____ Surface Water (A1)	____ Water-Stained Leaves (B9)	
____ High Water Table (A2)	____ Aquatic Fauna (B13)	
____ Saturation (A3)	____ Marl Deposits (B15)	
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)
____ Drainage Patterns (B10)
____ Moss Trim Lines (B16)
____ Dry-Season Water Table (C2)
____ Crayfish Burrows (C8)
____ Saturation Visible on Aerial Imagery (C9)
____ Stunted or Stressed Plants (D1)
____ Geomorphic Position (D2)
____ Shallow Aquitard (D3)
____ Microtopographic Relief (D4)
____ FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? Yes ____ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: E

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	20	Y	FAC
2.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Digitaria sp.*	75	Y	FACU
2. *Plantago lanceolata*	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	80	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1. Celastrus orbiculatus	3	Y	UPL
2. Toxicodendron radicans	5	Y	FAC
3.			
4.			
	8	=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: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by
OBL species		x1=
FACW species		x2=
FAC species		x3=
FACU species		x4=
UPL species		x5=
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation
X 2 – Dominance Test is >50%
___ 3 – Prevalence Index is #3.0[1]
___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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

Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: E

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100					Loamy	Contains gravel and ballast

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (s7) (**LRR, MLRA, 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR, K, L**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

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

Field Observations:
Type: ____________
Depth (inches): ____________

Hydric Soil Present? **Yes** **No**

Remarks:

The ground was partially frozen and refusal was met below 10 inches depth.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel – Ventilation Shaft   City/County: Hoboken/Hudson County   Sampling Date: December 19, 2016

Applicant/Owner: NJ TRANSIT, Hudson-Bergen Light Rail   State: NJ   Sampling Point: F

Investigator(s): Jesse Moore   Section, Township, Range: Hoboken

Landform (hillslope, terrace, etc.): Ditch   Local relief (concave, convex, none): Concave   Slope (%): ____

Subregion (LRR or MLRA): LRR R   Lat: 40.758113   Long: -74.030680   Datum: ____

Soil Map Unit Name: LagA – Laguardia artifactual coarse sandy loam, 0-3 percent slopes   NWI classification: None

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

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

Are Vegetation N , Soil N , or Hydrology N 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 X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes ____ No ____		
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on 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)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 3
Water Table Present?	Yes X	No ____	Depth (inches): 0.5
Saturation Present?	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? Yes X **No**

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

Remarks:

There is a culvert located at the mid-point (with regards to east-west direction) of the wetland. Waters within the wetland appeared to be brackish.

VEGETATION – Use scientific names of plants. Sampling Point: F

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	

Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	

Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 – Rapid Test for Hydrophytic Vegetation
X 2 – Dominance Test is >50%
___ 3 – Prevalence Index is #3.0[1]
___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Vegetation Strata:

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

Sapling/shrub – Woody plants less than 3 in. DBH and creater than or equal to 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 vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: F

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100					Loamy sand	Contains glass, gravel, and ballast

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (s7) (**LRR, MLRA, 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR, K, L**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

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

Field Observations:
Type: ____
Depth (inches): ____

Hydric Soil Present? **Yes** **No**

Remarks:

The ground was partially frozen and refusal was met below 3 inches depth.

APPENDIX 11-3

Essential Fish Habitat

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD website will assist you in completing this worksheet. The HCD website contains information regarding: the EFH consultation process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Our website also includes a link to the NOAA EFH Mapper .
We would note that the EFH Mapper is currently being updated and revised. Should you use the EFH Mapper to identify federally managed species with designated EFH in your project area, we recommend checking this list against the Guide to Essential Fish Habitat Designations in the Northeast to ensure a complete and accurate list is provided.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: Hudson Tunnel Project

DATE: 01/25/2018

PROJECT NO.:

LOCATION (Water body, county, physical address):
Hudson River, between New York County NY, and Hudson County NJ; Hackensack Meadowlands, NJ

PREPARER: AKRF, Inc.

Step 1: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest. Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS

EFH Designations	Yes	No
Is the action located in or adjacent to EFH designated for eggs? List the species: Winter flounder, windowpane flounder, scup, king mackerel, Spanish mackerel, cobia, bluefin tuna, smooth dogfish See Table 1	✔	
Is the action located in or adjacent to EFH designated for larvae? List the species: Red hake, winter flounder, windowpane flounder, Atlantic herring, Atlantic butterfish, summer flounder, scup, king mackerel, Spanish mackerel, cobia, bluefin tuna, smooth dogfish, sand tiger shark, dusky shark, sandbar shark See Table 1	✔	
Is the action located in or adjacent to EFH designated for juveniles? List the species: Red hake, winter flounder, windowpane flounder, Atlantic herring, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, clearnose skate, little skate, winter skate, bluefin tuna, smooth dogfish See Table 1	✔	

Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species: Adults: Red hake, winter flounder, windowpane flounder, Atlantic herring, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, clearnose skate, little skate, winter skate, bluefin tuna, smooth dogfish, sand tiger shark Spawning adults: Winter flounder and windowpane flounder See Table 1	✔	

If you answered 'no' to all questions above, then an EFH consultation is not required - go to Section 5.

If you answered 'yes' to any of the above questions, proceed to Section 2 and complete the remainder of the worksheet.

Step 2: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Subtidal and water column habitats are present at the Project site in the Hudson River. The portion of the project located in the New Jersey Meadowlands (Meadowlands) comprises emergent wetland and associated open waters (subtidal, intertidal, and water column habitats).
What are the sediment characteristics?	Sediments in the lower Hudson River are primarily composed of silt and clay with pockets of sand. Sediments in the portion of the Project site in the Meadowlands comprise mainly silt, organic material, and detritus.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	There is no submerged aquatic vegetation at or adjacent to the Project site.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	Mapped NYSDEC Littoral Zone wetlands and NWI Estuarine and Marine Deepwater wetlands (E1UBL) are present in the vicinity of the soil improvement area within the Hudson River. Large areas of NWI-mapped estuarine wetlands (E2EM5P6, E2EM5Pd6, E1UBLx6, and E1UBL) and smaller areas of freshwater wetlands are present within the New Jersey study area in the Meadowlands. There is also a section of NJDEP-mapped "Phragmites Dominate Interior Wetlands" in the Meadowlands area. An existing USACE-approved wetland mitigation site, implemented in 2014, is located within the Project area in Secaucus, NJ (the NYSW Wetland Mitigation Site).

Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	Hard clams (Mercenaria mercenaria) occur in soft substrates of the lower Hudson River year-round and could be present in the low-cover area. Soft-shell clams (Mya arenaria) could also be found in the vicinity, although they would more likely occur in the shallower waters outside the low-cover area. There are no known oyster beds in the vicinity of the Project location in the Hudson River. Shellfish that may occur in the New Jersey portion of the Project site include: ribbed mussel (Geukensia demissa) and mud snail (Nassarius obsoleta).
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	There are no mudflats at or adjacent to the Project site.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	There is no rocky or cobble bottom habitat present at or adjacent to the Project site. Sediments are silt and clay with some pockets of sand in the Hudson River, and silt with organic matter and detritus in the New Jersey portion of the Project site.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	There are no HAPCs designated at or near the Project site.
What is the typical salinity, depth and water temperature regime/range?	Based on NYCDEP water quality data from 2000-2015, salinity ranges from 0.3 to 30.5 ppt in the Hudson River project area, depending on tidal direction and amount of freshwater inflow. Temperature typically ranges from 32 to 81 degrees Fahrenheit. Water depths in the low cover area range from about 40 to 50 feet. In the New Jersey portion of the site, waters are mainly fresh or very low salinity. Average water temperature ranged from 13.5C to 18.3C between 1993 and 2015 (data from Meadowlands Environmental Research Institute), and depths generally range from less than a foot to 3 feet in most areas, with deeper water depths (greater than 4 feet) in the NYSW Wetland Mitigation Site.
What is the normal frequency of site disturbance, both natural and man-made?	The existing underwater environment experiences disturbance from boat traffic, as well as natural disturbance from tidal action. Due to the level of existing shoreline development in the area, human activity along the shoreline is common. Major natural disturbances are infrequent, in the form of periodic extreme storm events.
What is the area of proposed impact (work footprint & far afield)?	See Attachment 1 (Drawings ST-369 and ST-370). In-water work in the Hudson River comprises the 1.5-acre footprint of the low-cover area where soil will be stabilized via jet grouting or deep soil mixing. In the Meadowlands, 4.6 acres of wetlands and associated open waters would be permanently impacted due to a permanent access road, culverts, piles supporting a viaduct, and bridge foundation. Of this, 0.09 acres would be within the NYSW Wetland Mitigation Site within the Meadowlands and would be permanently impacted. Outside the Meadowlands, approximately 0.4 acres of emergent wetland and associated open water area within the Hudson-Bergen Light Rail (HBLR) right-of-way in Hoboken would be permanently impacted by a construction access road. Approximately 1.5 acres of wetlands and open water areas in the Meadowlands would be temporarily impacted due to sediment control measures and security fencing.

Step 3: **This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.**

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			See Attachment 2 for a detailed description of the Preferred Alternative.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	✔		There will be a permanent modification of soft bottom benthic habitat in the 1.5-acre footprint of the in-water low cover area. Cement grout will be combined with native soil, resulting in a hard bottom "soilcrete" substrate, which can eventually be colonized by encrusting organisms. In the New Jersey Meadowlands, approximately 4.2 acres of bottom habitat would be disturbed due to the permanent access road, culverts, piles to support the viaduct and the bridge footing, and the retained fill embankment.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		✔	There is no submerged aquatic vegetation in the study area.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		✔	There is no salt marsh habitat in the study area. In the New Jersey Meadowlands portion of the site, 4.6 acres of freshwater wetlands and associated open waters would be permanently impacted, of which 0.09 acres of freshwater wetlands would be within the NYSW Wetland Mitigation Site within the Meadowlands. Outside the Meadowlands, approximately 0.4 acres of emergent wetland and associated open water area within the Hudson-Bergen Light Rail (HBLR) right-of-way in Hoboken would be permanently impacted by a construction access road. An additional approximately 1.5 acres of freshwater wetlands and associated open water areas in the Meadowlands would be temporarily impacted due to sediment control measures and security fencing placed during construction. Temporary and permanent impacts to freshwater emergent wetlands and associated open waters in the New Jersey portion of the Project site are described in detail in Attachment 2.

Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?	☐	✔	There is no mudflat habitat in the study area.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact? Provide details of any shellfish survey conducted at the site.	✔	☐	Soft substrate suitable for hard and soft-shell clams, and any shellfish present at the time, will be modified within the low cover area. Shellfish would continue colonizing soft bottom habitats in the vicinity of the soil improvement area and would not be adversely affected by the Preferred Alternative. No shellfish habitat would be impacted within the New Jersey portion of the Project site. No shellfish surveys have been conducted within the Project site.
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?	☐	✔	There is no hard bottom habitat within the Project site in the Hudson River and in New Jersey. The Preferred Alternative will result in the replacement of 1.5 acres of soft bottom habitat with a hard bottom soilcrete substrate.
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	✔	☐	Sedimentation rates in the Hudson River and within the Meadowlands will not change. In the Hudson River, sediments will be altered from silt/clay to a mix of cement grout and native soil in the 1.5-acre area of ground improvement. Of this, approximately 0.8 acres will be level with the mudline, and 0.7 acres will be elevated between 1 and 2 feet above the mudline.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	✔	☐	There may be temporary localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be used during removal of the cofferdams to minimize the effects of sediment disturbance. Any resuspended sediment will settle quickly following these activities. Subsequent in-water work will be conducted within the cofferdams and will not result in increased turbidity. Within the Meadowlands, there may be temporary localized increases of turbidity during the installation of the permanent access road, installation of culverts and pile driving. These would be localized and temporary, ceasing shortly after the activity. Construction of the new culverts would include the installation of a temporary cofferdam to minimize sediment resuspension. Erosion and sediment control measures would be implemented during construction of the permanent access road to minimize discharge of sediment to wetlands within the Meadowlands.

Will water depth change? What are the current and proposed depths?	☐	✔	The Preferred Alternative will not affect water depth.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.	✔	☐	There may be temporary resuspension of sediments and contaminants during installation and removal of the cofferdams in the Hudson River. However, jet grouting or deep soil mixing will be performed within the cofferdams and will not release contaminants into the water column. Any resuspension will be minor and sediments will settle quickly after construction. Similarly, installation and removal of cofferdams in the Meadowlands may result in temporary resuspension of sediments and contaminants but it should be temporary and localized.
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.	☐	✔	The Preferred Alternative will not alter tidal flow, currents, or wave patterns.
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	✔	☐	Installation and removal of the cofferdams may result in temporary and localized increases in turbidity. Any resuspended sediments will settle quickly upon cessation of these activities. Within the Hudson River, a turbidity curtain used during removal of the cofferdams will minimize the effects of sediment disturbance. The jet grouting or deep soil mixing will be completed within the cofferdams and will not affect water quality. No permanent effects to water quality are expected as a result of the Preferred Alternative.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	✔	☐	The Preferred Alternative will result in a minimal temporary increase in underwater noise associated with the installation of the sheet pile cofferdams and increased vessel activity in the Hudson River, and from pile installation for the viaduct in the Meadowlands. See Attachment 2
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	✔	☐	The Preferred Alternative will result in the permanent modification to 1.5 acres of soft substrate, which may serve as habitat for prey species of benthic-feeding EFH species. The Preferred Alternative will result in permanent impacts to approximately 4.2 acres of freshwater wetlands and associated open waters within the Meadowlands which may serve as habitat for prey species of EFH species. See Attachment 2.

Step 4: **This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.**

4. EFH ASSESSMENT

Functions and Values	Y	N	Describe habitat type, species and life stages to be adversely impacted
Will functions and values of EFH be impacted for:			
Spawning **If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**	✔		Spawning winter flounder may be present within the Hudson River during Jan-Apr, and windowpane may be present in May. See Attachment 3.
Nursery **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	✔		Temporary effects on butterfish, windowpane, Atlantic herring, summer flounder, and smooth dogfish could occur within the Hudson River. See Attachment 3.
Forage **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	✔		Temporary effects on juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate foraging could occur within the Hudson River. See Attachment 3.
Shelter **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**		✔	The Preferred Alternative will not affect shelter habitat within the Hudson River, as it is neither creating nor removing shelter for EFH species.

Will impacts be temporary or permanent? Please indicate in description box and describe the duration of the impacts.			The Preferred Alternative will have both temporary and permanent effects. See Attachment 3.
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	☐	✔	While NYSDEC mapped littoral zone wetlands exist in the vicinity of the in-water soil improvement area, the water is deeper than 6 feet at mean low water within the proposed cofferdam footprints and would not be regulated as tidal wetlands by the NYSDEC. None of the in-water construction activities will result in significant long-term adverse effects to EFH, and mitigation will not be required. Sheet pile installation and removal would occur from July 1 to January 20 to avoid impacts to anadromous fish during the March 1 to June 30 migratory period. Monitoring would be conducted for 5 years post-construction within the 1.5-acre soil improvement area in the Hudson River to assess recovery as fish foraging habitat. Mitigation for the impacts to wetlands and associated open waters within the New Jersey portion of the Project site will be developed in consultation with NJDEP and USACE, and will likely including the purchase of mitigation credits from an approved mitigation bank within the same watershed unit as the Project site

<u>Step 5</u>: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

Federal Agency's EFH Determination		
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**	☐	**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required.**
	✔	**The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
	☐	**The adverse effect on EFH is substantial.** **This is a request for an expanded EFH consultation.**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.**
alewife	See Attachment 4
American eel	See Attachment 4
American shad	See Attachment 4
Atlantic menhaden	See Attachment 4
blue crab	See Attachment 4
blue mussel	See Attachment 4
blueback herring	See Attachment 4

Eastern oyster	See Attachment 4
horseshoe crab	See Attachment 4
quahog	See Attachment 4
soft-shell clams	See Attachment 4
striped bass	See Attachment 4
other species:	Impacts to sturgeon are included in Attachment 4.

Useful Links

National Wetland Inventory Maps

EPA's National Estuaries Program

Northeast Regional Ocean Council (NROC) Data

Mid-Atlantic Regional Council on the Ocean (MARCO) Data

Resources by State:

Maine
Eelgrass maps

Maine Office of GIS Data Catalog

Casco Bay Estuary Partnership

Maine GIS Stream Habitat Viewer

New Hampshire
New Hampshire's Statewide GIS Clearinghouse, NH GRANIT

New Hampshire Coastal Viewer

Massachusetts
Eelgrass maps

MADMF Recommended Time of Year Restrictions Document

Massachusetts Bays National Estuary Program

Buzzards Bay National Estuary Program

Massachusetts Division of Marine Fisheries

Massachusetts Office of Coastal Zone Management

Rhode Island
Eelgrass maps

Narraganset Bay Estuary Program

Rhode Island Division of Marine Fisheries

Rhode Island Coastal Resources Management Council

Connecticut

Eelgrass Maps

Long Island Sound Study

CT GIS Resources

CT DEEP Office of Long Island Sound Programs and Fisheries

CT Bureau of Aquaculture Shellfish

Maps CT River Watershed Council

New York

Eelgrass report

Peconic Estuary Program

NY/NJ Harbor Estuary

New Jersey

Submerged Aquatic Vegetation mapping

Barnegat Bay Partnership

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Maryland

Submerged Aquatic Vegetation mapping

MERLIN

Maryland Coastal Bays Program

Virginia

Submerged Aquatic Vegetation mapping

Table 1
Essential Fish Habitat Designated Species in the Vicinity of the Hudson Tunnel Project

Species	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Red Hake (*Urophycis chuss*)		M,S	M,S	M,S	
Redfish (*Sebastes fasciatus*)	n/a				
Winter flounder (*Pseudopleuronectes americanus*)	M,S	M,S	M,S	M,S	M,S
Windowpane flounder (*Scophthalmus aquosus*)	M,S	M,S	M,S	M,S	M,S
Atlantic herring (*Clupea harengus*)		M,S	M,S	M,S	
Bluefish (*Pomatomus saltatrix*)			M,S	M,S	
Long-finned squid (*Loligo pealeii*)	n/a	n/a			
Short-finned squid (*Illex illecebrosus*)	n/a	n/a			
Atlantic butterfish (*Peprilus triacanthus*)		M	M,S	M,S	
Atlantic mackerel (*Scomber scombrus*)			S	S	
Summer flounder (*Paralicthys dentatus*)		F,M,S	M,S	M,S	
Scup (*Stenotomus chrysops*)	S	S	S	S	
Black sea bass (*Centropristis striata*)			M,S	M,S	
Surf clam (*Spisula solidissima*)	n/a	n/a			
Ocean quahog (*Artica islandica*)	n/a	n/a			
Spiny dogfish (*Squalus acanthias*)	n/a	n/a			
King mackerel (*Scomberomorus cavalla*)	X	X	X	X	
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X	
Cobia (*Rachycentron canadum*)	X	X	X	X	
Clearnose skate (*Raja eglanteria*)			X	X	
Little skate (*Leucoraja erinacea*)			X	X	
Winter skate (*Leucoraja ocellata*)			X	X	
Bluefin tuna (*Thunnus thynnus*)	X	X	X	X	
Smooth dogfish (*Mustelus canis*)	X	X	X	X	
Sand tiger shark (*Carcharias taurus*)		X(1)		X	
Dusky shark (*Carcharinus obscurus*)		X(1)			
Sandbar shark (*Carcharinus plumbeus*)		X(1)			

Notes:
S: EFH designation includes seawater salinity zone (salinity > 25%)
M: EFH designation includes mixing water / brackish salinity zone (0.5% < salinity < 25%)
F: EFH designation includes tidal freshwater salinity zone (0% < salinity < 0.5%)
X: EFH has been designated within the square for a given species and life stage.n/a – insufficient data for this life stage exists and no EFH designation has been made.
(1) These species do not have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, “larvae” for sand tiger, dusky, and sandbar sharks refers to neonates and early juveniles.
Sources: National Marine Fisheries Service. “Summary of Essential Fish Habitat (EFH) Designation” posted on the Internet at http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40407400.html and http://www.nero.noaa.gov/hcd/skateefhmaps.htm National Marine Fisheries Service EFH Mapper accessed online at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html

PERMIT PLANS SUBMITTED WITH ASSESSMENT

Attachment 2 Site Characteristics and Description of Impacts

The following information is provided in response to certain questions listed under Step 3 "Description of Impacts" of the EFH Assessment Worksheet.

Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.

The Project is the construction of a new two-track rail tunnel running approximately parallel to the existing North River Tunnel, extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Attachment 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, which is used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using either jet-grouting or deep soil mixing, a cofferdam system consisting of alternating steel pipe king piles and sections of sheet pile, will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting or deep soil mixing. During removal, a turbidity curtain will be deployed around the cofferdam in order to minimize the effects of sediment disturbance. Turbidity curtains will not be used during cofferdam installation since sediment disturbance will be minimal for this stage of construction. To limit the impacts of the construction on navigation, the work will be divided into either two or three stages, which will limit the area of the river within the 1.5-acre in-water work zone that is occupied by a cofferdam at any given time. The cofferdams may be constructed in either three stages or two stages. If implemented in three stages, the in-river work would be conducted within three separate cofferdams that are 200 feet long (first and second stages) and 150 feet long (third stage). Each stage would occur in a different construction year, for a total of three separate years for the three stage cofferdam. If implemented in two stages, the individual cofferdams would be approximately 415 feet long (first stage) and 140 feet long (second stage) and would occur in two different construction years. Whether two or three cofferdam stages, the in-water work will begin at the location of the cofferdam closest to the Manhattan shoreline and move outward toward the 45-foot-deep Federal Navigation Channel.

Steel pipe king piles will support the sheet pile sections, providing additional strength and stability to the cofferdam structure. The king piles will be 54 inches in diameter. If a three-stage cofferdam is used, approximately 70 king piles would be used for each stage. If a two-stage cofferdam is used, the first stage would have approximately 114 king piles and the second stage would have approximately 56 king piles. The number of king piles required is based on preliminary estimates and will be subject to change by the final design/build contractor. The sheet pile cofferdam walls and supporting steel pipe king piles will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 12 hours per day, 5 days per week, and for up to 7 weeks for each cofferdam stage. Removal of the king piles and sheet pile walls will take up to 3 weeks and will also be conducted using a vibratory hammer. No in-water work, including driving or removal of sheet pile, will occur between January 21st and June 30th. The areas within the cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet over a period of up to 19 weeks, in waters a few feet lower than that outside the cofferdam. In total, in-water work will take approximately 29 weeks to complete, per cofferdam.

The jet grouting or deep soil mixing will be conducted within the cofferdams in waters ranging from 30 to 50 feet in depth, and grout will be injected or mixed into the soil to a depth of approximately 34 feet below the river bottom (the midpoint of the tunnel's height) and up to the surface of the river bottom sediment.

Jet grouting and deep soil mixing operations both create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to low strength rock. Jet grouting mixes native soil with cement and water via a high pressure jet. Deep soil mixing uses large diameter augers or paddles, rather than high pressure application, to achieve the same result. The material used will have a consistency equivalent to hard clay and will be applied over 1.5 acres of the river bottom. Within this area, 0.8 acres of soilcrete will be approximately level with the mudline, and 0.7 acres of soilcrete will be elevated between 1 and 2 feet above the mudline. Prior to removal of the cofferdam walls, all grout excess will be removed and any excess turbidity in pooled water will be brought down to be compliant with contract environmental requirements. Excess soil displaced by the jet grouting or deep soil mixing will be contained within the cofferdam and removed for off-site disposal by excavators stationed on the barges.

Construction personnel will travel to the in-water work area via tugboat or dinghy; three boats are likely necessary per day for the crew and for delivery of materials. The in-water work will be accomplished in one 12-hour shift per day, five days per week. All construction material and equipment will be left on up to four barges at the work site, which will be moored-in-place for the duration of in-water construction at each cofferdam segment. The barges will be relatively small (approximately 30 feet wide by 90 feet long; total of up to 10,800 square feet for the four barges) and will be moored in deep water.

During rehabilitation of the existing North River tunnel, which will be conducted entirely within the existing structure, water in the tunnel will continue to be discharged to the North and South Tube Mid-river sump pumps, which empty into the Weehawken sump, and discharge to the Hudson River. This water is and will continue to be monitored and discharged in accordance with the National Railroad Passenger Corporation's (Amtrak) discharge permit NJPDES Permit No. NJ0164640.

Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?

While there is no salt marsh habitat in the study area, the Preferred Alternative will result in temporary and permanent impacts to estuarine tidal wetlands in the New Jersey Meadowlands dominated by *Phragmites australis*. Installation of erosion and sediment control measures and security fencing will temporarily impact approximately 1.5 acres of emergent wetlands and associated open water areas within the portion of the Project Site in the Meadowlands. Indirect impacts to wetlands due to deposition of soil or other material will be minimized through the use of erosion and sediment control measures such as hay bales, silt fences, and cofferdams for the installation of culverts. Following completion of construction, where possible, wetlands temporarily affected during construction will be restored to their original topography and stabilized in accordance with the Stormwater Pollution Prevention Plan (SPPP) prepared for the project. The Preferred Alternative will result in the unavoidable permanent loss of approximately 4.6 acres of emergent wetlands and associated open water areas in the New Jersey study area, of which 0.09 acres would be within the NYSW wetland mitigation site. Mitigation for direct and indirect wetland impacts will be determined in consultation with NJDEP and USACE under Sections 404 and 401 of the Clean Water Act, and will likely include the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.

In-water construction will result in temporary increases in underwater noise from vessel activity and driving the sheet pile and king piles into the sediment for the cofferdams. During construction, there will be up to four barges moored-in-place in the work area from which cofferdam installation/removal and jet grouting activities will be conducted. Personnel will travel to the barges from an existing pier to the work area via tugboat or dingy, and construction materials will be delivered by a smaller vessels. This very minimal increase in the number of vessels present in the area, and the associated underwater noise, would be well within the typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic. As such, aquatic organisms in the area are likely acclimated to ambient noise levels and will not be adversely affected by the slight, possibly undetectable, increase in vessel noise.

Installation and removal of piles with a vibratory hammer will result in temporary increases in underwater noise during installation of each cofferdam section. The cofferdams will be installed in sections, with each section being completed in up to 7 weeks (12 hours of pile driving per day, for 5 days per week for each cofferdam; total of up to 14 weeks over two years or 21 weeks over three years, depending on the number of stages utilized) and removed in up to 3 weeks. This work will occur between July 1st and January 20th in each construction year. Installation of the piles for the cofferdam structures will result in temporary elevated underwater noise levels that are not expected to exceed the threshold for physiological injury to fishes.[1] For the 54-inch diameter steel pipe king piles, estimates for underwater noise levels were conservatively based on the values for either 36-inch or 72-inch diameter steel pipe piles estimated using the Simplified Attenuation Formula in the NMFS Acoustics Evaluation spreadsheet. The estimated sound levels and distances to species injury and behavioral thresholds associated with the pile driving are presented in **Tables 1 through 3**. The behavioral threshold used for analysis of noise impacts to sturgeon, as shown in the tables, is the standard recommended by NMFS to evaluate potential underwater noise impacts to all fishes, including other anadromous NOAA-Trust Resource species such as river herring (alewife and blueback herring) and American shad, as well as striped bass and American eel.

Table 1
Representative Case Studies for Estimating Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation Rate (dB/10m)
Multiple Projects	15	24”	AZ Steel Sheet	Vibratory	5
Multiple Projects	5	36”	Steel Pipe	Vibratory	5
Multiple Projects	5	72”	Steel Pipe	Vibratory	5

Table 2
Estimates of Underwater Noise Associated with Cofferdam Installation for Construction of the Hudson Tunnel

Type of Pile	Hammer Type	Estimated Peak Noise Level (dB SPL_{Peak})	Estimated Pressure Level (dB SPL_{RMS})	Estimated Single Strike Sound Exposure Level (dB_{SEL})
24” AZ Steel Sheet	Vibratory	175	160	160
36” Steel Pipe	Vibratory	185	175	175
72” Steel Pipe	Vibratory	195	180	180

[1] For vibratory driving of steel sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 SPLrms, and 160 dB for the 1-second SEL. These sound levels are continuous rather than percussive and would not exceed the threshold of 206 dB SPLpeak that is associated with the onset of recoverable physiological injury to fishes.

Table 3
Estimated Distances to Sturgeon/Salmon Injury and Behavioral Thresholds

Type of Pile	Hammer Type	Distance (m) to Physiological Threshold (206 dB SPL_{Peak})	Distance (m) to Behavioral Threshold (150 dB SPL_{RMS})	Distance (m) to Physiological Disturbance Threshold (150 dB SEL)[1]
24" AZ Steel Sheet	Vibratory	n/a	30	30
36" Steel Pipe	Vibratory	n/a	60	60
72" Steel Pipe	Vibratory	n/a	70	70

Notes:
[1] – Used as a proxy for the 187 dB SEL_{cum} criterion for the potential onset of recoverable physiological injury

Based on the acoustic evaluation, installation of sheet piles and king piles will not produce noise levels that exceed the peak threshold for the potential onset of recoverable physiological injury to fishes (i.e., 206 dB re: 1μPa peak sound pressure level (SPLpeak)). Fish will likely avoid portions of the Hudson River within 60 to 70 meters (200 to 230 feet) of pile driving where underwater noise levels exceed the behavioral threshold of 150 dB SPLrms. Fish present within 230 feet of the source may be exposed to the physiological threshold for recoverable injury (150 dB SEL) at the onset of pile driving, but would leave the area in response to noise levels exceeding the behavioral threshold of 150 dB SPLrms. By definition, fish within 230 feet would recover from any injury sustained at the start of vibratory pile driving for cofferdam installation and removal. Since 230 feet also represents the limit of the ensonified area corresponding to the behavioral threshold, any fish outside of that area at the onset of pile driving would be expected to remain so, and would not be exposed to levels exceeding the physiological threshold.

Since the Hudson River is approximately 4,500 feet wide in the project location, most of the river will be non-ensonified (<150 dB SPLrms) during pile driving, including the 2,600-foot river channel where water depths are greater than 45 feet and the shallower waters to the east of the low-cover area. During installation and removal of cofferdam piles, the ensonified area will encompass approximately 460 feet of the channel (or about 18% of its width). Even when the deepest sheet piles are installed closest to the navigation channel, approximately 82% of the river channel will remain non-ensonified. Because the total span of the 150 dB SPLrms isopleth would not be greater than 460 feet, approximately 90% of the river width will remain non-ensonified during cofferdam installation and removal.

The behavioral threshold used for analysis of noise impacts to sturgeon, as shown in Tables 1 through 3, is the standard recommended by NMFS to evaluate potential underwater noise impacts to all fishes, including other anadromous species such as river herring (alewife and blueback herring) and American shad, as well as striped bass and American eel. Within the hearing range of most fishes (i.e., 30 Hz to 3,000 Hz), striped bass and American eel have comparable hearing capabilities with sturgeon; all three species have a swim bladder, which aids in hearing, but hearing sensitivity is relatively poor, meaning that sound pressure levels need to be relatively high to be detected compared to other species (BOEM 2014). The highest frequencies detected by sturgeon, striped bass, and American eel do not exceed 1,000 Hz. Because of the similarities in hearing ability for these species, the results of the underwater noise valuation for sturgeon would be applicable to striped bass and American eel.

In contrast to sturgeon, and compared to other fish species, clupeid fishes like shad and herring have relatively poor hearing, in that the sound level needs to be relatively loud to be detected by clupeids (BOEM 2014). Unlike other fish species, American shad are hearing specialists in terms of their ability to hear ultrasound in the range of 25 to 130 kHz at levels greater than 145 dB (Mann et al. 1997). Other clupeids, like blueback herring and alewife, have demonstrated similar sensitivity to ultrasound. At frequencies in the range of impact pile driving (100 to 1,000 Hz), blueback herring elicited only a startle response to noise levels of 160 to 175 dB at a distance of 1 meter from the source (Nestler et al. 1992). Alewife exhibited a behavioral response to high-frequency pulsed sound ranging from 110 to 150 kHz, but only at levels greater than 157 dB (Dunning et al. 1992). The sound levels that caused a behavioral response by clupeids in these studies are comparable to those observed at a distance of 33 feet in the case studies in Tables 1 and 2 and would occur at a distance of less than 230 feet from the pile during vibratory installation of piles during cofferdam construction and removal in the Hudson River. That is, the spatial extent of noise levels associated specifically with a behavioral response by shad and river herring is smaller than the extent of the behavioral threshold for fish in general (i.e., 150 dB SPLrms).

Since the ensonified area of the river will only extend a maximum of 230 feet from the source, cofferdam installation in July and August and their removal in January will not impede migration of anadromous species like river herring or sturgeon. While a small portion of the river will be ensonified during pile installation and removal, there will be room for fish passage both in the shallower waters to the east and in the river channel, about 82 percent of the channel will remain non-ensonified and available for fish passage.

During cofferdam removal in January, overwintering juvenile sturgeon are not expected to occur in this portion of the river; any sturgeon that might occur there would likely be found in the deeper waters of the channel where water temperatures are warmer than those found in the shallower off-channel areas and would not be exposed to elevated noise levels. Overwintering striped bass that may be present within 230 feet of the cofferdam during vibratory removal of piles would only have to move less than a few hundred feet to avoid elevated noise levels; this movement is not likely to cause any detectable physiological or energetic effects to the fish. Spawning winter flounder will not be adversely impacted by underwater noise since levels exceeding the biological thresholds will not occur in the shallow water spawning habitat outside the ensonified portion of the Hudson River, and similar suitable foraging habitat for winter flounder is available in this portion of the lower Hudson River. Moreover, the daily duration of vibratory pile driving will not exceed 12 hours during a 24-hour period and will not occur during the weekend, which means that the entire river in the vicinity of the project will be non-ensonified during the majority of the time. Additionally, pile driving within those 12 hours will occur intermittently, rather than continuously. Therefore, underwater noise associated with cofferdam installation and removal is not expected to result in significant adverse impacts to EFH or NOAA-Trust Resources.

Construction of the viaduct within the Meadowlands will require the installation of approximately 600 two-foot diameter steel pipe piles using an impact hammer. Underwater noise levels in the very shallow wetlands and in the adjacent Penhorn Creek would be minimized through the use of a cushion block, which would provide up to 11 dB of attenuation. Along the majority of the alignment, piles will be driven at least 200 meters from the open water of Penhorn Creek and noise levels in the creek should not exceed the biological thresholds for behavioral (150 dB re: 1μPa SPLrms) or physiological (206 dB re: 1μPa SPLpeak) effects to fish; however, pile-driving sound may be transmitted through saturated soils and into very shallow inundated wetland pools adjacent to the creek. Based on a case study from the Geyserville Bridge over the Russian River, CA, where 4-foot diameter steel piles were impact driven in saturated soil approximately 40 to 60 meters from the shoreline of the river, SPLpeak levels in the inundated wetlands and in Penhorn Creek would be 169 to 172 dB re: 1μPa and 154 to 168 dB re: 1μPa, respectively, which is well below the threshold for the potential onset of recoverable physiological effects to fish in the vicinity of pile driving. Based on the same case study, SPLrms levels would be approximately 157 to 161 dB re: 1μPa in very shallow wetland pools and 144 to 155 dB re: 1μPa in Penhorn Creek in the limited locations along the proposed viaduct alignment where impact pile driving occurs within 40 to 60 meters of the creek. Therefore, underwater noise produced during impact pile driving are unlikely to reach the biological threshold for physiological effects to fish, meaning that fish are unlikely to experience recoverable physiological injury (e.g., hemorrhaging of internal organs, increased stress hormones) during pile driving. Fish within the immediate vicinity of impact pile driving may experience behavioral effects (e.g., temporary avoidance of, or exclusion from, the ensonified area) within a limited and localized area of the inundated wetlands and potentially within a small area of Penhorn Creek. These behavioral effects would only occur during active impact pile driving, which is scheduled for 3 to 4 months and would be intermittent during any given day.

Does the action have the potential to impact prey species of federally managed fish with EFH designations?

The Preferred Alternative will result in both temporary and permanent impacts to prey species of EFH fish. Construction activities have the potential to result in temporary impacts to fish and macroinvertebrates due to temporary increases in suspended sediment, movement of construction vessels through the water column, shading by the barges moored-in-place at the work site, and underwater noise associated with the cofferdam installation/removal and vessel activity. Sediment disturbance associated with installation and removal of the cofferdams would result in minor, short-term increases in suspended sediment and re-deposition of contaminants. The effects of sediment disturbance during removal of the cofferdams in the Hudson River will be minimized through the use of turbidity curtains. In the Hudson River and the New Jersey Meadowlands, fish and motile benthic macroinvertebrates will be able to avoid the project area during installation of the cofferdams and will not be affected by temporary increases in suspended sediment. Elevated suspended sediment concentrations will dissipate via dispersion by tidal currents of the lower Hudson River upon cessation of sediment disturbing activities. Similarly, any contaminants released to the water column as a result of sediment disturbance would dissipate quickly and would not result in significant adverse long-term impacts to water quality and prey species of EFH. Elevated suspended sediment concentrations in the New Jersey Meadowlands would be localized and of short duration and would not be expected to adversely affect prey species of EFH species. The area shaded by the barges (up to approximately 10,800 square feet) represents a very small area within the lower Hudson River and will not have an adverse effect on prey species of EFH species. Increased vessel activity will be well within the typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic, and would not adversely affect prey species in the area.

Temporary increases in underwater noise in the Hudson River from vessel activity and pile installation and removal via vibratory hammer may cause motile prey species to avoid the area in favor of suitable habitat in the vicinity. Elevated underwater noise will be temporary, as the cofferdams will be installed in sections, with each section being completed in up to 7 weeks (12 hours of pile driving per day, for 5 days per week for each cofferdam; total of up to 14 weeks over two years or 21 weeks over three years, depending on the number of stages utilized, including time required for removal) and removed in up to 3 weeks. Installation of the king piles and sheet pile for the cofferdam structures would result in temporary increased underwater noise levels that would not be expected to exceed the threshold for physiological injury to fishes.[2] These organisms are expected to return to the area following completion of pile driving. The use of a vibratory hammer and any permit conditions restricting the timing of pile driving would minimize the effects of elevated noise levels on fish.

Similarly, as discussed above, underwater noise produced during impact pile driving within the Meadowlands for the viaduct are unlikely to reach the biological threshold for physiological effects to fish. Fish and other motile prey species within the immediate vicinity of impact pile driving may experience behavioral effects (e.g., temporary avoidance of, or exclusion from, the ensonified area) within a limited and localized area of the inundated wetlands and potentially within a small area of Penhorn Creek. These behavioral effects would only occur during active impact pile driving, which is scheduled for 3 to 4 months and would be intermittent during any given day. Motile prey species would be expected to return to the area following completion of pile driving.

The Preferred Alternative will result in a permanent loss of non-motile benthic organisms, which may serve as prey for EFH species, within the 1.5-acre footprint of soil improvement, and within the area of permanent wetland and associated open water impacts within the Meadowlands (approximately 4.2 acres within the permanent access road, culverts, piles and bridge foundation). While burrowing macroinvertebrates will no longer be available to predators within the soilcrete footprint within the Hudson River, there is similar available habitat in the vicinity, and these organisms will continue to serve as prey to EFH species in these areas. About 0.8 acres of the soilcrete will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete in this lower profile area at sedimentation rates typical of the lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates. About 0.7 acres of the soilcrete area would be between 1 and 2 feet above the existing mudline. It is expected that encrusting organisms tolerant of the soilcrete will colonize this area following completion of construction activities and will likewise be available as prey to EFH species. However, because it would be higher than the surrounding river bottom, this 0.7-acre area will have a lower potential to accumulate sediment that would provide soft-bottom habitat for benthic invertebrates, and will not provide forage habitat to soft-bottom feeding fish species such as windowpane, skates, and summer and winter flounder. The loss of this soft-bottom habitat represents a small loss of this type of habitat within the Harbor Estuary in the context of the thousands of acres of similar available habitat, and will not result in significant adverse impacts to prey for EFH species. Within the Meadowlands, the loss of about 4.2 acres of wetlands and open water areas would result in the loss of habitat for prey species, similar habitat is available nearby that would continue to provide habitat for these species within this portion of the Project site.

[2] For vibratory driving of sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 dB SPLrms, and 160 dB for the 1-second SEL.

References

Bureau of Ocean Energy Management (BOEM). 2014. Appendix J. Fish Hearing and Sensitivity to Acoustic Impacts. Final Programmating Environmental Impact Statement. Atlantic Outer Continental Shelf Proposed Geological and Geophysical Activities. Mid-Atlantic and South Atlantic Planning Areas. U.S. Department of the Interior.

Dunning, D.J., Q.E. Ross, P. Geoghegan, J.J. Reichle, J.K. Menezes, and J.K. Watson. 1992. Alewives avoid high-frequency sound. North American Journal of Fisheries Management 12:407-416.

Mann, D.A., Z. Lu, and A.N. Popper. 1997. A clupeid fish can detect ultrasound. Nature 389:341.

Nestler, J.M., G.R. Ploskey, J. Pickens, J. Menezes, and C. Schilt. 1992. Responses of blueback herring to high-frequency sound and implications for reducing entrainment at hydropower dams. North American Journal of Fisheries Management

The following information is provided in response to certain questions listed under Step 4 "EFH Assessment" of the EFH Assessment Worksheet and pertains to EFH species within the Hudson River.

<u>Spawning</u>: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.

Spawning winter flounder may be present during January through April, and spawning windowpane may be present in May. The Preferred Alternative will comply with any in-water restrictions from NMFS to protect winter flounder spawning EFH at the site, which overlaps with windowpane spawning. The 1.5-acre footprint of the low-cover area represents a very small portion of the lower Hudson River, and suitable spawning habitat will be available to winter flounder and windowpane in the vicinity. The soil improvement via jet-grouting or deep soil mixing will be contained within either two or three segments of cofferdams and is not likely to adversely affect water quality or spawning habitat for these species. During the in-water work, up to four construction barges will be moored-in-place for each cofferdam section and will result in shading of approximately 10,800 square feet of relatively deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect EFH spawning. Installation and removal of the cofferdams may result in temporary resuspension of sediment, but this effect will be minor, as suspended sediments will dissipate with the tidal currents upon cessation of sediment disturbing activities. During cofferdam removal, a turbidity curtain will be deployed to minimize the effects of sediment disturbance. Driving of the king piles and sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. At any given time during pile installation, most of the width of the river would be non-ensonified, leaving room for fish to avoid portions of the Hudson River in proximity to the cofferdam while the pile is driven. Fish will likely avoid portions of the Hudson River in the vicinity of pile installation. Since the vibratory hammer will not reach levels that would exceed the threshold for physiological injury to fishes, and there will be available habitat outside the ensonified area, the temporarily elevated underwater noise levels will not have a significant adverse effect on spawning habitat for EFH.

<u>Nursery</u>: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.

Windowpane and winter flounder larvae are initially planktonic, but quickly become bottom-oriented and could be affected by installation and removal of the cofferdams if they are present at the project site. Any pelagic larvae that may occur in the study area will be less susceptible to effects from sediment-disturbing activities, as they are able to move away from the construction area to suitable habitat in the vicinity. Larvae in the study area could be temporarily impacted by minor increases in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. In-water construction activities will be restricted between January 21st and June 30th, which will protect spawning winter flounder and any larvae present in the study area during that time. The permanent loss of 0.7 acres of soft bottom habitat where elevated soilcrete will be added within the soil improvement area will not adversely affect nursery habitat for EFH species, as similar habitat is available in the vicinity. During the in-water work, up to four construction barges will be moored-in-place and will result in shading of approximately 10,800 square feet of deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect nursery habitat. As noted above, driving of the king piles and sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. Elevated noise levels during this time may lead to avoidance of the area by some fish, but will not have a significant adverse effect on larvae.

***Forage*: If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**

Juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate are benthic feeders. Other EFH species also feed on benthic organisms, although not exclusively. The Preferred Alternative will result in a minor temporary increase in suspended sediment and localized increases in turbidity during the installation and removal of the cofferdams, which could impact bottom dwelling forage species; any sediment disturbed during these activities will dissipate quickly with the tidal currents in the lower Hudson River upon completion of construction. Driving of the king piles and sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. The temporary loss of foraging habitat within and in the vicinity of the soil improvement area, when compared to the available suitable habitat that will still be available in the lower Hudson River, will not result in a significant adverse effect to foraging habitat for EFH species. The 1.5-acre low cover area will provide foraging opportunities following construction, including 0.8 acres of potential soft-bottom habitat (following sediment accumulation) and 0.7 acres of soilcrete that could serve as habitat for encrusting organisms.

Will impacts be temporary or permanent? Describe the duration of the impacts.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. This effect will be minor, as any resuspended sediment will dissipate quickly with the tidal currents upon cessation of sediment disturbing activities. As the cofferdams are constructed over a 7 week period and removed over 3 weeks (per cofferdam), motile organisms will be temporarily displaced to other suitable habitat in the area. There will be a temporary increase in vessel traffic during the construction period, along with shading by the moored-in-place barges, but these actions will not be outside the range of typical vessel activity within the study area in the lower Hudson River, which is a region of high commercial vessel traffic. This temporary increase in vessel traffic will not result in significant adverse impacts to benthic invertebrates or fish communities in the project area. Temporary increases in underwater noise from driving the king piles and sheet pile cofferdam walls will be minimized through the use of a vibratory hammer, and will occur intermittently only during cofferdam installation. The elevated noise level will likely cause some fish to avoid the Hudson River in the proximity of pile driving, but they are expected to return to the area following completion of pile driving. In-water construction is expected to last approximately 29 weeks in total (up to 7 weeks for installation of each cofferdam, 19 weeks for each section of jet grouting, and 3 weeks to remove each cofferdam).

Ground stabilization via jet grouting or deep soil mixing will result in the permanent loss of 1.5 acres of silt/clay bottom in the low-cover area, along with non-motile organisms within this footprint. The grout will mix with the soft sediment within this footprint to form a hard bottom substrate of soilcrete. Approximately 0.8 acres will be approximately level with the mudline, and 0.7 acres will be elevated between 1 and 2 feet above the mudline. After ground stabilization activities are complete, encrusting organisms will be able to colonize the 0.7-acre area of elevated soilcrete, soft-bottom benthic organisms will be able to colonize the 0.8-acre area of soilcrete flush with the mudline following sediment deposition, and fish are expected to return to the area following construction.

The following information is provided in response to Step 6 "Other NOAA-Trust Resources Impact Assessment" of the EFH Assessment Worksheet.

Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.

Alewife

Alewife (*Alosa pseudoharengus*) is a pelagic species that can occur in the lower Hudson River from spring to fall. During the spring months, this species migrates through the New York Harbor to spawning grounds in the Hudson, Raritan, and Navesink Rivers, where eggs are deposited in slow-flowing water over a variety of substrates (Mackenzie 1990, Pardue 1983). Peak abundance of larval alewife in estuaries occurs in waters with salinities of 1-5 parts per thousand (ppt) at the surface and 1-15 ppt at the bottom (Locke and Courtenay 1995). Most juveniles emigrate from freshwater estuarine nursery habitats in the rivers where they were spawned between June and November of their first year (Pardue 1983). Adult alewife school in open waters and occupy a variety of inshore ocean, estuarine, and freshwater habitats depending on the season (Hildebrand 1963). They are only associated with bottom structure or substrate during spawning, which occurs in rivers and tributaries. Larval and juvenile alewife feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that alewife are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Any temporary increases in suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for alewife.

American Eel

American eel (*Anguilla rostrata*) can occur in the lower Hudson River year-round. This species is catadromous, spending most of its life in fresh water and spawning in salt water. They occur in streams and rivers with continuous flow over muddy or silty substrate (Scott and Scott 1988). During the day they tend to rest in undercut banks and deep pools near logs or boulders (Fischer 1978). At sexual maturity, adults migrate from the Hudson, Raritan, and Navesink Rivers and their tributaries to spawning grounds in the Sargasso Sea (Mackenzie 1990). American eels have several life stages: egg, glass, elver, yellow, and silver. Eggs hatch on the ocean surface in the Sargasso Sea and drift with currents for about a year as they develop into larvae before reaching the Atlantic coast (USFWS 2015). Glass eels, or larvae, are about 2-3 inches long by the time they reach the coast, and metamorphose into elvers, or juveniles, in nearshore areas of estuaries and tidal rivers (USFWS 2015, Fischer 1978). Elvers transform into yellow eels, which are sexually immature adults, and can spend up to 40 or more years living in freshwater habitats before they mature into silver eels and migrate to the Sargasso Sea to spawn; eels that remain in brackish waters tend to mature earlier than those in freshwater (USFWS 2015). American eels feed on a variety of things, including insects, fish, fish eggs, crabs, worms, clams, and frogs (USFWS 2011).

Given that neither spawning nor nursery habitat for American eel occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American eel.

American Shad

American shad (*Alosa sapidissima*) is a schooling pelagic species that can occur in the lower Hudson River year-round. This species migrates from offshore waters to spawning grounds in the freshwater tidal areas of the Hudson River; they can tolerate moderate salinity but spawn in lower salinity waters over sand and gravel (Leggett 1976, Walberg and Nichols 1967). Spawning occurs over a variety of substrates, but preferably over sand and gravel bottom with sufficient water movement to eliminate silt deposits (Stier and Crance 1985). Larvae prefer brackish waters with salinities of 7 ppt or less (Leim 1924). Larvae and juveniles start to migrate into the open ocean during the fall, and adults spend most of their lives in offshore ocean waters. Larval and juvenile shad feed mainly on aquatic insects and crustaceans, and adults are primarily plankton feeders (Stier and Crance 1985).

Given that American shad are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The

Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American shad.

Atlantic Menhaden

Atlantic menhaden (*Brevoortia tyrannus*) can occur in the lower Hudson River year-round. This species migrates seasonally along the Atlantic coast, moving north through the Mid-Atlantic Bight during spring, and south to Cape Hatteras during the fall (Able and Fahay 1998). Adults are found near surface waters, typically in shallow areas overlying the continental shelf, and they occur in greatest abundance adjacent to major estuaries (Jones et al. 1978). They move inshore during the summer and into deeper waters in the winter. Spawning occurs in continental shelf waters and in the lower reaches of estuaries and coastal bays in waters up to 10 meters deep (Dovel 1971, Rogers and Van Den Avyle 1989). Larvae and juveniles use estuaries during the summer before migrating offshore in the fall (Dovel 1971). Concentrations of young menhaden occur in inshore estuarine waters along the entire Atlantic coast (Rogers and Van Den Avyle 1989). Larvae feed on plankton, and juveniles and adults are filter feeders.

Given that Atlantic menhaden are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for Atlantic menhaden.

Blue Crab

Blue crab (*Callinectes sapidus*) can occur in the lower Hudson River year-round. Mating season occurs from May through October in the mid-Atlantic in the upper areas of estuaries and lower portions of rivers (Hill et al. 1989). Females generally spawn in high salinity waters between 2 and 9 months after mating (Hill et al. 1989). Eggs are deposited as a cohesive mass that remains attached to the female until larvae, called zoeae, emerge (Hill et al. 1989). Zoeae molt multiple times over the course of about 1-1.5 months, transforming into megalops, or the second larval stage, which is crablike in appearance; development into the juvenile “first crab” stage is characterized by adult proportions and appearance after 6-20 additional days (Hill et al. 1989). Areas of submerged aquatic vegetation in high salinity estuarine waters are used as nursery areas (Heck and Thoman 1984). Juveniles gradually migrate into shallower, less saline waters of upper estuaries and rivers, where they grow and mature into adults through a series of molt and intermolt phases over the course of about 12-18 months (Hill et al. 1989). Blue crabs move from shallow areas and tributaries in the summer to deeper waters in the fall (Mackenzie 1990). When not mating, small blue crabs prefer shallow, high salinity waters over substrates of soft detritus, mud, or mud-shell; larger crabs generally prefer deeper estuarine waters with hard bottom substrates (Hill et al. 1989). As detritivores and scavengers, blue crabs feed on a variety of phytoplankton, invertebrates, fish, and other crabs.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels may cause avoidance of the area by blue crab, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for blue crab. Blue crabs are motile and are not expected to be adversely impacted by project activities.

Blue Mussel

Blue mussel (*Mytilus edulis*) is a valuable commercial species and is widely distributed and locally abundant in the north and mid-Atlantic regions; it is most common in the littoral and sublittoral zones of oceanic and estuarine waters and can occur in the lower Hudson River year-round. This species is a bivalve mollusk that filter-feeds on phytoplankton and particulate detritus from the water (Rice 2010). Adult mussels typically reach shell lengths of about 4 inches and attach to hard surfaces, including large boulders, pebbles, and other mussels (Rice 2010, Newell 1989). Eggs are released into the water column for fertilization and hatch after about 5 hours (Newell 1989). Blue mussels go through several larval stages lasting between 15 days and 6 months after hatching. After about 6 months, the mussel temporarily attaches to filamentous substrates and develops as a juvenile for up to 2 years (Newell 1989). Juveniles grow to approximately 1.5 mm while attached to filamentous algae, and then are carried by currents until they reattach to a hard substrate (Newell and Moran 1989). Following the juvenile stage, adults live in habitats ranging from flat intertidal shores to vertical surfaces subject to wave splash (Newell 1989). They are typically found in subtidal and intertidal environments over a wide range of salinities (5-35 ppt) and depths ranging from 16 to 32 feet (Zagata et al. 2008).

The ground stabilization area is composed of soft silt and clay substrate that is not suitable for blue mussels; therefore, this species is not likely to occur within the 1.5-acre footprint of ground stabilization through jet grouting or deep soil mixing. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities and will not adversely impact blue mussel populations in the Hudson River.

Blueback Herring

Blueback herring (*Alosa aestivalis*) is a schooling pelagic species that can occur in the lower Hudson River. Blueback herring adults spend much of their lives in salt water and return to freshwater tributaries to spawn over gravel and sand substrates (Loesch 1969) and would likely only occur in the project area between April and June during migrations into freshwater spawning habitats and back into inland coastal waters post-spawn. Spawning occurs in swift-flowing, deeper stretches of rivers over hard substrate, and in slower-flowing tributaries and flooded areas with soft substrates (Pardue 1983). Eggs adhere to vegetation, rocks, and debris in fresh water where they are deposited. Blueback herring remain in freshwater habitats as larvae and migrate to low salinity estuarine water as juveniles, generally between June and November of their first year (Loesch 1969, Pardue 1983). Larval and juvenile blueback herring feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that blueback herring are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for blueback herring.

Eastern Oyster

Eastern oyster (*Crassostrea virginica*) can occur in the deeper waters of the Hudson River and New York Harbor year-round. Adult oysters are non-motile and typically live in clumps, or beds. In mid-Atlantic waters, they prefer water depths ranging from 2 to 16 feet (MacKenzie, Jr. 1996). Spawning occurs via release of eggs into the water, where they are fertilized; eggs and young larvae remain in the water column for 2-3 weeks (Stanley and Sellers 1986). Juveniles, or spat, develop in the water column and attach to hard surfaces such as stones or other oyster shells, usually in established oyster beds, about 2-3 weeks after spawning. This species tolerates a wide range of salinity, generally between 5 and 32 ppt. Sufficient water currents are necessary to flush suspended sediments, remove debris, and transport food over oyster beds. Oyster larvae feed largely on plankton, while adult oysters filter-feed on diatom plankton, dinoflagellates, ostracods, small eggs, and anything else in the water that is 3-4 micrometers in size, including bacteria (Stanley and Sellers 1986).

There are no known natural or man-made oyster beds in the vicinity of the ground stabilization area. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate quickly upon the cessation of sediment disturbing activities and will not adversely affect oysters that may be present in the lower Hudson River either upstream or downstream of the ground stabilization area. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for oysters.

Horseshoe Crab

Horseshoe crab (*Limulus polyphemus*) can occur in the lower Hudson River. Adult horseshoe crabs migrate from deep offshore waters from April to July to spawn. Eggs are deposited on beaches in the upper portion of the intertidal zone and below the feeding zone of shorebirds (USACE 2009). Spawning habitat depends on ready access to open and undisturbed sandy beaches in relatively calm waters, with a portion of the beach at or above Mean High Water where eggs are laid and larvae develop (Baine et al. 2007). Beach quality, including slope, width, and sediment grain size, can influence spawning activity (Baine et al. 2007); beach slope between 7 and 10° is thought to be optimal for horseshoe crab spawning habitat (USACE 2009). Females make several nests during one beach trip and often return on successive tides to lay more eggs (MDNR 2016). After about one month, the eggs hatch and larvae remain in the intertidal flats or shoal waters where they were spawned until settling to the bottom to molt (USACE 2009, MDNR 2016). During its first 2-3 years, the horseshoe crab molts several times per year, and then about once annually until it reaches sexual maturity around 9-11 years in age (MDNR 2016). Adults remain in deep offshore habitats during most of the year, except during the spawning season. Horseshoe crabs feed mainly on marine worms and shellfish, and serve as an important food source to shorebirds and juvenile sea turtles. Migratory shorebirds rely on horseshoe crab eggs to survive their journey to breeding grounds (MDNR 2016). Horseshoe crab eggs and larvae are also a food source for a variety of species including crabs, whelks, striped bass, white perch, American eel, killifish, silver perch, weakfish, kingfish, silversides, summer flounder, and winter flounder (MDNR 2016).

There are no beaches near the ground stabilization area, therefore, horseshoe crab spawning will not be adversely affected by the Preferred Alternative. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels may cause avoidance of the area by horseshoe crab, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for horseshoe crabs.

Quahog

Northern quahog (*Mercenaria mercenaria*), also known as hard clams, can occur in the lower Hudson River year-round. Hard clams are found in the intertidal and subtidal zones of bays and estuaries in waters up to 15 meters deep, most often in higher salinity waters (Stanley and DeWitt 1983). They can be found in all sediment types, but prefer sediments that are a mixture of sand and mud with some coarse material. Adults burrow an average of 2 centimeters into sand, and an average of just one centimeter into softer substrates; adults can escape 10-50 cm of overburden if buried and can re-burrow if removed from the substrate (Stanley and DeWitt 1983). Eggs are released into the water column for fertilization and are carried by tidal and coastal currents for about 10 hours before hatching. Larvae develop 12-14 hours after hatching and drift up and down through the water column until they reach about 2-3 millimeters in length. At this time, the shell begins to thicken and larvae transform into seed clams, which begin a final migration to their ultimate habitat, settling as adults in their second summer (Stanley and De Witt 1983). Adult clams filter plankton and microorganisms from the water that are carried close to the bottom by currents.

Any hard clams present in the 1.5-acre footprint of ground stabilization with jet grouting or deep soil mixing, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, hard clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for hard clams.

Soft-shell Clams

Soft-shell clams (*Mya arenaria*) can occur in the lower Hudson River year-round. This species inhabits sandy, sand-mud, or sandy clay bottoms of inlets and bays, typically at water depths of 3-4 meters and salinities no less than 4-5 ppt (Abraham and Dillon 1986). Adults burrow up to 30 centimeters into the substrate, with siphons extending to the sediment surface to feed on detritus and plankton suspended in the water (Abraham and Dillon 1986). Soft-shell clams spawn biannually based on water temperatures, once in spring at 10-20°C and once in fall when temperature falls to 20°C. Eggs are broadcast into the water and develop into planktonic larvae about 12 hours after fertilization; after about 4-6 weeks, larvae settle to the bottom (Abraham and Dillon 1986). Juveniles are able to move to more favorable locations, usually sandy bottoms with less than 50% silt content, before burrowing into the substrate as adults (Abraham and Dillon 1986).

Any soft-shell clams present in the 1.5-acre footprint of ground stabilization with jet grouting or deep soil mixing, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, soft-shell clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for soft-shell clams.

Striped Bass

Striped bass (*Morone saxatillis*) can occur in the lower Hudson River from spring to fall. Striped bass can be found in the lower Hudson River during spawning migrations from coastal waters into freshwater spawning grounds between May and June, and back to coastal waters post-spawn in the fall (CHG&E et al. 1999). Larvae drift with the current, but remain in low salinity river waters; juveniles begin to move into higher salinity waters as they grow. Juveniles could be found in the New York Harbor by late summer (CHG&E et al. 1999, Dunning et al. 2009). Outside of spawning periods, adult striped bass migrate along the Atlantic coast and would not likely be found in the lower Hudson River. When they are present, they generally occur in open water, inter-pier, and semi-enclosed basin areas, especially offshore from sandy beaches or rocky shores where prey species are most abundant. Larvae feed mainly on copepods and chironomid larvae, adding larger aquatic invertebrates and small fishes to their diet as they grow (Fay et al. 1983). Larger striped bass begin to school while foraging and feed primarily on clupeids, including bay anchovy and Atlantic menhaden, but also continue to feed on invertebrates (Fay et al. 1983).

Given that striped bass are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the cofferdams. A turbidity curtain will be deployed during removal of the cofferdams to minimize the effects of sediment disturbance. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for striped bass.

Atlantic and Shortnose Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). The full length of the tidal Hudson River has been proposed as Critical Habitat for Atlantic sturgeon (NMFS 2016b). Atlantic sturgeon is a bottom-dwelling fish that inhabits large freshwater rivers when spawning and primarily marine waters when not breeding. They can also be found in bays, river mouths, and estuaries. Atlantic sturgeon spend most of their lives in marine waters along the Atlantic coast, and return to the freshwater portions of the Hudson River to spawn from late May through mid-

July. Adults are more often found in deeper offshore waters, and early life stages are relatively intolerant of salinity. Primary spawning habitat has been identified in Hyde Park, New York at river mile 83 (Bain et al. 2000), well upstream of the project location. Atlantic sturgeon prefer waters between 10 and 15 meters (32 and 49 feet) in depth (Dunton et al. 2010), and no Atlantic sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1995, Able et al. 1998, Bain et al. 2006).

Shortnose sturgeon (*Acipenser brevirostrum*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). Shortnose sturgeon are bottom-dwellers that spawn, develop, and overwinter in the Hudson River in its freshwater and brackish reaches, and occasionally use areas of the lower Hudson River downstream of the George Washington Bridge. Shortnose sturgeon prefer the deeper, colder waters of the river channel, and occur in greatest abundance north of river mile 46. Spawning in the Hudson River occurs between March and May in fresh waters over rock or gravel substrate well upstream of the project location (NMFS 1998). Although larvae can be found in brackish areas of the river, juveniles are predominately confined to freshwater areas upstream from the saline area of the lower Hudson River and New York Harbor. Older juveniles, or sub-adults, tend to move downstream in fall and winter and upstream in the spring, and feed mostly in freshwater reaches during the summer. No shortnose sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1998, Bain et al. 2006).

No critical habitat has been designated for shortnose sturgeon. However, the full length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy has been proposed to be designated as critical habitat for Atlantic sturgeon. The physical or biological features of critical habitat essential to conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and
- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

Given the location of the Project, construction activities will not occur in the vicinity of hard bottom substrate in low salinity waters, and the installation of the cofferdams will not remove any soft substrate used for juvenile foraging and physiological development. As the in-water construction activities will only produce minimal increases in suspended sediment, it would have insignificant effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the vicinity of the Project. Given the width of the Hudson River in the study area (approximately 4,350 feet), the temporary addition of the cofferdams will not add a physical barrier to passage between the mouth of the river and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults. No adverse effects to the proposed critical habitat are anticipated.

While they are not expected to occur in significant numbers in the study area, as they move through shallower marine waters along the Atlantic coast, transient Atlantic sturgeon adults and sub-adults have the potential to occur within the 1.5-acre area of the lower Hudson River that would receive soil improvement under the Preferred Alternative. While shortnose sturgeon do not undertake the significant marine migrations seen in Atlantic sturgeon, they do make localized coastal migrations and could be found in the New York Harbor and lower Hudson River near the project location. Transient individuals of both sturgeon species would be more likely to occur in the deeper waters of the River along the margins of the deep navigation channel than in shallower waters. Increased underwater noise during installation and removal of each cofferdam, including along the margins of the navigation channel, will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with the onset of physiological injury or mortality. Most of the width of the river and about 54 percent of the distance across the navigation channel will be unaffected by the noise from the vibratory hammer, and sturgeon will be able to avoid the portion of the river in proximity to the in-water work in favor of suitable habitat in the vicinity.

Since any impacts to water or sediment quality associated with the Preferred Alternative's in-water construction activities associated with soil improvement would be localized and temporary, the deep channel habitat is unlikely to be adversely affected during construction. Adult and sub-adult sturgeon are benthic feeders, and soil improvement through jet grouting or deep soil mixing in the 1.5-acre low-cover area has the potential to disturb foraging habitat, including temporary disturbance of 0.8 acres where the soilcrete is level with the mudline and permanent loss of 0.7 acres where the soilcrete is elevated. However, when compared to the available suitable habitat that will still be available within the lower Hudson River, this temporary loss of foraging habitat that would only be used during migration will not have the potential to result in significant adverse effects to sturgeon. Increased underwater noise during installation and removal of each cofferdam will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with physical injury. Sturgeon are expected to return to the area of soil improvement within the Hudson River following the cessation of in-water construction activities. While the 0.8-acre area where the soilcrete is level with the mudline will initially be unsuitable for burrowing organisms, over time sediments are expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that provide forage for sturgeon.

References

Able, K.W., A.L. Studholme, and J.P. Manderson. 1995. Habitat quality in the New York/New Jersey Harbor Estuary: An evaluation of pier effects on fishes. Final Report. Hudson River Foundation, New York, NY.

Able, K.W., and F.P. Fahay. 1998. The first year in the life of estuarine fishes in the Middle Atlantic Bight. Rutgers University Press, New Brunswick, New Jersey. 400 pp.

Able, K.W., J.P. Manderson, and A.L. Studholme. 1998. The distribution of shallow water juvenile fishes in an urban estuary: The effects of manmade structures in the lower Hudson River. Estuaries 21: 731-744.

Abraham, B.J., and P.L. Dillon. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic) – softshell clam. U.S. Fish and Wildlife Service Biological Report 82(11.68); U.S. Army Corps of Engineers TR EL-82-4. 18 pp.

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological status of sanctuary waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bain, M.B., N. Haley, D. Peterson, J.R. Waldman, and K. Arend. 2000. Harvest and habitats of Atlantic sturgeon *Acipenser oxyrinchus* Mitchill, 1815, in the Hudson River Estuary: Lessons for sturgeon conservation. Instituto Espanol de Oceanografia. Boletin 16: 43-53.

Baine, M., J. Lodge, D.J. Suszkowski, D.B. Botkin, R.J. Diaz, K. Farley, J.S. Levinton, F. Steimle, and P. Wilber. 2007. Target ecosystem characteristics for the Hudson Raritan Estuary: technical guidance for developing a comprehensive ecosystem restoration plan. A report to the Port Authority of NY/NJ, pp. 1-112.

Central Hudson Electric and Gas Corp. (CHG&E), Consolidated Edison Company of New York Inc., New York Power Authority, and Southern Energy New York. 1999. Draft Environmental Impact Statement for State Pollution Discharge Elimination System Permits for Bowline Point, Indian Point 2&4, and Roseton Steam Electric Generating Stations.

Dovel, W.L. 1971. Fish eggs and larvae of the upper Chesapeake Bay. University of Maryland. Natural Resources Institute Special Report 4:1-71.

Dunning, D.J., Q.E. Ross, K.A. McKown, and J.B. Socrates. 2009. Effect of striped bass larvae transported from the Hudson River on juvenile abundance in Western Long Island Sound. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1:343-353.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fisheries Bulletin 108:450-465.

Fay, C.W., R.J. Neves, and G.B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – striped bass. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.8. U.S. Army Corps of Engineers, TR EL-82-4. 36 pp. October 1983.

Fischer, W. 1978. FAO species identification sheets for fishery purposes. Western Central Atlantic (fishing area 31). Food and Agriculture Organization of the United Nations.

Heck, K.L., and T.A. Thoman. 1984. The nursery role of seagrass meadows in the upper and lower reaches of the Chesapeake Bay. Estuaries 7: 70-92.

Hildebrand, S.F. 1963. Family: Clupeidae. In: Fishes of the Western North Atlantic, pp. 152-249. Memoir, Sears Foundation for Marine Research 1:1-630.

Hill, J., D.L. Fowler, and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates Mid-Atlantic) – Blue Crab.

U.S. Fish and Wildlife Service Biological Report 82(11.100). U.S. Army Corps of Engineers, TR EL-82-4. 18 pp. March 1989.

Jones, W.P., D.F. Martin, and J.D. Hardy. 1978. Development of fishes of the Mid-Atlantic Bight. An atlas of egg, larval and juvenile stages. Fish and Wildlife Service.

Leggett, W.C. 1976. The American shad with special reference to its migration and population dynamics in the Connecticut River. In: D. Merriman and L.M. Thorpe (eds.), The Connecticut River Ecological Study: The Impact of Nuclear Power Plant, pp. 169-225. American Fishery Society Monograph 1:169-225.

Leim, A.H. 1924. The life history of the shad *Alosa sapidissima*, (Wilson) with special reference to factors limiting its abundance. Contributions to Canadian Biology of Fisheries 2:161-284.

Locke, A., and S.C. Courtenay. 1995. Effects of environmental factors on ichthyoplankton communities in the Miramichi estuary, Gulf of St. Lawrence. Journal of Plankton Research 17:333-349.

Loesch, J.L. 1969. A study of blueback herring, *Alosa aestivalis* (Mitchill), in Connecticut waters. PhD Thesis, University of Connecticut, Storrs, CT. 78pp.

MacKenzie, Jr., C.L. 1990. History of the fisheries of Raritan Bay, New York and New Jersey. Marine Fisheries Review 52: 1-45.

MacKenzie, Jr., C.L. 1996. History of oystering in the United States and Canada, featuring the eight greatest oyster estuaries. Marine Fisheries Review 58: 1-79.

Maryland Department of Natural Resources (MDNR). 2016. Horseshoe crab life history. Available http://dnr2.maryland.gov/fisheries/Pages/horseshoe-crab.aspx. Accessed September 2, 2016.

National Marine Fisheries Service (NMFS). 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pp.

Newell, R.I.E. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) – Blue Mussel. U.S. Fish and Wildlife Service Biological Report 82(11.102). U.S. Army Corps of Engineers, TR El-82-4. 25 pp. June 1989.

Newell, R.I., and D. Moran. 1989. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) blue mussel. Biological Report 82(11.102). Fish and Wildlife Service, U.S. Department of the Interior.

Pardue, G.B. 1983. Habitat suitability index models: alewife and blueback herring. U.S. Fish and Wildlife Service FWS/OBS-82/10.58. 22 pp. September 1983.

Rice, M.A. 2010. Cultured mussels of the Northeast. Northeastern Regional Aquaculture Center, NRAC Publication No. 210-2010.

Rogers, S.G., and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – Atlantic menhaden. U.S. Fish and Wildlife Service Biological Report 82(11.108). U.S. Army Corps of Engineers TR EL-82-4. 23 pp. August 1989.

Scott, W., and M. Scott. 1988. Atlantic fishes of Canada. Canadian Bulletin of Fisheries and Aquatic Science, 219. University of Toronto Press, Toronto, Canada.

Stanley, J.G., and R. DeWitt. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic) – hard clam. U.S. Fish and Wildlife Service FWS/OBS-82/11.18. U.S. Army Corps of Engineers, TR EL-82-4. 19 pp. October 1983.

Stanley, J.G., and M.A. Sellers. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – American Oyster. U.S. Fish and Wildlife Service Biological Report 82(11.65). U.S. Army Corps of Engineers, TR EL-82-4. 25 pp. July 1986.

Stier, D.J., and J.H. Crance. 1985. Habitat suitability index models and instream flow suitability curves: American shad. U.S. Fish and Wildlife Service Biological Report 82(10.88). 34 pp. June 1985.

United States Army Corps of Engineers (USACE). 2009. Delaware River main stem and channel deepening project. Draft Essential Fish Habitat evaluation. February 2009.

United States Fish and Wildlife Service (USFWS). 2011. The American Eel. Available http://www.fws.gov/northeast/newsroom/facts.html. Updated December 21, 2011.

United States Fish and Wildlife Service (USFWS). 2015. American eel, *Anguilla rostrata*. October 2015.

Walberg, C.H., and P.R. Nichols. 1967. Biology and management of the American shad and status of the fisheries. Atlantic coast of the United States, 1960. U.S. Fish and Wildlife Service, Special Science Report, Fisheries, 550. 105pp.

Zagata, C., C. Young, J. Sountis, and M. Kuehl. 2008. *Mytilus edulis*. Available http://animal.diversity.ummz.umich.edu/site/accounts/informatino/Mytilus_edulis.html.

SEE APPENDIX 11-1 FOR SUBSEQUENT CORRESPONDENCE WITH THE NATIONAL MARINE FISHERIES SERVICE WITH RESPECT TO ESSENTIAL FISH HABITAT

HUDSON TUNNEL

FINAL ENVIRONMENTAL IMPACT STATEMENT AND FINAL SECTION 4(f) EVALUATION

APPENDIX 11-4

Conceptual Compensatory Mitigation Plan

1) PROJECT DESCRIPTION

The Hudson Tunnel Project (Project) is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1)**. It will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year. If no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

The Federal Railroad Administration (FRA) is the lead agency for the preparation of the environmental review and NJ TRANSIT and the Port Authority of New York and New Jersey (PANYNJ) are joint lead agencies for the environmental review of the Hudson Tunnel Project in accordance with the National Environmental Policy Act (NEPA). The PANYNJ is currently the Project Sponsor and will be responsible for advancing the Project through final design and construction and for meeting the commitments identified in the lead Federal agency's Record of Decision (ROD), including those associated with mitigation. The PANYNJ will remain the Project Sponsor until such time as the Gateway Development Commission (GDC) assumes the role of Project Sponsor. The PANYNJ and GDC anticipate that change will occur prior to the award of Federal financial assistance for the Project.

Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson River Tunnel by tunnel boring machine (TBM); staging and construction of a ventilation shaft and fan plant in Hoboken, NJ; in-water ground improvement over 3 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel. Major components of the Project will include:

- Two new surface tracks parallel to the south side of the NEC beginning at a realigned Allied Interlocking in Secaucus[1], New Jersey just east of NJ TRANSIT's Secaucus Junction Station. The eastern portion of these tracks where the tracks deviate from the NEC will be accessible for maintenance via new gravel access road. The new Hudson River Tunnel with two tracks in separate tubes beneath the Palisades and the Hoboken waterfront area east of the Palisades, continuing beneath the Hudson River to Manhattan. In New Jersey, the tunnel will begin at a portal in the western slope of the Palisades, just east of Tonnelle Avenue (US Routes 1 and 9). The two new tracks will continue through the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue (Route 9A) to meet the underground Hudson Yards Right-of-Way Preservation Project being constructed by Amtrak beneath the Hudson Yards overbuild project at the Western and Eastern Rail Yards in Manhattan.
- Two new tracks and associated rail systems to be added by the Project to the Hudson Yards Right-of-Way Preservation Project.
- Extension of the tunnel past the Hudson Yards Right-of-Way Preservation Project beneath Tenth Avenue to a tunnel portal east of Tenth Avenue, within the complex of tracks located beneath the existing building that spans the tracks on the east side of Tenth Avenue (450 West 33rd Street, referred to as the "Lerner Building"). The new tunnel portal will be adjacent to the tunnel portals for Amtrak's Empire Line and for the North River Tunnel.
- Track connections east of Tenth Avenue to the existing approach tracks into PSNY.
- A ventilation shaft and associated fan plant building in Hoboken, New Jersey.
- A ventilation shaft and fan plant building near Twelfth Avenue between West 29th and 30th Streets (Block 675) in Manhattan.
- A fan plant beneath or near the building at 450 West 33rd Street at Tenth Avenue, which sits above the rail right-of-way.
- Rehabilitation of the existing North River Tunnel.

2) POTENTIAL FOR IMPACT ON WATERS OF THE UNITED STATES

The Project will result in the permanent placement of fill in waters of the United States in Penhorn Creek and associated wetlands in New Jersey. The Project will also result in temporary impacts to waters of the United States resulting from construction activities. Wetlands within the Limit of the Project (LOP) were delineated in November and December of 2016. Approximately 14.5 acres of wetlands were delineated within the LOP for the new surface alignment in November 2016, and approximately 0.44 acres within the proposed temporary construction access road for the fan plant/vent shaft in Hoboken in December 2016. A request for Jurisdictional Determination (JD) was submitted to the USACE on March 17, 2017, and USACE conducted the site visit on April 12, 2017. The modifications to the JD drawings requested by the USACE as a result of the site visit were submitted on May 1, 2017. The USACE determined wetlands A, CD and F to be jurisdictional waters regulated by the USACE under Section 404 of the Clean Water Act (see **Figures 2a**, **b**, and **c**).

[1] An interlocking is a system of switches and signals that allows trains to make connections from one track to another.

Wetlands A, B and CD

Table 1 summarizes temporary and permanent impacts to Wetlands A, B, CD, and the New York Susquehanna & Western (NYSW) Wetland Mitigation Site resulting from the Project. Wetlands A, B, and CD are tidally influenced emergent marshes dominated by *Phragmites australis*. The surface alignment will result in the unavoidable permanent loss of approximately 4.1 acres of emergent wetlands and associated open water areas within the footprint of the retained fill embankment and retaining wall, permanent access road, culverts, bridges, and piles for the viaduct within the Meadowlands.

These same elements have the potential to result in indirect impacts to wetlands due to changes in hydrology within the study area. Culverts in Penhorn Creek that currently run underneath the existing surface tracks will be extended prior to placement of fill material for the retaining wall at the western end of the surface alignment and for the retaining wall east of Secaucus Road. These include the following construction activities:

- Extension of the existing twin 48-inch culvert that conveys Penhorn Creek under the new embankment. This twin culvert serves as the outlet for the large wetland area located north of the NEC.
- Construction of new culverts beneath the permanent access road adjacent to the viaduct and at the outlet to the NYSW wetland mitigation site.
- Replacement of the weir on Penhorn Creek downstream from the culvert extension.

East of Secaucus Road, a tributary to Penhorn Creek parallels the south side of the NEC embankment. A portion of this Penhorn Creek tributary will be relocated. It will remain open, passing under the rail viaduct and the access road along the railroad embankment wall. The relocated portion of the Penhorn Creek tributary will be a trapezoidal channel with a natural bottom. The new construction and maintenance access road will be elevated on a trestle for approximately 315 feet from the right bank of Penhorn Creek to the end of the railroad embankment retaining wall and will comprise open grid steel grating. This open grid steel grating access road will be above the Penhorn Creek tributary. The inoperable pump station will be demolished and removed, and the weir just south of the NEC will be removed. A new weir will be installed downstream of the twin 48-inch culvert extension to maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands.

The existing culverts beneath the NEC are critical drainage elements that will be carefully maintained during culvert extension and construction to minimize impacts to flow patterns within wetlands and discharges to Penhorn Creek. New culverts will be constructed beneath the permanent access road adjacent to the viaduct and at the outlet to the NYSW wetland mitigation site.

Installation of erosion and sediment control measures and security fencing will temporarily impact a total of approximately 1.4 acres of Wetlands A and CD. Implementation of erosion and sediment control measures (e.g., hay bales, silt fences, seeding and mulch, straw or hay) in accordance with the Stormwater Pollution Prevention Plan (SPPP) required under NJPDES General Permit NJ0088323 for Construction Activity Stormwater (General Permit 5G3) will minimize indirect impacts to these wetlands due to deposition of soil and other material. Temporary cofferdams and sump pits will be installed to divert the flow around construction areas for new culverts and culvert extensions to prevent runoff and groundwater from flooding the work area and the adjacent properties. Water removed during cofferdam dewatering will be treated with temporary sediment control measures developed in consultation with the New Jersey Department of Environmental Protection (NJDEP) (e.g., sediment control basin) before being discharged back to Penhorn Creek. In consultation with NJDEP, measures will be implemented during the replacement of the weir to minimize impacts to surface waters and associated wetlands of Penhorn Creek. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), will be considered where feasible to minimize temporary impacts to wetlands that will not be permanently impacted by the Project. Following the completion of construction, where possible, wetlands temporarily affected during construction will be restored back to original topography and stabilized.

Wetland F

The Project will result in impacts to a 0.44-acre wetland area in Hoboken, Wetland F, located in a drainage ditch adjacent to the north side of the Hudson-Bergen Light Rail (HBLR) right-of-way. This wetland will be filled for use as a construction access road for the Project's construction staging area at the ventilation fan plant and shaft site in Hoboken during the seven-year construction period at this site. Drainage culvert(s) will be installed as part of the construction access road to maintain the existing drainage pattern while the road is in place. Due to the duration that the construction access road will remain in place, it is considered a permanent impact, and will be mitigated as such. Once construction of the Project in this area is complete, the construction access road will either be removed or remain in place for maintenance access.

Existing NYSW Wetland Mitigation Site

A portion of the 3-acre NYSW Railway wetland mitigation site is located within the Limit of the Project. This site is located adjacent to the eastern portion of Wetland CD, south of the NEC, to the west of Tonnelle Avenue, along the western side of the NYSW Secaucus yard (see Figure 11-4b).

The wetland mitigation site is compensation for the permitted filling of 3 acres of waters of the United States (WOTUS, U.S. Department of Army (USACE) Permit No. 90-0679 (the "Permit") dated November 24, 1995). To mitigate for the loss of these 3 acres, the Permit required NYSW to perform on-site wetlands creation and/or enhancement activities in accordance with a mitigation plan titled "Revised Wetlands Mitigation Plan, Resources Terminal Project (Phase IIB) North Bergen, New Jersey," dated April 1995. The plan required the creation of palustrine scrub-shrub, emergent, aquatic bed and open water habitats in what was previously a *Phragmites australis*-dominated wetland. The Permit also required NYSW to restrict the use of the mitigation site (the "site") in perpetuity by creation of a conservation easement or outright transfer of the site to an entity acceptable to USACE.

On December 12, 2012, NYSW and the USACE signed a Settlement Agreement stating that NYSW had failed to complete mitigation or restrict the use of the mitigation site in perpetuity as required by the USACE Permit 90-0679. The Settlement Agreement reaffirmed acceptance of the original mitigation plan with additional conditions. One such condition required NYSW to grant a conservation easement, dated March 27, 2013, to NJDEP to restrict subsequent development of the site. As designed, the wetland mitigation project is to include palustrine scrub-shrub, emergent, aquatic bed and open water habitats. NYSW implemented the mitigation plan in 2014. North Bergen Combined Sewer Overflow (CSO) outfall 011A discharges to the southernmost end of the mitigation site. NJDEP holds a conservation easement on the mitigation site.

The Project will result in 0.09 acres of permanent wetland impacts, 0.05 acres of temporary wetland impacts, and 0.18 acres of permanent upland impacts to this wetland mitigation site **(Table 1)**. The Proposed Project will require the formal removal of the conservation easement on this site for these impacted portions of this property. Twenty-four 2-foot piles supporting the viaduct, the pier in the western edge of the site, and a portion of a permanent access road will contribute to the permanent loss of wetland area within the NYSW wetland mitigation site. A culvert will be installed at the outlet of the wetland mitigation site and sized to maintain flow through the system. The Preferred Alternative has the potential to result in indirect impacts to the wetland mitigation site and adjacent wetlands due to changes in hydrology and hydraulics associated with the loss of wetland area and change in the discharge point or structure from the wetland mitigation site to the adjacent wetland. The Project Sponsor, in cooperation with the other Project Partners, will conduct additional evaluations to confirm that the outlet structure for the wetland mitigation site is designed to minimize hydraulic impacts to the wetland mitigation site and the North Bergen CSO outfall 011A, and the functioning of the wetland with respect to water quality and minimizes impacts to the wetland receiving the discharge from the mitigation site. Approximately 0.03 acres of viaduct will be located above the NYSW wetland mitigation site. As with the other portions of the viaduct, this section of viaduct will be positioned between 18 and 19 feet above the surface of the wetland. This elevation above the emergent wetland combined with the southern exposure will allow sufficient sunlight to reach the wetland during periods of the day to support the existing plant community. Therefore, shading due to the viaduct will not result in significant adverse impacts to the NYSW wetland mitigation site. Temporary impacts will result from the installation of erosion and sediment control measures and security fencing, and culverts with associated riprap outlet protection.

Table 1
Summary of Impacts to Wetlands and Associated Open Waters Under USACE Jurisdiction

Wetlands and Associated Open Waters within LOP under USACE Jurisdiction*	Permanent impact due to permanent fill (acres)	Temporary impact due to construction activity (acres)
Wetland A	0. 8	0.6
Wetland B	0.01	0.00
Wetland CD	3.2	0.9
Wetland F*	0.4	0.00
Total Impact within Delineated Wetlands	**4.4**	**1.5**
Total Wetland Impact within NYSW Mitigation Site	0.09	0.05
Total Upland Impact within NYSW Mitigation Site	0.18	0.00

Notes: *Due to the duration that the construction access road will remain in place, this impact is considered permanent by USACE.
** Wetland Impacts to the NYSW Mitigation Site are separate from the impacts to delineated Wetland CD

3) ALTERNATIVES CONSIDERED

This section describes the alternatives of the Project that were assessed in determining a Preferred Alternative. A preliminary screening evaluation of 15 alternatives was conducted during the Project's National Environmental Policy Act (NEPA) scoping process. The 15 alternatives were evaluated against a two-tiered set of criteria: whether the alternative met the purpose and need of the Project, and, if the alternative met the purpose and need of the Project, it was assessed in terms of its feasibility and reasonableness, which included an assessment of the likelihood for substantial environmental impact relative to other alternatives. The results of the screening analysis resulted in only one Build Alternative that met the Project's purpose and need. A No Action Alternative was also assessed.

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under the No Action Alternative no new passenger rail tunnel would be constructed across the Hudson River. The No Action Alternative would implement only those initiatives that are necessary to keep the existing North River Tunnel in service and provide continued maintenance as necessary to address ongoing deterioration and maintain service. The No Action Alternative is not a practicable alternative because it does not preserve the current functionality of passenger rail service between New Jersey and PSNY, does not repair the deteriorating North River Tunnel, and does not strengthen the NEC's resiliency to support reliable passenger rail service by providing redundant capability under the Hudson River.

ALTERNATIVE 2 – THE PREFERRED ALTERNATIVE

For the Preferred Alternative to meet the Project's purpose and need, it must maintain current levels of train service on the NEC for Amtrak and NJ TRANSIT while the North River Tunnel is being rehabilitated. To do this, the alignment of the Preferred Alternative's new tunnel is constrained by a number of geographic considerations, which limit the potential Project alignment at its western and eastern ends, where it must connect to the NEC and the existing tracks at PSNY. These are as follows:

1. To the west, the Preferred Alternative must connect to the NEC in New Jersey in a way that allows operational flexibility for trains moving between the NEC and the new tunnel. Therefore, to provide a new route close to the NEC that maximizes the use of existing infrastructure, maintains flexible and redundant NEC rail operations for Amtrak and NJ TRANSIT, and minimizes the potential for environmental and community impact associated with new right-of-way, the Preferred Alternative's two new tracks should be immediately adjacent to the existing NEC, using existing Amtrak right-of-way where possible, and connect to the NEC as close as possible to the new tunnel portal while providing switches between tracks for operational flexibility. Due to the southerly location of the connection to PSNY as described below, approach tracks to the new tunnel on the south side of the NEC in New Jersey would avoid the need for tunneling beneath or flying over the NEC, and therefore would have fewer potential environmental impacts than new approach tracks on the north.

2. To the east, the Preferred Alternative must connect to the array of approach tracks that lead into PSNY, which provide access to PSNY tracks 1 through 18. Connecting to these tracks allows trains to reach existing PSNY platforms and is essential to maintaining the NEC's current capacity and functionality. This connection can only be made at the southwestern end of PSNY, because areas farther north are occupied by the existing tracks from the North River Tunnel, Amtrak's Empire Line (which heads north to Albany), and tracks connecting to the West Side Yard. The connection point on the southern end of the approach tracks would make use of the Hudson Yards Right-of-Way Preservation Project being constructed by Amtrak underneath the West Side Yard. The Hudson Yards Right-of-Way Preservation Project preserves a rail right-of-way beneath the extensive overbuild project that is planned to be constructed on a platform above the rail complex. Any other connection point would conflict not only with the existing rail infrastructure but also with the foundations and supports for this platform.

These connection points narrow the area where the Preferred Alternative can be located. The constraints in New Jersey related to connections to the NEC require the Preferred Alternative to be located immediately south of the NEC through the New Jersey Meadowlands. The constraints in New York related to connections to PSNY set both the horizontal and vertical alignment of the new tunnel, so that the new tunnel must be relatively shallow beneath the Hudson River to allow trains to connect to approach tracks to PSNY that begin along the south side of the LIRR train storage yard.

Within these parameters, multiple different alignment options are possible for the Preferred Alternative's new tunnel between its portal at the western slope of the Palisades and the Manhattan shoreline. To identify the routing that best meets the Project's purpose and need, four conceptual alignment options were identified based on potential locations where a ventilation shaft and associated fan plant could be sited in New Jersey. The ventilation shaft must be located directly above the tunnel and east of the Palisades, and therefore the location of the ventilation shaft determines the tunnel alignment. The ventilation shaft site would also be used as a construction staging site. The options were as follows:

- Alignment Option 1: Tunnel alignment close to the existing North River Tunnel, with a ventilation shaft site on a portion of an office building's parking lot near the Lincoln Tunnel Helix in Weehawken, New Jersey.
- Alignment Option 2: Tunnel alignment south of Option 1, with a shaft site on a property occupied by a commercial office building north of 19th Street near JFK Boulevard East in Weehawken.
- Alignment Option 3: Tunnel alignment south of Option 2, with a shaft site south of 19th Street near the HBLR in Weehawken. Two potential shaft sites were identified for this alignment: one on a previously vacant site on Harbor Boulevard south of 19th Street which is now occupied by a large new residential project, and the other on the property occupied by Dykes Lumber, south of 19th Street between the HBLR right-of-way and Park Avenue.
- Alignment Option 4: Tunnel alignment south of Option 3, with a shaft site south of 18th Street in Hoboken, New Jersey. This option would follow the same horizontal alignment in New Jersey identified for the previous Access to the Region's Core (ARC) Project, and would use the same shaft site in Hoboken as the ARC Project.

The four alignment options were evaluated comparatively in terms of how well each option met the Project's goals and objectives. The four alignment options would be the same over the surface portion of the alignment in New Jersey, as well as in Manhattan, so those segments were not considered in the comparison. In addition, based on the analyses conducted for the ARC Project, it is assumed that potential construction or operational effects (e.g., noise and vibration) related to the alignment of the deep rock tunnel beneath the Palisades would not be significant for areas directly above the tunnel, so that was not a factor in the comparison.

The alignment options were evaluated and compared in terms of how well they meet the Project's goals and related objectives. The Project's goals are as follows:

- Improve service reliability and upgrade existing tunnel infrastructure in a cost-effective manner.
- Maintain uninterrupted existing NEC service, capacity, and functionality by ensuring North River Tunnel rehabilitation occurs as soon as possible.
- Strengthen the NEC's resiliency to provide reliable service across the Hudson River crossing, facilitating long-term infrastructure maintenance and enhancing operational flexibility.
- Do not preclude future trans-Hudson rail capacity expansion projects.
- Minimize impacts on the natural and built environment.

The refined screening evaluation concluded that Option 4 best meets the Project goals and objectives and is the preferred alignment option. Option 4 offers the following advantages over the other alignment options:

- Least potential for delays to the Project schedule, because of the pre-construction risk related to property acquisition, investigation, and remediation already conducted for the ventilation shaft site as part of the ARC Project;
- Minimal impacts to existing transit and other transportation services; and
- Least impact related to displacement of active uses (residential, business, and future residential), since NJ TRANSIT has already acquired the properties needed for the New Jersey shaft site and staging areas.

While Option 4 would have a slightly longer tunnel than the other options, this was not found to result in negative impacts that outweighed this option's advantages. Option 4 would have a greater construction cost for tunneling than Options 1 through 3 because of the additional length, but if construction is delayed for Options 1 through 3 because of their greater pre-construction risk, the cost difference would be minimized and might be eliminated after accounting for cost increases that occur from inflation. Similarly, while the tunneling for Option 4 could take slightly longer than for the other options (2.5 months longer than the shortest alignment option, Option 1), this would be a small difference relative to the total schedule of seven years, and could be eliminated with any delay in Options 1 through 3. Finally, the slightly longer tunnel length for Option 4 would not meaningfully increase travel time for trains in the tunnel, especially once operating conditions at and near PSNY are considered. While trains operating at the maximum design speed through the tunnel would have different potential total travel times, in reality, controlling signals at Tenth Avenue near PSNY would result in a uniform speed step-down for eastbound trains approaching PSNY. This would reduce the difference between different travel times farther west (for example, from the Tonnelle Avenue portal to the middle of the Hudson River) as trains are slowed to reach a common location at a common point in time, based on PSNY dispatching and operational issues. In reality, therefore, the four alignment options would likely have little or no difference in travel times between Secaucus Junction Station and PSNY.

Each of the other alignment options (Options 1 through 3) would be feasible, but was found to have one or more substantial disadvantages relative to Option 4:

- Alignment Option 1 would have a construction staging site within the Lincoln Tunnel Helix (the curving approach ramp to the Lincoln Tunnel), which would require displacement of NJ TRANSIT's existing Weehawken bus parking and staging site currently located there. The bus parking facility is used to store approximately 160 buses at a location close to the Lincoln Tunnel so that they can reliably reach the Port Authority Bus Terminal for the evening commute. Displacement of this bus parking area would result in substantial negative impacts on NJ TRANSIT's trans-Hudson bus operation serving the Port Authority Bus Terminal and providing service to thousands of commuters. Option 1's shaft site and staging area would also have the potential for major conflicts with future Lincoln Tunnel Helix reconstruction being planned by the Port Authority of New York & New Jersey. In addition, Option 1 may introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. For these reasons, Option 1 was eliminated from further consideration
- Alignment Option 2 would require the acquisition and demolition of an existing, occupied, multi-story office building for its shaft site and staging area, an adverse

impact that could be avoided by Option 4. In addition, Option 2 may introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. Option 2 has no substantial advantages over Option 4 and would not reduce potential environmental impacts relative to Option 4. For these reasons, Option 2 was eliminated from further consideration.

- Alignment Option 3 was eliminated from further consideration because in using the shaft site along Harbor Boulevard, it would preclude the development of at least a portion of a major planned residential development currently under construction at 800 Harbor Boulevard, an adverse impact that could be avoided by Option 4. In addition, at the time that the alternatives evaluation was conducted, acquisition of the alternative staging area would have required displacement of the active commercial use at Dykes Lumber Company. Since the alternatives evaluation was conducted, Dykes Lumber Company has put its property up for sale, but the business remains in operation at the time of publication. Even though the Dykes Lumber Company property is now for sale and therefore development of Option 3 with the alternative shaft site may not have to result in displacement of that business, Alignment Option 3 would still have the potential to introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. Option 3 has no substantial advantages over Option 4. Therefore, Option 3 was not considered further.

Least Environmentally Damaging Practicable Alternative Evaluation

As described above, only one Alternative was found to meet the purpose and need for the Project: a new two-track tunnel beneath the Palisades and Hudson River connecting the existing NEC in the New Jersey Meadowlands to the existing PSNY approach tracks in New York. This alternative will have a ventilation shaft, associated fan plant building, and construction staging area on a site just east of the Palisades in Hoboken, New Jersey (with small portions of the site also located in Union City and Weehawken, New Jersey). It will also require filling of wetlands at two locations in New Jersey—in the Meadowlands (Secaucus and North Bergen) and in Hoboken—and modifications within the Hudson River in New York County, as discussed below.

Meadowlands

The Preferred Alternative for the Project must be located within the New Jersey Meadowlands, because it must connect to the NEC, which is already located on a berm within the New Jersey Meadowlands. The track connections will be accomplished in a new interlocking (a system of switches, signals, and track connections that connects multiple tracks, so that trains can move between the tracks) that begins just east of County Road and Secaucus Junction Station in Secaucus, New Jersey. Within the Meadowlands, the new track will be located on an embankment, on bridges, and on a viaduct.

The western end of the Meadowlands section will be closest to the existing NEC berm, since this is the area where tracks will begin to diverge from the NEC. In this area, the widened embankment will be supported by a retaining wall along its southern edge because the tracks will be close to adjacent businesses and use of a retaining wall for a widened embankment will reduce the land area needed for the new tracks. The new surface track segment of the Preferred Alternative would cross Secaucus Road on a rail bridge adjacent to the existing NEC.

Beyond the section supported by the retaining wall, approximately 3,100 feet of the new alignment will be supported on a viaduct over wetlands and would continue on a bridge over the freight rail right-of-way owned by Conrail and NYSW. The bridge over the freight rail tracks would have two spans with a center support pier. A viaduct is proposed in this section rather than a sloped embankment (as proposed earlier in the Project design), resulting in an approximately 40 percent reduction in impacts to wetlands and associated open waters. With this modification in design from sloped embankment to viaduct, permanent wetland and associated open waters impacts within the Meadowlands were reduced from approximately 7 acres to 4 acres.

The segment of the new alignment between the freight rail right-of-way and Tonnelle Avenue will be on a sloped (unretained) embankment.

The Preferred Alternative will pass beneath Tonnelle Avenue, which will span the tracks on a new roadway overpass. The tracks will then continue in a cut to connect to the new tunnel portal on the east side of Tonnelle Avenue, which is approximately 600 feet south of the existing North River Tunnel portal.

Hoboken

The alternatives analysis conducted in coordination with the Project's NEPA review considered multiple alignments for the tunnel that would in turn have different ventilation shaft and construction staging area locations. The alignment selected best met the Project's goals and objectives because of its shorter time to implement and smaller impact on the environment and surrounding community.

The selected alignment option will result in permanent impacts during construction to a 0.44-acre wetland area in Hoboken, Wetland F, located in a drainage ditch adjacent to the north side of the HBLR right-of-way. This area will be filled for use as part of the Project's construction staging area. Once construction has been completed, the access road will either be removed and the wetland will be restored, or the road will remain in place for maintenance access to be used by the HBLR. As noted above, other alignment options that avoided this wetland area would result in greater environmental and community impacts in other respects.

4) AVAILABLE MITIGATION CREDITS

The Project Sponsor will purchase acre-credits for the permanent impacts to wetlands and associated open water areas within the Meadowland and permanent wetland and permanent upland impacts to the NYSW Mitigation Site from an approved Wetland Mitigation Bank or Banks whose primary service areas include the Hackensack-Passaic Hydrologic Unit 02030103 watershed where the New Jersey surface alignment portion of the Project is located and the Lower Hudson Hydrologic Unit 02030101 watershed where Wetland F in Hoboken is located. The Project Sponsor will solicit bids from approved Wetland Mitigation Banks within these service areas to procure the necessary mitigation acre-credits once the project has received approval from the regulatory authorities.

5) GOALS AND OBJECTIVES

The primary objective of this mitigation plan is to offset the 4.4 acres of permanent wetland and WOTUS impacts, and the 0.09 acres of permanent wetland impacts and 0.18 acres of permanent upland impacts to the NYSW Mitigation Site, identified in **Table 1** for impacts to Wetlands A, B, and CD, that will result from the Project through the purchase of mitigation credits from an approved Wetland Mitigation Bank. The 1.5 total acres of temporary impacts will be offset through the removal of temporary fill material, restoration of topography, and stabilization through seeding with suitable native plant species.

The 3 acres of the Hudson River bottom habitat that will be modified as a result of the in-water soil improvement through deep soil mixing to produce soilcrete within the low-cover area will permanently modify the fine-grained silt/clay sediments, resulting in a permanent loss of this portion of the sediment to infaunal macroinvertebrates, or those that live within the sediment, and the species that prey on them, but would initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete, providing some foraging habitat for benthic feeders once the area is colonized. Approximately 0.7 acres of soilcrete area (approximately 120 feet wide and 270 feet long) would be between 1 and 2 feet above the existing mudline (i.e., river bottom). This elevated portion of the soilcrete would provide habitat for encrusting organisms, which would provide some foraging habitat for fish. However, because it will be higher than the surrounding river bottom, this area may have a lower potential to accumulate sediment that would provide soft-bottom habitat for benthic invertebrates and would not, therefore, provide forage habitat to soft-bottom feeding fish species such as windowpane, skates, and summer and winter flounder. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS and the New York State Department of Environmental Conservation (NYSDEC), for five years to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 2.3 acres of soilcrete for five years post-construction. Section 9; "Monitoring Of The 3-Acre Hudson River Low-Cover Area" provides a proposed conceptual monitoring plan for this area. In addition to the monitoring, NYSDEC is requesting additional mitigation for the modification to 3 acres of bottom habitat within the Hudson River. NYSDEC recommendations include contribution to the Estuarium[2] at Pier 26 within Hudson River Park or purchase of credits from the Saw Mill Creek Wetland Mitigation Bank on Staten Island.

6) SITE PROTECTION

The wetlands that will be restored because of temporary construction impacts are within the right-of-way for National Railroad Passenger Corporation and within the NYSW right-of-way. The Project Sponsor will be responsible for ensuring the protection of the restored wetland areas and for monitoring the 1.5 acres of the Hudson River that will be modified through the establishment of the soilcrete for 5 years post-construction.

[2] https://www.bire.org/news/hudson-river-park-pier-26-estuarium-project-awarded-to-clarkson-university.

7) BASELINE CONDITIONS

PROJECT SITE IN NEW JERSEY

The western half of the study area within New Jersey is located within the New Jersey Meadowlands, a large complex of tidal marshes and impounded wetlands surrounded by developed areas that include paved parking areas, warehouse and industrial development, and transportation infrastructure such as major highways and secondary roads. Natural areas, including wetland habitats and adjacent upland habitats have been documented, by the New Jersey Sports and Exhibition Authority (NJSEA) and NJDEP, to provide habitat for many resident and migratory species, including some species that have been listed by state or Federal regulatory agencies as being of special concern, threatened, or endangered. The following sections describe the natural resources within the study area, within and outside the Meadowlands.

Wetlands

FRA reviewed the National Wetlands Inventory (NWI) published by the USFWS, NJDEP's wetland maps, and conducted a field reconnaissance in fall 2016. The NWI shows large areas of estuarine wetlands and smaller areas of freshwater wetlands within the New Jersey study area in the Hackensack Meadowlands (see **Figure 3**).

The freshwater wetlands shown on the NWI are riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (designated by USFWS as "R5UBH"). As shown on the NWI, this R5UBH wetland is mapped on Penhorn Creek as it crosses the NEC east of County Road in Jersey City, NJ and the Project alignments and again near Secaucus Road in Secaucus, NJ, and on a wetland area immediately north of the NEC near the NYSW right of way at the eastern edge of the Meadowlands.

The estuarine tidal wetlands within the study area (see **Figure 3**) include an intertidal wetland spanning both sides of the NEC from County Road to Penhorn Creek that is irregularly flooded oligohaline,(i.e., brackish water with a salinity ranging from 0.5 to 3.0 parts per thousand [ppt]) and dominated by emergent *Phragmites australis* (a large perennial reed species that is invasive within the United States) ("E2EM5P6") Outside Penhorn Creek, the NWI indicates large areas of oligohaline intertidal wetlands along both sides of the NEC east of Secaucus Road that are irregularly flooded, dominated by emergent *Phragmites australis*, and partially drained/ditched (E2EM5Pd6). The NYSW wetland mitigation project is located within a portion of the area mapped as E2EM5Pd6. The following section presents a detailed description of this wetland mitigation site. In addition, the NWI indicates subtidal wetlands with the following characteristics in small areas close to Penhorn Creek and County Road: subtidal wetlands with an unconsolidated bottom that is permanently flooded, oligohaline, and excavated (E1UBLx6); and subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). FRA confirmed these wetland types and approximate locations during site reconnaissance conducted in fall 2016.

NJDEP-mapped wetlands are located in the study area (see **Figure 4**). These wetlands are designated by NJDEP with the land use/land cover code, "*Phragmites* Dominate Interior Wetlands." They are located along both sides of the NEC in the Meadowlands area between County Road and the NYSW right-of-way. FRA confirmed this wetland type and approximate wetland locations during site reconnaissance.

Delineated Wetlands

FRA delineated wetlands within the New Jersey study area during November and December 2016, in accordance with USACE's three-parameter approach for identifying wetlands[3]. These wetlands, Wetlands A, B, CD, and F, are described in greater detail in Appendix 11-2 to the EIS, "Wetland Delineation Report." Wetland F is described below. Two of these wetlands are located along the NEC and are tidally influenced emergent marshes that correspond with the locations of NWI-mapped wetlands E2EM5P6, R5UBH, E1UBLx6, and E2EM5Pd6 (Wetlands A and CD). An isolated, emergent wetland was delineated along the NEC (Wetland B). An emergent wetland with a possible nexus to the Hudson River through a tide gate was delineated along the HBLR right-of-way in Hoboken (Wetland F).

NYSW Wetland Mitigation Site

An existing USACE-approved wetland mitigation site is located within the Project area in Secaucus, NJ just south of the NEC, to the west of Tonnelle Avenue, along the western side of the NYSW Secaucus yard (see **Figure 2b**). The USACE approved the implementation of a plan within a 3-acre portion of the NYSW right-of-way to mitigate for project activities undertaken in North Bergen, NJ by NYSW that resulted in 3 acres of fill to waters of the United States. As designed, the wetland mitigation project is to include palustrine scrub-shrub, emergent, aquatic bed and open water habitats. NYSW implemented the mitigation plan in 2014. North Bergen Combined Sewer Overflow (CSO)[4] outfall 011A discharges to the southernmost end of the mitigation site. NJDEP holds a conservation easement on the mitigation site.

Surface Waters

The western surface alignment portion of the Project site in New Jersey crosses through the Penhorn Creek watershed within the Meadowlands, which the Meadowlands Environmental Research Institute (MERI, 2016a) divides into four subwatersheds. Penhorn Creek is a tributary to the Hackensack River and drains a portion of the Meadowlands to the east of the Hackensack River. The ridgeline of the Palisades sill forms the eastern boundary of Penhorn Creek's watershed, and the ridgeline running through Secaucus forms the western boundary of the watershed. Dikes formed by roadway fill constructed across the Meadowlands and the Hackensack River form the northern and southern boundaries of the watershed, respectively. Penhorn Creek's bed elevation is lower than much of the tidal range in the Hackensack River; however, its waters are regulated by a tide gate at St. Paul's Avenue near its mouth (NJMC, 2006).

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[3] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss; U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[4] A combined sewer overflow (CSO) is the discharge or release of water from a combined sewer system (a sewer system designed to collect storm water runoff, domestic sewage, and industrial wastewater in the same pipe and bring it to wastewater treatment facilities) caused by snowmelt or storm water runoff.

Several municipal CSO outfalls[5] discharge to the Penhorn Creek watershed. The North Bergen CSO outfall 011A (New Jersey Pollutant Discharge Elimination System (NJPDES) Number NJ0108898), discharges to the NYSW wetland mitigation site, which then drains to the wetlands within the Project site. No surface waters other than the Hudson River are located within the portion of the Project area east of the Palisades that is within the Hudson River watershed. Runoff within this urbanized area is conveyed to the Hudson River by storm sewers and CSO outfalls.

Water Quality

Surface Water Quality Standards for New Jersey Waters (N.J.A.C. 7:9B) establish the designated uses to be achieved, provide management guidelines, and specify the water quality criteria necessary to protect the state's waters. Designated uses include potable water, propagation of fish and wildlife, recreation, agricultural and industrial supplies, and navigation. These are reflected in use classifications assigned to specific waters.

All waters of Penhorn Creek are classified FW2-NT/SE2. “FW2-NT” represents fresh waters that are non-trout and not in the Pinelands. “SE2” waters are saline waters of estuaries. The combined classification, “FW2-NT/SE2” includes waterways where there may be a salt water/freshwater interface. The exact point of demarcation between the fresh and saline waters is defined as “that point where the salinity reaches 3.5 parts per thousand at mean high tide” (N.J.A.C. 7:9B).

MERI operates a surface water monitoring station, station PHC6, on Penhorn Creek (MERI, 2016b). With the exception of a sample collected on February 19, 2014, all measured salinity concentrations, which have been collected quarterly from 1993 to the present, were below 3 parts per thousand (ppt), indicating that the waters may be below the salinity threshold for the saline waters classification and therefore classified as FW2-NT. However, concentrations at PHC6 are highly dependent on the condition of the downstream tide gate.

The NJPDES permit for North Bergen Township MUA’s CSO outfall 011A (NJDEP, 2015) indicates that the Penhorn Creek tributary receiving the discharge is classified SE2. The NJPDES permit also indicates that it is a “C2” or Category Two water, which is New Jersey’s lowest antidegradation designation below Outstanding National Resource Waters[6] and Category One waters.

Table 2 summarizes water quality parameters and heavy metal concentrations reported for MERI Station PHC6, as well as the NJDEP surface water quality standards for Class SE2 waters, including Penhorn Creek. Both dissolved oxygen (DO) and biological oxygen demand (BOD) have increased over the years, indicating some improvement in water quality (increased DO) but also some level of continued pollution (increased BOD). Except for copper, dissolved heavy metal concentrations remained below their respective acute standards from 1996 through 2015.

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[5] http://www.nj.gov/dep/dwq/cso.htm

[6] An Environmental Protection Agency (EPA) designation which applies to New Jersey surface waters classified as freshwater 1 waters and “Pinelands waters;” these waters are considered nondegradation waters that are set aside for posterity because of their unique ecological significant, exceptional recreational significance, or exceptional water supply significance.

Table 2
NJDEP Water Quality Standards and Data for Penhorn Creek Sampling Station PHC6

Parameter	NJDEP SWQS for Class SE2 Waters	Water Quality Data (Average)					
		1993-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020
Ammonia (mg/L)	0.115 (acute); 0.030 (chronic)	3.85	1.97	2.42	1.27	2.25	1.76
BOD (mg/L)	No standard	5.37	4.66	9.20	8.67	9.33	13.06
Dissolved oxygen (mg/L)	Not less than 4.0 at any time	4.69	6.22	5.87	6.01	7.39	7.26
Nitrate (mg/L)	No standard	-	0.30	2.91	1.70	6.78	1.28
Temperature (°C)	Summer seasonal average shall not exceed 29.4°C	18.3	15.0	13.5	13.7	13.6	15.8
Cadmium (μg/L)[1]	40 (acute); 8.8 (chronic)	30.7	4.8	3.8	1.4	1.4	0.2[2]
Chromium (μg/L)	No standard	23.8	5.5	8.0	7.2	3.5	3.7
Copper (μg/L)[1]	4.8 (acute); 3.1 (chronic)	24.7	9.3	13.8	16.3	79.0	26.8
Lead (μg/L)	210 (acute); 24 (chronic)	69.4	50.2	41.1	33.2	21.9	14.1
Nickel (μg/L)[1]	64 (acute); 22 (chronic)	27.6	22.7	22.9	9.1	7.0	3.2
Zinc (μg/L)[1]	90 (acute); 81 (chronic)	155.7	37.4	43.6	61.5	62.2	43.9

Notes:

1. The NJDEP surface water quality standards for cadmium, copper, nickel, and zinc are based on water hardness and expressed in terms of dissolved criteria.
2. In this time period, cadmium measurements were only collected quarterly from January 2016 to May 2017.

Except for nitrate, for which fewer samples were collected in each year range except 2016-2020, average values were based on 10 samples for 1993-1995, 20 samples for 1996-2000, 16 samples for 2001-2005, 20 samples for 2006-2010, 19 samples for 2011-2015, and 16 samples for 2016-2020.

Sources: MERI 2021; NJAC 7:9B Surface Water Quality Standards.

Aquatic Biota

Macroinvertebrates

The portion of the study area along the NEC in the Meadowlands features aquatic biota[7] in the wetlands and Penhorn Creek. These include two common mollusks: the mud snail (*Nassarius obsoleta*) and ribbed mussel (*Geukensia demissa*). Common epibenthic[8] crustaceans of the tidal and semi-tidal (impounded) streams and wetlands in this area include blue crab (*Callinectes sapidus*), fiddler crabs (*Uca* spp.), white-fingered mud crabs (*Rhithropanoepus harrisii*), mysid shrimp (*Neomysis americana*), sand shrimp (*Crangon septemspinosa*), grass shrimp (*Palaemonetes pugio*), and several species of amphipods (Cerrato 2006). Neither the NJDEP's Landscape Project–Piedmont Plains nor the USFWS's IPaC databases list any threatened or endangered invertebrate species in the study area.

Fish

The most abundant and commonly occurring fish in the New Jersey Meadowlands, which are therefore likely to occur in the Meadowlands portion of the study area, include mummichog

[7] Aquatic biota are organisms living in or depending on the aquatic environment.

[8] Epibenthic crustaceans are those that live on the surface of sediments at the bottom of a water body.

(*Fundulus heteroclitus*), Atlantic silverside (*Menidia menidia*), inland silverside (*Menidia beryllina*), white perch (*Morone americana*), blueback herring (*Alosa aestivalis*), Atlantic tomcod (*Microgadus tomcod*), brown bullhead (*Ameriurus nebulosus*), striped killifish (*Fundulus majalis*), striped bass (*Morone saxatilis*), pumpkinseed sunfish (*Lepomis gibbosus*), American eel (*Anguilla rostrata*), and bay anchovy (*Anchoa mitchilli*). An inventory of fisheries resources conducted by the Hackensack Meadowlands Development Commission (now the New Jersey Sports and Exhibition Authority) in 1989 (HMDC Inventory of Fisheries Resources 1989) reported that the mummichog, closely associated with salt marsh habitats, comprised 85 percent and 91 percent of the total catches during the two years of sampling of the study. Bragin et al. (2005) reconfirmed found that mummichog was the most abundant species in a 2001-2003 fish inventory.

Other common resident fish known to occur in the Hackensack River include white catfish (*Ameiurus catus*) and the non-native common carp (*Cyprinus carpio*); these have the potential to occur in Penhorn Creek. Alewife (*Alosa pseudoharengus*), blueback herring, American shad (*Alosa sapidissima*), Atlantic tomcod, and striped bass are anadromous fish (i.e., fish that migrate from salt water to spawn in fresh water) that use the Hackensack River and associated marshes such as Penhorn Creek in the spring. Some marine fish, such as juvenile Atlantic menhaden (*Brevoortia tyrannus*) and juvenile bluefish (*Pomatomus saltatrix*), also occur in the Hackensack River (Bragin et al. 2005) and have the potential to occur in Penhorn Creek.

Terrestrial Resources

Ecological Communities

The Project area includes the wetlands/industrial landscape of the Meadowlands and the urban landscape east of the Palisades in Weehawken and Hoboken. Railroad[9], mowed lawn[10], urban vacant lot[11], and successional southern hardwoods[12] communities (Edinger et al. 2014[13]) occur within the Project area. The railroad community represents the NEC tracks and is largely covered by ballast and is unvegetated areas. A few ruderal species (plants growing in waste

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[9] Edinger et al. (2014) define this community as "a permanent road having a line of steel rails fixed to wood ties and laid on gravel roadbed that provides a track for cars or equipment drawn by locomotives or propelled by self-contained motors. There may be sparse vegetation rooted in the gravel substrate along regularly maintained railroads. The railroad right of way may be maintained by mowing or herbicide spraying."

[10] Edinger et al. (2014) define this community as "residential, recreational, or commercial land, or unpaved airport runways in which the groundcover is dominated by clipped grasses and there is less than 30 percent cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50 percent cover. The groundcover is maintained by mowing and broadleaf herbicide application."

[11] Edinger et al. (2014) define this community as "an open site in a developed, urban area that has been cleared either for construction or following the demolition of a building. Vegetation may be sparse, with large areas of exposed soil, and often with rubble or other debris."

[12] Edinger et al. (2014) define this community as "a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed."

[13] The "Classification of Vegetation Communities of New Jersey: Second Iteration" by Breden et al. does not include descriptions of "cultural" vegetation communities, the category to which the vegetation communities of the study area belong. Therefore, Edinger et al. 2014 was used to classify vegetation communities within the New Jersey and New York study areas.

places and along roadsides), including common mullein (*Verbascum thapsus*), pokeweed (*Phytolacca americana*), and common mugwort (*Artemisia vulgaris*), are found on the slope adjacent to the railroad tracks. The mowed lawn and urban vacant lot communities are vegetated primarily by herbaceous species, including crabgrass (*Digitaria* sp), Kentucky bluegrass (*Poa pratensis*), English plantain (*Plantago lanceolata*), common mugwort, and clovers (*Trifolium* spp). The successional southern hardwoods community is confined to narrow bands at the toe of slope of the railroad tracks. Dominant species within the successional southern hardwoods community include: black locust (*Robinia pseudoacacia*), grey birch (*Betula populifolia*), eastern cottonwood (*Populus deltoides*), princess tree (*Paulownia tomentosa*), and tree of heaven (*Ailanthus altissima*) in the tree stratum; common blackberry (*Rubus allegheniensis*), multiflora rose (*Rosa multiflora*), and winged sumac (*Rhus copallinum*) in the shrub stratum; Asiatic bittersweet (*Celastrus orbiculatus*) and poison ivy (*Toxicodendron radicans*) in the vine stratum; and common mugwort in the herbaceous stratum.

Wildlife

Approximately half of the Project area is located in an industrial and heavily urbanized landscape dominated by buildings, transportation infrastructure, and other impervious surfaces that offers minimal habitat for wildlife other than urban-adapted generalists that are ubiquitous throughout the metropolitan area. The remaining portions of the Project area (e.g., the wetland complex associated with Penhorn Creek in the Meadowlands) are capable of supporting more rich and diverse communities of wildlife. These habitats are still subjected to high levels of noise and other indirect and direct forms of human disturbance and are further degraded by invasive species and pollution. As such, the wildlife communities in these areas are lacking in number or diversity of species and dominated by disturbance-tolerant species.

Birds

The most substantive habitat for supporting birds and other wildlife in the Project area is the wetland complex around Penhorn Creek. Based the wetland's relative large size, the dominance of non-native common reed (*Phragmites australis*), within it, and its isolation within a heavily urbanized area, breeding bird species likely to use this habitat include marsh birds, waterbirds, and land birds that are tolerant of degraded habitat conditions and ubiquitous in urban wetland habitats. Examples include red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), swamp sparrow (*Melospiza georgiana*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*), European starling (*Sturnus vulgaris*), yellow warbler (*Setophaga petechia*), barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), Canada goose (*Branta canadensis*), green heron (*Butorides virescens*), and spotted sandpiper (*Actitus macularia*). Some additional species that nest elsewhere in the region may use this wetland as foraging habitat, including herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), osprey (*Pandion haliaetus*), great blue heron (*Ardea Herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*).

During winter, birds likely to use the habitats within the Meadowlands portion of the Project area likely include only a few temperate migrants and non-migratory species, such as white-throated sparrow (*Zonotrichia albicollis*), European starling, house sparrow (*Passer domesticus*), Canada goose, brant (*Branta canadensis*), herring gull (*Larus argentatus*), and ring-billed gull (*Larus delawarensis*). During spring and fall migration, the same species that nest in the area may also use the wetland as stopover habitat on route to more northern breeding grounds or southern wintering grounds. Some additional species that are not likely to nest or overwinter in the area, such as the least sandpiper (*Calidris minutilla*), and northern harrier (*Circus cyaneus*) might also use the wetland as stopover habitat during their migration.

Mammals

Mammals that are expected to occur in the marsh of the Meadowlands near Penhorn Creek include muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), meadow vole (*Microtus pennsylvanicus*), and occasionally, white-tailed deer (*Odocoileus virginianus*).

Reptiles and Amphibians

Common reptile species with potential to occur in the wetlands around Penhorn Creek include snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), northern diamondback terrapin (*Malaclemys terrapin terrapin*), eastern garter snake ((*Thamnophis setalis*), and northern water snake (*Nerodia sipedon*). The newly described southern leopard frog species (*Rana kauffeldi*; formerly classified as *Rana sphenocephala utricularius*) that is endemic to the New York metropolitan area and inhabits coastal freshwater and brackish wetlands (Newman et al. 2012, Feinberg et al. 2014) also has the potential to occur in the wetlands around Penhorn Creek.

Threatened, Endangered, or Special Concern SpeCies

According to the USFWS's IPaC database, there are no Federal threatened or endangered species or critical habitats (including wildlife refuges or fish hatcheries) within the New Jersey portion of the Project area. Of the 34 migratory bird species of conservation concern listed in by the USFWS IPaC resource list, only one—–the seaside sparrow— is considered to have the potential to breed near the project site on the basis of its habitat associations, geographic range within New Jersey, listing as a breeding bird of the Meadowlands by the New Jersey Sports and Exposition Authority[14], and records of the New Jersey Natural Heritage Program. Seaside sparrow is a very uncommon breeding bird of the Meadowlands and prefers marshes dominated by saltmarsh cordgrass, unlike the phragmites-dominated marsh surrounding the project site. Therefore, seaside sparrow is not likely to occur near the Project site.

The New Jersey Natural Heritage Program (NJNHP) identified the following threatened, endangered, special concern, and rare species, wildlife habitats, and ecological communities as having have the potential to occur in the Project area or its vicinity: glossy ibis (*Plegadis falcinellus*; special concern), little blue heron (*Egretta caerulea*; special concern), osprey (*Pandion haliaetus*; threatened), snowy egret (*Egretta thula*; special concern), yellow-crowned night-heron (*Nyctanassa violacea*; threatened), shortnose sturgeon (*Acipenser brevirostrum*; endangered), black-crowned night-heron (*Nycticorax nycticorax*; threatened), barn owl (*Tyto alba*; special concern), and floating marsh-pennywort (*Hydrocotyle ranunculoides*; endangered) (NJNHP 2016).

The NJDEP's Landscape Project–Piedmont Plains database identified the study area as foraging habitat for little blue heron, snowy egret, yellow-crowned night-heron, and glossy ibis (NJDEP 2016).Glossy ibis, little blue heron, and black-crowned night-herons, have the potential to nest within the portion of the Project area within the Meadowlands. Ospreys have the potential to nest on trees or artificial structures in and around the wetlands surrounding Penhorn Creek, and have

[14] http://www.njsea.com/njmc/pdfs/general/meadowlands-bird-list-10-15-ol.pdf

the potential to occur over the open waters of the wetlands while foraging for fish Barn owls have the potential to occur in the study area, and would be most likely to occur in the wetland complex surrounding Penhorn Creek.

The state-endangered floating marsh-pennywort (*Hydrocotyle ranunculoides*) is documented as occurring in the vicinity of the Project area just north of the NEC. Floating marsh-pennywort is a perennial floating aquatic plant in the Apiaceae family. It is found in shallow, slow-moving or stagnant waters or in muddy soils. Threats to populations of floating marsh-pennywort include development, herbicide runoff, and displacement by invasive species (WDNR 2005). FRA observed a population of floating marsh-pennywort within the Project area on November 1, 2016. NJDEP has records of additional populations of floating marsh-pennywort documented within the study area, and nearby within Penhorn Creek dating from 2019. It has also been documented within the NYSW mitigation site.

PROJECT SITE IN HUDSON RIVER

The Project site is located within the Lower Hudson River Estuary, a tidally influenced portion of the Hudson River that is part of the New York–New Jersey Harbor Estuary, which also includes upper and lower New York Harbor, Arthur Kill, Kill Van Kull, East River, Raritan Bay, and Jamaica Bay. Saltwater from Upper New York Harbor enters the Lower Hudson River Estuary during the flood phase of the tidal cycle and lower salinity water is discharged from the Estuary to the Harbor during the ebb phase. The typical tidal range in the Hudson River is approximately 5 feet.[15] Average tidal velocities near the Project site are about 2.4 feet per second, and the average predicted ebb flow is about 2.6 feet per second.[16] Freshwater and higher salinity waters are well mixed during low-flow conditions, but are stratified under high-flow conditions when freshwater inflow from upriver overrides the denser saltwater layer.[17] Ristich et al. classified the lower Hudson River as polyhaline (indicating moderate salinity, less than seawater, with salinity of 18-30 ppt) in summer and fall months and mesohaline (less salinity, 5-18 ppt) in spring and early summer.[18]

USACE maintains a Federally authorized navigation channel at a depth of 40 to 48 feet below mean low water (MLW) from the mouth of the Hudson River upstream to approximately 59th Street.[19] Bathymetric surveys[20] conducted by USACE in April 2016 showed depths ranging from about 36 to 48 feet below mean lower low water (MLLW)[21] on the eastern side of the navigation channel, and depths from 33 to 51 feet below MLW on the western side of the navigation

[15] Geyer and Chant 2006.

[16] NOAA 2013.

[17] Moran and Limburg 1986.

[18] Ristich et al. 1977.

[19] USACE 2016.

[20] Bathymetry is the study of underwater depths of a water body; the underwater equivalent to underwater topography. Bathymetric surveys chart seafloor relief or terrain as contour lines (called depth contours or isobaths).

[21] Mean lower low water, as defined by NOAA, represents the average height of the lowest tide recorded at a tide station each day over the National Tidal Datum Epoch.

channel in the Project vicinity.[22] Shallower depths were found near or adjacent to piers and other structures, and depths rapidly increased to 40 feet or more over a distance of less than 200 feet from these structures. NOAA's Nautical Chart #12335 shows current water depths ranging from 3 to 17 feet below MLLW around the piers outside the navigation channel, and from 40 to 54 feet below MLW within the navigation channel. At the edges of the channel, depths are about 20 to 30 feet below MLLW.[23] Sedimentation in the lower Hudson River tends to be highest in the shallows on the west side of the river.[24] Sedimentation within the interpier areas where current velocities are lower ranges from 1 to 2 feet per year.[25]

Water Quality

Federal agencies such as USACE, multi-jurisdictional agencies such as the PANYNJ, the states of New Jersey and New York, New York City, and cooperative efforts such as the New York–New Jersey Harbor Estuary Program (HEP) have implemented programs to monitor and improve water quality in the New York–New Jersey Harbor and connected waterbodies. These programs have, over time, resulted in water quality improvements documented by monitoring programs such as the Harbor-Wide Water Quality Monitoring Report for the New York–New Jersey Harbor Estuary and the NYCDEP New York Harbor Water Quality Report. The City of New York has monitored harbor water quality with an annual survey for more than 90 years.

NYSDEC classifies the lower Hudson River as Class I saline surface waters from Battery Park in Manhattan upstream to Spuyten Duyvil, New York, including the Project site area. Suitable uses of Class I waters are secondary contact recreation[26], fishing, and fish propagation and survival. NJDEP classifies the lower Hudson River in the Project site area as SE2 saline surface waters. Suitable uses of SE2 waters are secondary contact recreation, maintenance and propagation of biota, and maintenance of diadromous fish[27] and wildlife. **Table 3** presents the surface water quality standards for the Project area in the Hudson River for both New Jersey and New York jurisdictions.

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[22] USACE 2016, sheet 5 of 11.

[23] NOAA 2016.

[24] Geyer 1995.

[25] Smith 1992.

[26] "Secondary contact recreation" means recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

[27] A fish that migrates between fresh and salt waters. Diadromous fish include anadromous fish (fish that spend most of their lives in saltwater and migrate to freshwater to spawn such as striped bass and sturgeon) and catadromous fish (fish that spend most of their lives in freshwater and migrate to saltwater to spawn such as the American eel).

Table 3
NYSDEC and NJDEP Surface Water Quality Standards

Parameter	NYSDEC Class I Waters	NJDEP Class SE2 Waters
Temperature	No standard	Summer seasonal average shall not exceed 29.4°C (84.9°F)
Salinity (psu)	No standard	No standard
pH	Normal range shall not be extended by more than 0.1 pH unit	6.5 – 8.5
Dissolved oxygen (DO) (mg/L)	Not less than 4.0 at any time	Not less than 4.0 at any time
Fecal coliform (cfu/100mL)	Monthly geometric mean, from a minimum of five examinations, shall not exceed 2,000 cfu/100mL	Monthly geometric mean, based on a minimum of five samples shall not exceed 770 cfu/100mL
Enterococcus (cfu/100mL)(1)	EPA Bathing Standard = 35 cfu/100mL	EPA Bathing Standard = 35 cfu/100mL
Secchi transparency (ft)	No standard	No standard
Total suspended solids (mg/L)	None from sewage, industrial wastes or other wastes that will impair usage	None of which would render the water unsuitable for the designated uses

Note: (1) NYSDEC does not identify a standard for enterococcus; however, USEPA provides a standard for bathing of 35 cfu/100mL; NJDEP does establish enterococcus standards, but not for SE2 waters.

Sources: 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations; NJAC 7:9B Surface Water Quality Standards; EPA Recreational Water Quality Criteria (Office of Water 820-F-12-058)

New York Water Quality Monitoring

The Project site falls within the NYCDEP Harbor Survey Inner Harbor study area, which includes the Hudson River from the New York City–Westchester County line through the Battery to the Verrazano Narrows; the Lower East River; and the Kill Van Kull–Arthur Kill system.[28] Class I portions of the Hudson River in New York County are listed as impaired for polychlorinated biphenyls (PCBs) and other toxins, which may include mercury, dioxins/furans, polycyclic aromatic hydrocarbons (PAHs), pesticides, and other heavy metals.[29] Results of recent Harbor Surveys conducted by NYCDEP (2010, 2012, 2013, 2014, 2016, 2017, 2018) show that the water quality of New York–New Jersey Harbor, including the lower Hudson River within the Inner Harbor, has improved since the 1970s as a result of measures undertaken by New York City (e.g., improvements to wastewater treatment plants and increased capture of stormwater runoff) and others.[30] Recent water quality data (2000-2019) from NYCDEP Harbor Survey stations N3B, N4, and N5, which are located in the vicinity of the study area are presented below in **Table 4**. Station N4 is located closest to the Project site, just to the north off 42nd Street. Station N3B is located at the northern end of Manhattan off 125th Street and Station N5 is located at the southern end of Manhattan at the Battery, where the lower Hudson River meets the Upper New York Harbor.

[28] NYCDEP 2019.

[29] NYSDEC 2016.

[30] NYCDEP 2019.

Between 2000 and 2019, temperature, salinity, and pH were similar from Station N3B downstream to Station N5. Temperatures ranged from about 32 to 85°F, with an average of 67°F at the surface and 63 to 65°F at the bottom. As a tidal estuarine system, the lower Hudson River exhibits a wide range of salinity, from less than 1 ppt to 44.7 ppt[31] at Station N4 near the Project site. Average dissolved oxygen measurements upstream and downstream from the Project site showed similar variation, ranging from 7.0 to 7.3 mg/L at the surface and 6.0 to 6.4 mg/L at the bottom. Dissolved oxygen near the Project site fell below the standard for Class I waters only six times at the surface and 25 times at the bottom over the 15-year period. These data are consistent with those reflecting Harborwide improvements in dissolved oxygen levels over the past couple of decades.[32] NYCDEP indicates that by 2012, fecal coliform[33] levels had not exceeded the standard at any of its monitoring sites in the Harbor since the early 1990s. Similarly, enterococci[34] levels did not exceed the bathing standard at monitoring sites in the lower Hudson River.[35]

New Jersey Water Quality Monitoring

Water quality within the New Jersey waters of the Inner Harbor is monitored as part of the New York Harbor Water Quality Report, on which NYCDEP and NJDEP collaborate. Through the HEP, data are collected from NYCDEP and the New Jersey Harbor Dischargers Group (NJHDG) in order to develop water quality trend assessments for the New York–New Jersey Harbor Estuary. NJHDG's water quality reports focus on a total of 68 sampling sites throughout the harbor, including those monitored as part of NYCDEP's Harbor Survey and discussed above. Data for New Jersey waters collected by NJHDG at Stations 32 and 33 are presented in **Table 5** below. Station NJHDG-32 is located closest to and north of the Project site near Harbor Survey Station N4. Station NJHDG-33 is located south of Project site near the Holland Tunnel.

[31] Salinity measurements in practical salinity units (psu) and parts per thousand (ppt) are nearly equivalent. Historically, salinity has been presented in ppt.

[32] NYCDEP 2013.

[33] Coliform bacteria generally originate in the intestines of warm-blooded animals. Waters are tested for fecal coliform as an indicator of possible presence of disease causing organisms to determine suitability for consumption of the water.

[34] Enterococci are bacteria that live in the intestinal tracts of warm-blooded animals, including humans. Waters are tested for enterococci as an indicator of possible contamination by fecal waste and the possible presence of disease causing organisms.

[35] NYCDEP 2013.

Table 4
NYCDEP Water Quality Data for Lower Hudson River Sampling Stations N3B, N4, and N5 (2000-2019, all months)

Parameter	Station N3B						Station N4*						Station N5					
	Surface Waters			Bottom Waters			Surface Waters			Bottom Waters			Surface Waters			Bottom Waters		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Temperature (°F)	32.4	84.7	67.1	33.7	79.8	65.0	32.3	85.0	66.5	34.6	78.7	64.3	33.2	83.1	65.6	31.7	77.3	63.4
Salinity (psu)	0.2	23.1	11.6	0.2	27.9	20.3	0.3	26.1	13.9	0.3	44.7	22.6	0.6	28.6	17.4	2.9	32.8	25.3
pH	7.0	8.6	7.6	7.0	8.5	7.5	7.0	8.7	7.6	6.5	8.3	7.5	6.8	8.4	7.6	7.0	8.2	7.6
Dissolved oxygen (mg/L)	1.2	20.2	7.3	1.1	16.4	6.0	0.7	23.8	7.2	0.6	24.1	6.1	0.8	22.2	7.0	0.6	26.2	6.4
Fecal coliform (cfu/100 mL)(1)	1	4,240	113	-	-	-	1	4,000	153	-	-	-	1	22,000	191	-	-	-
Enterococcus (cfu/100mL)	1	860	27	-	-	-	1	790	26	-	-	-	1	400	23	-	-	-
Secchi transparency (ft)	0.5	5.5	2.5	-	-	-	0.5	6	2.6	-	-	-	0.5	8	3.2	-	-	-
Total suspended solids (mg/L)	0.5	256.0	17.6	-	-	-	0.6	186	17.9	-	-	-	0.5	87.4	14.9	-	-	-

Notes:

All three stations are located in Class I waters. Station N4 (*) is located at 42nd Street, nearest the study area.

Fecal coliform, enterococcus, secchi transparency, and total suspended solids were either not measured at all or not measured consistently in bottom waters.

(1) Compliance with the fecal coliform standard is based on a monthly geometric mean comprising at least 5 measurements, for which data are not available to calculate, and not on the basis of the maximum fecal coliform value presented here. The maximum values occurred in 2011, a year characterized by higher than usual precipitation (NYCDEP 2013).

Source: NYCDEP Harbor Survey Water Quality Data 2000-2019.

Table 5
NJHDG Water Quality Data for Sampling Stations 32 and 33
(2003-2019, all months)

Parameter	NJHDG-32			NJHDG-33		
	Min	Max	Avg	Min	Max	Avg
Temperature (°F)	32.8	81.9	63.1	33.0	81.6	62.5
Salinity (psu)	0.9	67.9	16.5	1.3	31.4	18.5
pH	5.3	9.3	7.5	5.5	9.0	7.5
Dissolved oxygen (mg/L)	3.0	18.2	7.9	3.0	18.0	8.0
Fecal coliform (cfu/100 mL)[(1)]	2	7,100	101	1	1,600	91
Enterococcus (cfu/100mL)	1	400	24	1	384	24
Secchi transparency (ft)	1.0	8.0	2.9	1.0	8.0	3.0
Total suspended solids (mg/L)	4	494	50.3	1.0	342	42.0

Notes: All numbers represent surface water samples; no bottom water samples were taken. Water quality data from NJHDG sampling stations are available starting in 2003.

(1) As with the NYCDEP Harbor Survey data, compliance with the fecal coliform standard is based on a monthly geometric mean comprising at least 5 measurements, for which data are not available to calculate, and not on the basis of the maximum fecal coliform value presented here.

Sources: New Jersey Harbor Dischargers Group Water Quality Data, obtained from the National Water Quality Monitoring Council (www.waterqualitydata.us/provider/STORET/NJHDG).

Water quality measurements that NJHDG took in New Jersey waters were consistent with NYCDEP's Harbor Survey measurements over the same sampling period. Temperatures ranged from about 33°F to 82°F, both at and downstream of the Project site. Salinity ranged from 0.9 ppt to 67.9 ppt, with average salinities similar to average surface salinity measured at NYCDEP Station N4. Dissolved oxygen ranged from 3.0 mg/L at both stations to 18.2 mg/L at NJGDG-32 and 18.0 mg/L at NJHDG-33; averages were about the same for both stations, at 7.9 mg/L for NJHDG-32 and 8.0 mg/L for NJHDG-33. Over the sampling period, dissolved oxygen measurements fell below the standard 13 times at NJHDG-32 and six times at NJHDG-33. Average fecal coliform levels were 101 cfu/100mL at the Project site and 91 cfu/100mL downstream of the Project site. NJHDG et al. reported that long-term trends showed improvement in fecal coliform levels.[36] Near the Project site, seasonal geometric means for fecal coliform ranged from 0 to 50 cfu/100mL in the summers of both 2006 and 2009.[37] Similar long term trends have been demonstrated for enterococcus, which has decreased over much of the Harbor except at stations in the Raritan River and Arthur Kill systems.[38] These trends are consistent with those recorded by NYCDEP's Harbor Survey program.

Sediment Quality

Complex flow patterns lead to widely variable sediment characteristics throughout the New York–New Jersey Harbor and connected waterbodies. Lower Hudson River sediments are primarily silt and clay.[39] Typical of most urban watersheds, sediments in the New York–New Jersey Harbor, including the lower Hudson River where the Project site is located, are contaminated due to a history of surrounding industrial uses. EPA's National Estuary Program Coastal Condition Report rates overall New York–New Jersey Harbor sediment quality as poor,

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[36] NJHDG et al. 2011.

[37] NJHDG et al. 2011.

[38] NJHDG et al. 2011.

[39] USACE 1999, EEA 1988.

based on sediment toxicity, contamination, and/or total organic carbon levels.[40] The lower Hudson River is listed as being impaired for PCBs and other toxic materials,[41] and the suspected source for these impairments is contaminated sediment. EPA has designated the 200-mile stretch of the Hudson River from the Battery upstream to Hudson Falls, New York, a Superfund site as a result of PCB contamination. Contaminants found throughout the New York–New Jersey Harbor Estuary include pesticides such as chlordane and DDT, heavy metals like mercury, cadmium, lead, and copper, PCBs, and various PAHs.[42] While the sediments of the harbor are generally contaminated, the concentrations of most sediment contaminants (e.g., dioxin, DDT, PCBs, and mercury) have decreased on average by an order of magnitude over the past few decades, mainly due to control measures implemented through the Clean Water Act.[43]

Aquatic Biota

The New York–New Jersey Harbor Estuary, including the lower Hudson River, supports a diverse and productive aquatic community of more than 100 species of finfish, more than 100 invertebrate species, and a variety of phytoplankton and zooplankton.

Primary Producers

Primary producers are plants or microorganisms that can convert light energy or chemical energy into organic matter (e.g., plant growth or cell growth) which is then eaten by other organisms. Primary producers are the base of the aquatic food chain. In the Hudson River, primary producers include phytoplankton[44] and macroalgae.[45] Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Light penetration, turbidity, and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Diatoms such as *Skeletonema costatum* and *Thalassiosira* spp. generally dominate the phytoplankton community within the lower Hudson River, with lesser contributions from dinoflagellates[46] and green algae.[47] Phytoplankton sampling in the lower Hudson River between 1991 and 2000 resulted in the collection of 71 taxa[48]; the most abundant species were *Nannochloris atomus* and *Skeletonema costatum*.[49] Phytoplankton sampling from 1996-2003 on the Hudson River near Pier 26, downstream of the Project site, found that the most dominant species were: *Asterionella japonica*, *Chaetoceros*

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40 EPA 2012.

41 Other toxic materials may include mercury, dioxins/furans, PAHs, pesticides, and other heavy metals.

42 Rohmann and Lilienthal 1987.

43 Steinberg et al. 2004.

44 Microscopic marine plants. The two main classes of phytoplankton are dinoflagellates and diatoms.

45 Large algae that can be seen by the naked eye.

46 Dinoflagellates are a type of photosynthetic plankton (a microscopic marine plant that uses sunlight to synthesize foods from carbon dioxide and water).

47 Brosnan and O'Shea 1995.

48 Plural of "taxon." Organisms identified down to the lowest taxonomic unit possible (i.e., not always down to species) for example: a phylum, order, family, genus, or species.

49 NYCDEP 2007.

subtilis, *Coscinodiscus excentricus*, *Ditylum brightwelli*, *Eucampia zodiacus*, *Gyrosigma* sp., *Nitzchia reversa*, *Pseudonitzchia seriata*, *Rhizosolenia setigera*, and *Ebria tripartite*.[50] The most common benthic macroalgae, or large multicellular algae, present in the Project site area include sea lettuce (*Ulva* spp.), green fleece (*Codium fragile*), and brown algae (*Fucus* spp.).[51] While nutrient concentrations in most of the harbor are high, low light penetration has often precluded the occurrence of phytoplankton blooms. Limited light penetration also restricts the distribution of submerged aquatic vegetation (SAV) in the vicinity of the Project site.[52] Extensively developed shorelines and swift currents further limit SAV growth in this area.

Zooplankton

Zooplankton are an integral component of aquatic food webs; they are primary grazers on phytoplankton and detritus and serve as prey for higher trophic level organisms. Consumers of zooplankton typically include forage fish, such as bay anchovy, as well as commercially and recreationally important species in their early life stages, such as striped bass and white perch. Zooplankton sampling in the Hudson River between 1991 and 2000 resulted in the collection of 16 taxa, most commonly *Tintinnopsis* spp. and nauplius of copepods.[53]

Benthic Invertebrates

Major benthic invertebrate groups in the New York–New Jersey Harbor Estuary include: aquatic earthworms (oligochaetes), segmented worms (polychaetes), snails (gastropods), bivalves, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp.[54] Most benthic invertebrates that have been found in the area are classified as pollution-tolerant species.[55] A study conducted between the summers of 2002 and 2004 collected a total of 145 benthic invertebrate taxa in the Hudson River Park area, downstream of the Project site.[56] Abundant species in this sampling program include: polychaetes *Mediomastus* spp., *Streblospio benedicti*, *Leitoscoloplos* spp., *Heteromastus* spp., *Spio setosa*, and *Tharyx* spp.; bivalves *Mulinia lateralis* and *Tellina agilis*; gastropods *Acteocina canaliculata* and *Rictaxis punctostriatus*; crustacean *Leocon americanus*; and oligochaete worms.[57] Blue crab (*Callinectes sapidus*) and American lobster (*Homarus americanus*) may also be present within the Upper Harbor region.[58]

Finfish

The finfish community in the New York–New Jersey Harbor and connected waterbodies is typical of large coastal estuaries and inshore waterways along the mid-Atlantic Bight in that it supports a variety of estuarine, marine, catadromous (migrating from fresh water to spawn in the sea), and anadromous (migrating from salt water to spawn in fresh water) fish species that use its

[50] Levandowsky and Vaccari 2004.

[51] PBS&J 1998.

[52] Olson et al. 1996.

[53] NYCDEP 2007.

[54] EEA 1988, EA 1990, Coastal 1987, PBS&J 1998.

[55] Adams et al. 1998.

[56] Bain et al. 2006.

[57] Bain et al. 2006.

[58] NMFS 2001.

waters for spawning and nursery, migratory, and foraging purposes. The Lower Hudson River and Upper Harbor fish community is spatially and seasonally dynamic. A 2002-2004 survey collected a total of 41 fish species from the Hudson River Park region, the most abundant being bay anchovy, Atlantic herring (*Clupea harengus*), striped bass, and blueback herring, all of which use open water habitat.[59]

Essential Fish Habitat (EFH)

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The NMFS designates EFH within squares identified by latitude and longitude coordinates. The Project site is within a portion of the Hudson River estuary EFH that includes the Hudson River and Bay from Guttenberg, New Jersey south to Jersey City, New Jersey, including the Global Marine Terminal and the Military Ocean Terminal, Bayonne, New Jersey; Hoboken, New Jersey; Weehawken, New Jersey; Union City, New Jersey; Ellis Island; Liberty Island; Governors Island; the tip of Red Hook Point on the west tip of Brooklyn, NY; and Newark Bay, New Jersey. **Table 6** lists the species for which EFH is designated, and the life stages of those fish identified as having EFH there, in the portion of the Hudson River at and near the Project site.[60] **Appendix 11** to the EIS provides the consultation with NMFS with respect to EFH in the vicinity of the Project site.

[59] Bain et al. 2006.

[60] NOAA 2016.

Table 6
Essential Fish Habitat Designated Species in the Vicinity of the Project Site

Species	Designated Life Stage			
	Eggs	Larvae	Juveniles	Adults
Red Hake (*Urophycis chuss)*	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane flounder (*Scophthalmus aquosus*)	X	X	X	X
Atlantic herring (*Clupea harengus*)		X	X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Long-finned squid/Longfin Inshore Squid (*Loligo pealeii/ Doryteuthis pealeii*))	X			
Atlantic butterfish (*Peprilus triacanthus*)		X		
Summer flounder (*Paralichthys dentatus*)[(1)]		X	X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X

Note: (1) Habitat Areas of Particular Concern (HAPC) have been designated for summer flounder in the Greater Atlantic Region. HAPCs are subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. HAPC for summer flounder is defined as "All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH is HAPC. If native species of submerged aquatic vegetation (SAV) are eliminated then exotic species should be protected because of functional value, however, all efforts should be made to restore native species." There is no SAV in the study area, therefore, HAPC for summer flounder does not exist within the study area.

Source: NMFS EFH Mapper at https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper accessed March 24, 2021.

Wildlife

On and over the open waters of the Hudson River, urban-adapted waterbirds such as double-crested cormorant (*Phalacrocorax auritus*), ring-billed gull, herring gull, and Canada goose occur year-round. Common terns, least terns, and osprey can also be found foraging for fish over the river during spring, summer, and fall. During winter, additional waterbirds, such as bufflehead (*Bucephala albeola*), red-breasted merganser (*Mergus serrator*), horned grebe (*Podiceps auritus*), brant, lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), green-winged teal (*Anas carolinensis*), American widgeon (*Anas americana*), common goldeneye (*Bucephala clangula*), surf scoter (*Melanitta perspicillata*), black scoter (*Melanitta americana*), common loon (*Gavia immer*), canvasback (*Aythya valisineria*), and ruddy duck (*Oxyura jamaicensis*), can also often be found on the river, usually in nearshore areas.[61]

Threatened, Endangered, or Special Concern Species

NJNHP identified shortnose sturgeon (endangered) and Atlantic sturgeon (endangered) as having the potential to occur in the lower Hudson River study area in 2021. In 2016, both NMFS and NYNHP identified shortnose sturgeon and Atlantic sturgeon (endangered) as having the potential to be present within the lower Hudson River study area. FRA has completed

[61] Fowle and Kerlinger 2001.

consultation with NMFS in accordance with Section 7 of the ESA. The following sections discuss these species.

Shortnose Sturgeon

NMFS indicated that no eggs or larval shortnose sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries;[62] however, older life stages (juveniles and adults) are present in the Hudson River and connected waterbodies. The shortnose sturgeon is an anadromous bottom-feeding fish that can be found throughout the Hudson River from the Battery to the Federal Dam at Troy. Peterson and Bain (2002) estimated that the Hudson River shortnose sturgeon population contained about 61,000 fish. Shortnose sturgeon may occasionally use areas of the lower Hudson River downstream of the George Washington Bridge; however, spawning, nursery, and overwintering areas are located well upstream of the Project site.[63] Although larvae can be found in brackish regions of the Hudson River, juveniles from 2 to 8 years old are predominately confined to reaches upriver from the Project site. Bain et al. reported that primary summer habitat for shortnose sturgeon is the river channel, where water depths range from 43 to 138 feet, in the middle section of the Hudson River Estuary.[64] However, more recently the New York State Thruway Authority conducted mobile tracking of tagged shortnose sturgeon within the Hudson River north of the Project site, between the George Washington Bridge and Stony Point and found that approximately 58 percent of all detections of shortnose sturgeon were in waters shallower than 20 feet,[65] indicating some use of shallower water habitat within that portion of the Hudson River. The Hudson River south of the Tappan Zee Bridge (now the Governor Mario M. Cuomo Bridge), including the portion of the lower Hudson River where the Project site is located, is not considered optimal shortnose sturgeon habitat.[66]

Long-term Hudson River monitoring data collected by the New York utilities and others since the 1970s have also indicated that shortnose sturgeon occur in greatest abundance north of the Tappan Zee Bridge (now the Governor Mario M. Cuomo Bridge). Hoff et al. reported most captures of adult shortnose sturgeon during river monitoring efforts by Hudson River electric utilities were made between approximately river mile 24 and river mile 76, or from the Tappan Zee Bridge (the Governor Mario M. Cuomo Bridge) to Poughkeepsie.[67] Shortnose sturgeon were collected between the Statue of Liberty (south of river mile 0) and the George Washington Bridge (river mile 12) during winter sampling in 2003-2004 and 2004-2005 (15 and 18 shortnose sturgeon, respectively). These sturgeon were collected within the channel, and all but two individuals were collected north of approximately river mile 2,[68] suggesting that shortnose sturgeon are still rare in the lower Hudson River in the vicinity of the Project site. During

[62] NMFS 2016.

[63] Bain et al. 2007.

[64] Bain et al. 2007.

[65] NMFS 2017a.

[66] Bain 1997.

[67] Hoff et al. 1988.

[68] Young 2005, Mattson 2005.

sampling conducted between 2002 and 2004 near Hudson River Park, just downstream of the Project site, no sturgeon were collected.[69]

Atlantic Sturgeon

NMFS indicated that no eggs or larval Atlantic sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries;[70] however, older life stages (adults and subadults) could occur in the study area. The Atlantic sturgeon is an anadromous[71] bottom-feeding species that occurs within the New York–New Jersey Harbor and Hudson River estuaries.[72] Adults of this species spawn in freshwater rivers and migrate between riverine and coastal marine waters. In the Hudson River, Atlantic sturgeon are found in deeper waters and generally do not occur farther upstream than Hudson, New York. Adults migrate from the ocean upriver to spawn in fresh water above the salt front from late April to early July.[73] Females migrate from the river back to marine waters following spawning, but males may remain in the river until October or November. Early life stages (i.e., eggs, larvae, and smaller juveniles) are relatively intolerant of salinity; young-of-year Atlantic sturgeon exhibit poor survival at salinities ranging from 5 to 10 ppt, and older juveniles (Age-1 and Age-2) may tolerate salinities up to 12 ppt.[74]

In the New York–New Jersey Harbor, Atlantic sturgeon typically occur in deeper waters. According to recent surveys conducted by NMFS and multiple state agencies in the region[75], the majority of Atlantic sturgeon occurred in waters between 32 to 49 feet in depth; many of these sturgeon were found off the west coast of Long Island.[76] Tagging studies have indicated that Atlantic sturgeon from this aggregation have been detected in the Hudson River north of the Project site.[77] While Atlantic sturgeon are not expected to occur in significant numbers within the study area, transient sub-adults (i.e., larger juveniles that have migrated from the river to the nearshore coastal waters of the Atlantic Ocean) may be present as they move through shallower marine waters along the Atlantic coast; adults are most likely to be seasonal migrants and would occur primarily in the deeper waters of the river channel adjacent to the Project site.

Critical Habitat

The study area is located within an area designated as critical habitat for Atlantic sturgeon.[78] Critical habitat for Atlantic sturgeon has been designated for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy. For Atlantic sturgeon, the physical or

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[69] Bain et al. 2006.

[70] NMFS 2016.

[71] Fish that spend most of their lives in saltwater and migrate to freshwater to spawn.

[72] Woodhead 1990.

[73] Smith 1985, Stegemann 1999.

[74] Kynard and Horgan 2002, ASMFC 2012.

[75] The reference for these studies, Dunton et al. 2010, includes an author from NYSDEC and received data from NJ, ME, and MA state agencies.

[76] Dunton et al. 2010.

[77] NMFS 2017a.

[78] NMFS 2017b. 82 Federal Register 39160; August 17, 2017.

biological features (PBFs) of critical habitat that are essential to the conservation of the species include:

- PBF #1—Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0 to 0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages.
- PBF#2—Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development.
- PBF #3—Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: unimpeded movement of adults to and from spawning sites; seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and staging, resting, or holding of subadults or spawning condition adults.
- PBF #4—Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: spawning; annual and interannual adult, subadult, largval, and juvenile survival; and larval, juvenile, and subadult growth, development, and recruitment (e.g., 13°C to 26°C for spawning habitat and no more than 30°C for juvenile rearing habitat, and 6 milligrams per liter (mg/L) dissolved oxygen or greater for juvenile rearing habitat.

The Project site contains physical and biological features identified under PBFs #2, #3, and #4. Spawning habitat (PBF #1) does not occur in the vicinity of the Project site, which is much too far downstream in high salinity waters and does not contain hard substrate.

Significant Coastal Fish and Wildlife Habitat

The NYSDOS has designated 15 Significant Coastal Fish and Wildlife Habitats within New York City. The Project site falls within one of these designated areas, the Lower Hudson Reach. Significant Coastal Fish and Wildlife Habitats are coastal habitats designated by the NYSDEC based on the uniqueness of the habitat; presence of protected or vulnerable species; recreational, education, and other uses; abundance of ecologically important species; and habitat irreplaceability.[79] The Lower Hudson Reach includes the 19-mile stretch of the Hudson River from Battery Park to the tip of Manhattan and from there north to Yonkers near Glenwood, and includes areas with deep waters, shallows, piers, and interpier basins. NYSDEC designated the Lower Hudson Reach as a Significant Coastal Fish and Wildlife Habitat in part because it provides an important wintering habitat for young-of-the-year, yearling, and older striped bass. In addition, the Lower Hudson Reach is one of the few large tidal river mouth habitats in the northeastern United States, which is part of the greater Hudson River Estuary system that supports a diverse and historically highly productive ecosystem of fish and invertebrate species.[80] Significant numbers of other fish species and waterfowl also use the Lower Hudson Reach, including winter flounder, summer flounder, white perch, Atlantic tomcod, Atlantic silversides, bay anchovy, hogchoker, and American eel. The Lower Hudson Reach is potentially

[79] NYSDOS 1984.

[80] Briggs and Waldman 2002, NYDOS 1992.

important for bluefish and weakfish young of year, American shad, blue crab, Atlantic sturgeon, and shortnose sturgeon. Planktonic and benthic animals that provide an important food source are also present, including copepods, rotifers, mysid shrimp, nematodes, oligochaetes, polychaetes, and amphipods. Wintering waterfowl that use habitat in the Lower Hudson Reach include canvasback, scaup, mergansers, mallards, and Canada geese.[81] In addition, the portion of the Project site beneath the Hudson River east of the New York pierhead line is located within (beneath) the Hudson River Park Estuarine Sanctuary.

The USFWS also designated the Lower Hudson River Estuary, from the Battery at the southern tip of Manhattan up to Stony Point at river mile 41, as a Significant Habitat Complex because it is a regionally significant nursery and wintering habitat for a number of anadromous, estuarine, and marine fish species, including striped bass, and is a migratory and feeding area for birds and fish that feed on the abundant fish and benthic invertebrate resources found in this portion of the estuary.[82] Striped bass are anadromous their range extends from along the North American Atlantic coast from Canada to northern Florida. Striped bass was one of the four most abundant species collected within Hudson River Park from June 2002 through June 2004.[83]

Adult striped bass spend much of the year from summer through late winter in the nearshore coastal waters of the Atlantic Ocean. Northward migration of Hudson River fish along the Atlantic coast extends as far north as the Bay of Fundy, Nova Scotia, with older fish tending to travel farther north.[84] Although most migrate to sea, some striped bass adults remain in the Hudson River year-round, never migrating. During winter, these resident adults (ages 4 and older) are joined by migratory adults returning to the estuary to spawn. Adults aggregate near the mouths of their natal rivers and begin moving upstream to spawn as water temperatures increase in the spring.

The Hudson River supports one of the principal spawning populations of striped bass along the U.S. Atlantic coast. Other important spawning populations include Delaware Bay, Chesapeake Bay, the Roanoke and Chowan Rivers and Albemarle Sound, North Carolina, the Santee River in South Carolina, and the St. Johns River in northern Florida. Peak spawning in the Hudson River typically occurs between mid-May and mid-June in freshwater areas where currents are moderate to swift, from Indian Point, NY (river mile 42) upstream to Saugerties, New York (river mile 106).[85] Fecundity depends on age and size and females may produce up to several million pelagic eggs.[86] Utilities' fish surveys conducted from 1998 to 2007 during May and June primarily collected striped bass eggs upstream of Indian Point at river mile 46. Peak densities typically occur near Cornwall, New York (river mile 56 to 61), with very few eggs found south of the Tappan Zee Bridge (Governor Mario M. Cuomo Bridge) region. The spawning area is considerably upriver of the Project site.

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[81] NYSDOS 1992.

[82] USFWS 1997.

[83] Bain et al. 2006.

[84] Waldman et al. 1990.

[85] CHGE et al. 1999, ASA 2010.

[86] ASMFC 2015.

Larval striped bass recruit to the lower salinity areas of the Hudson River well upstream of the Project site from May to July. Larvae are abundant throughout the Hudson River during this time and are more common from the Tappan Zee Bridge (Governor Mario M. Cuomo Bridge) to Hyde Park than the lower estuary. Striped bass juveniles begin to move to shallower nursery habitat in the lower estuary. Juvenile abundances typically peak in July and August upstream of Hyde Park in deeper (greater than 20 feet deep) bottom habitats. Many juvenile striped bass move downstream by the end of their first summer to occupy the lower estuary and into New York Harbor, western Long Island Sound, and along the south shore of Long Island. Juvenile striped bass remain near shore until November or December, before moving to deeper coastal waters; juveniles, however, may overwinter (December through March) in the interpier areas within the Hudson River Park, which is adjacent to the Project site.[87] The lower Hudson River, including the area near the Project site, contains striped bass throughout the year and provides important winter habitat (mid-November to mid-April) for young-of-the-year, yearling, and older striped bass.[88]

At two to three years old, striped bass leave Atlantic coast estuaries and begin the typical seasonal coastal migration, northward during the spring and summer and southward during the fall. Some individuals are thought to mature and remain year-round in the upper freshwater portion of the estuary, while others adopt an anadromous pattern and, once sexually mature, spend most of their time in coastal saltwater habitats migrating into freshwater and brackish habitats in the spring to spawn.[89]

Adult striped bass are top predators and are prey to few other animals. Adult striped bass in the Lower Hudson–Raritan Estuary prey upon at least 20 different taxa, dominated by a variety of small-bodied and juvenile fishes and crustaceans.[90] The coastal stock is healthy, with spawning stock biomass well above the target level specified in the Interstate Fisheries Management Plan[91] and stocks at historically high levels.[92]

8) DETERMINATION OF CREDITS

Table 1 summarized impacts to wetlands and associated open waters under USACE jurisdiction. It also includes wetland and upland impacts to the NYSW Wetland Mitigation Site. **Table 7** below identifies the proposed allocation of mitigation credits. The proposed mitigation credits for impacts to the existing NYSW wetland mitigation site were determined through consultation with NJDEP.

87 AKRF, Inc. et al. 1998, Dunning et al. 2009, CHGE et al. 1999.

88 Heimbuch et al. 1994, NYSDOS 1992.

89 Zlokovitz et al. 2003.

90 Steimle et al. 2000. Dunning et al. 2009.

91 ASMFC 2015.

92 NYSDEC 2010.

Table 7
Proposed Allocation of Mitigation Credits

Affected Resource	Area Affected (Acres)	Anticipated Mitigation Ratio	Habitat Enhancement to Mitigate (Acres) Below MHW
Permanent Impacts to Tidal Wetlands A, B, CD	4	2:1	8
Temporary Impacts to Tidal Wetlands A and CD	1.4	1:1 Restoration of Impacted Wetlands	1.4
Permanent Impacts to Tidal Wetland F*	0.44	2:1	0.88
Permanent Wetland Impacts to the NYSW Wetland Mitigation Site*	0.09	3:1	0.27
Temporary Wetland Impacts to the NYSW Wetland Mitigation Site	0.05	1:1 Restoration of Impacted Wetlands	0.05
Permanent Upland Impacts to the NYSW Wetland Mitigation Site	0.18	3:1	0.54
Notes: * *Final mitigation ratio to be determined in consultation with USACE and NJDEP			

9) MONITORING OF THE 3-ACRE HUDSON RIVER LOW-COVER AREA

The 3 acres of the Hudson River bottom habitat that will be modified as a result of the in-water soil improvement through deep soil mixing to produce soilcrete within the low-cover area will permanently modify the fine-grained silt/clay sediments, resulting in alteration of this area as foraging habitat for fish for which Essential Fish Habitat (EFH) has been designated for this portion of the Hudson River. Following the completion of this activity, an area of 0.7 acres of elevated soilcrete is expected to remain as new hard-bottom habitat, and 2.3 acres of soilcrete at ambient elevation is expected to return to soft-bottom habitat as a result of sediment deposition over the low-lying soilcrete. In both of these areas, the benthic community is expected to colonize/recover, at which time the area would be available as foraging habitat for EFH species including bluefish, windowpane, winter flounder, and summer flounder.

As part of the compensatory mitigation for this disturbance, a biological and benthic habitat monitoring program will be developed and implemented by the Project Sponsor in consultation with the NYSDEC, USACE, and NMFS. The goal of the monitoring program will be to track the recovery of fish foraging habitat in the 3-acre impact area. Within this area, benthic habitat and the associated benthic invertebrate community will be characterized using a combination of characterization of water depth and bottom type (e.g., multibeam side-scan sonar survey), benthic grab sampling of soft-bottom habitat, and quadrat/removable substrate sampling of hard-bottom habitat. Depending on logistical considerations, hard-bottom habitat may be sampled by divers using quadrats or, if visibility makes that an impractical approach, alternative sampling approaches would be considered (e.g. deployment of blocks made from soilcrete placed adjacent to the sediment stabilization area which would be removed, sampled and replaced during each monitoring season). Survey data collected from the 3-acre soilcrete area will be compared to data collected from several reference sites in the lower Hudson River (i.e., control areas) where similar soft-bottom and hard-bottom habitats currently exist.

Pre-construction monitoring of the soft- and hard-bottom benthic invertebrate communities will be conducted seasonally for a period developed in consultation with NMFS, NYSDEC, and USACE (e.g., between 1 and 3 years) prior to the start of soil improvement activities. Pre-construction monitoring or the control and impact area will also include methods to characterize the existing conditions, including water depth and sediment characteristics. This could include sonar survey work at both control and impact areas to map the water depth and acoustic reflectivity of those areas. Following the completion of in-water work for the project, post-construction monitoring of the recovery of the 3-acre soilcrete area will be conducted seasonally for a period of 5 years, with samples being collected every other year over that period, for a total of 3 years of post-construction monitoring data. Characterization of water depth and sediment type, possibly using sonar surveys to map acoustic reflectivity, will be conducted at control and impact areas within 1 year, 3 years, and 5 years following construction for comparison with pre-construction conditions to document the degree of benthic-habitat recovery. Pre- and post-construction monitoring data from the control and impact areas will be analyzed using a Before-After, Control-Impact (BACI) statistical design. This approach will allow for the control of spatial variation (i.e., site to site, habitat to habitat) and temporal variation (i.e., season to season, year to year) that would otherwise obscure the ability to observe the effects of sediment improvement activities on the benthic community.

Following completion of the monitoring program, benthic habitat availability in the impact area will be characterized relative to the available benthic habitat that existed prior to construction. The benthic invertebrate community in soft-bottom and hard-bottom habitats in the impact area will be compared with the pre-construction benthic community and with control areas to document the degree of recovery following project construction.

REFERENCES

Adams, D.A., J.S. O'Connor, and S.B. Weisberg. 1998. Final Report: Sediment quality of the NY-NJ Harbor System. An investigation under the Regional Environmental Monitoring and Assessment Program (R-EMAP). EPA-902-R-98-001.

AKRF, Inc., PBS&J, Inc., Philip Habib & Associates, al Perspectives, Inc., and A&H Engineers, P.C. 1998. Hudson River Park Project Final Environmental Impact Statement. Prepared for the Empire State Development Corporation in cooperation with the Hudson River Park Conservancy. May 1998.

Atlantic States Marine Fisheries Commission (ASMFC). 2012. Habitat Addendum IV to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon. September 2012.

Atlantic States Marine Fisheries Commission (ASMFC). 2015. Atlantic Striped Bass Stock Assessment Update 2015. Atlantic States Marine Fisheries Commission, Washington, D.C

Applied Science Associates, Inc. (ASA). 2010. Hydrothermal Modeling of the Cooling Water Discharge from the Indian Point Energy Center to the Hudson River. ASA Project 09-167. March 22, 2010.

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48: 347-358.

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological status of sanctuary waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

Bragin, A.B., J.Misuik, C.A. Woolcott, K.R. Barrett, and R. Jusino-Atresino. 2005. A fishery resource inventory of the lower Hackensack River within the Hackensack Meadowlands District: A Comparative Study 2001-2003 vs. 1987-1988. New Jersey Meadowlands Commission, Meadowlands Environmental Research Institute. May 2005. 231 pp.

Briggs, P. T. and J. R. Waldman. 2002. Annotated list of fishes reported from the marine waters of New York. Northeastern Naturalist. 9: 47-80.

Brosnan, T.M., and M.L. O'Shea. 1995. New York Harbor Water Quality Survey: 1994. New York City Department of Environmental Protection, Marine Sciences Section, Wards Island, NY.

Cerrato, R.M., 2006. Long-term and large-scale patterns in the benthic communities of New York Harbor. Pp. 242-265. In: The Hudson River Estuary, J.S. Levinton and J.R. Waldman (Eds.), Cambridge University Press.

Central Hudson Gas & Electric Corp., Consolidated Edison Company of New York Inc., New York Power Authority, and Southern Energy New York (CHGE). 1999. Draft Environmental Impact Statement: For State Pollutant Discharge Elimination System Permits for Bowline 1 & 2, Indian Point 2 & 3, and Roseton 1 & 2 Steam Electric Generating Stations, Orange, Rockland, and Westchester Counties. December 1, 1999.

Coastal Environmental Services (Coastal). 1987. Television City Project: Characterization of the aquatic ecology of the site and assessment of potential impacts of the project on the aquatic biota. Prepared for Berle, Cass, and Case, New York, New York; McKeown and Franz, Inc., New York, NY; and The Trump Organization, New York, NY.

Dunning, D. J., Q. E. Ross, K. A. McKown, and J. B. Socrates. 2009. Effect of striped bass larvae transported from the Hudson River on juvenile abundance in Western Long Island Sound. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1: 343-353.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (Acipenser oxyrinchus) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fisheries Bulletin 108: 450-465.

EA Engineering, Science, and Technology (EA). 1990. Phase I feasibility study of the aquatic ecology along the Hudson River in Manhattan. Final Report. Prepared for New York City Public Development Corporation, New York, NY. Newburgh, NY.

EEA, Inc. (EEA). 1988. Hudson River Center Site Aquatic Environmental Study. Final Report. Garden City, NY.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero. 2014. Ecological Communities of New York State, Second Edition. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.Edinger et al. 2014

Feinberg, J.A, C.E. Newman, G.J. Watkins-Colwell, M.D. Schlesinger, B. Zarate, B.R. Curry, H.B. Shaffer, and J. Burger. 2014. Cryptic diversity in metropolis: Confirmation of a new leopard frog species (Anura: Ranidae) from New York city and surrounding Atlantic coast regions. PloS One 9:e108213.

Geyer, W.R. 1995. Final Report: Particle trapping in the lower Hudson Estuary. Submitted to the Hudson River Foundation, New York, NY.

Geyer, W.R., and R. Chant. 2006. The Physical Oceanography Processes in the Hudson River Estuary. In: J.S. Levinton and J.R. Waldman (eds.) The Hudson River Estuary. Cambridge University Press, New York, NY.

Hackensack Meadowlands Development Commission (HMDC). 1989. Inventory of Fishery Resources of the Hackensack River within the jurisdictional boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey.

Heimbuch, D., S. Cairns, D. Logan, S. Janicki, J. Seibel, D. Wade, M. Langan, and N. Mehrotra. 1994. Distribution Patterns of Eight Key Species of Hudson River Fish. Coastal Environmental Services, Inc. Linthicum, MD. Prepared for the Hudson River Foundation, New York, NY.

Hoff, T.B., R.J. Klauda, and J.R. Young. 1988. Contribution to the biology of shortnose sturgeon in the Hudson River estuary. In C.L. Smith (ed.) Fisheries Research in the Hudson River, State University of New York Press, Albany, pp. 171-189.

Kynard, B., and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon Acipenser oxyrinchus oxyrinchus, and shortnose sturgeon A. brevirostrum, with notes on social behavior. Environmental Biology of Fishes 63: 137-150.

Levandowsky, M., and D. Vaccari. 2004. Analysis of phytoplankton data from two lower Manhattan sites. Final Report of a Grant from the Hudson River Foundation. March 2004.

Mattson, M. 2005. Personal communication from Mark Mattson, Normandeau Associates, and Dr. Fred Jacobs, AKRF, Inc. July 5 and 6, 2005.

Moran, M.A., and K.E. Limburg. 1986. The Hudson River Ecosystem. In: K.E. Limburg, M.A. Moran, and W.H. McDowell (eds.) The Hudson River Ecosystem. Springer-Verlag, New York, NY. pp. 6-40.

National Marine Fisheries Service (NMFS). 2001. Regional Council Approaches to the Identification and Protection of Habitat Areas of Particular Concern. Office of Habitat Conservation, NOAA.

National Marine Fisheries Service (NMFS). 2016. Letter from Mark Murray-Brown, NMFS, to Sandy Collins, AKRF, re response to request for information on threatened and endangered species. December 8, 2016.

National Marine Fisheries Service (NMFS). 2017a. Endangered Species Act Section 7 Consultation. Biological Opinion. Tappan Zee Bridge Replacement. NER-2016-13822. January 4, 2017.

National Marine Fisheries Service (NMFS). 2017b. Endangered and Threatened Species; Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon. Final Rule. 82 Federal Register 39160-39274. August 17, 2017.

National Oceanic and Atmospheric Administration (NOAA). 2016. Mean Sea Level Trend, 8518750, The Battery, New York. National Ocean Service. Revised: 10/15/2013. https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8518750tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8518750. Website accessed November 2016March 2021.

New Jersey Meadowlands Commission (NJMC). Hackensack Meadowlands Tide Gates Inspection Report. Prepared in conformity to The National Flood Insurance Program Community Rating System. March 27, 2006.

New Jersey Department of Environmental Protection, Natural Heritage Program (NJNHP). 2016. Letter from R. Cartica, NJNHP, to S. Collins, AKRF, re Hudson Tunnel Project. October 27, 2016.

Newman, C.E., J.A. Feinberg, L.J. Rissler, J. Burger, and H.B. Shaffer. 2012. A new species of leopard frog (Anura: Ranidae) from the urban northeastern US. Molecular Phylogenetics and Evolution 63:445-55.

New York City Department of Environmental Protection (NYCDEP). 2010. New York Harbor Water Quality Report for 2009.

New York City Department of Environmental Protection (NYCDEP). 20162019. NYC Green Infrastructure Performance Metrics2019 Annual Report. June 2016. NYCDEP 2011Website accessed March 23, 2021. https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/gi-annual-report-2019.pdf.

New York State Department of Environmental Conservation (NYSDEC). 2010. 2010 Review of the Atlantic States Marine Fisheries Commission Fishery Management Plan for Atlantic Striped Bass (Morone saxatilis) 2009 fishing year. 32 pp.

New York State Department of Environmental Conservation (NYSDEC). 2016. Draft 2016 Section 303(d) List. January 2016.

New York State Department of State (NYSDOS). 1984. Technical Memorandum: Procedures Used To Identify, Evaluate and Recommend Areas For Designation As "Significant Coastal Fish And Wildlife Habitats." July 24, 1984.

New York State Department of State (NYSDOS). 1992. Significant Coastal Fish and Wildlife Habitats Program: A part of the New York Coastal Management Program and New York City's approved Waterfront Revitalization Program.

Olson, A.M., E.G. Doyle, and S.D. Visconty. 1996. Light requirements of eelgrass: A literature survey.

PBS&J. 1998. The Hudson River Park, Natural Resources Appendix to Final Environmental Impact Statement. Prepared for the Empire State Development Corporation and the Hudson River Park Conservancy.

Ristich, S.S., M. Crandall, and J. Fortier. 1977. Benthic and epibenthic macroinvertebrates of the Hudson River: Distribution, natural history and community structure. Estuarine and Coastal Marine Science 5: 255-266.

Rohmann, S.O., and N. Lilienthal. 1987. Tracing a river's toxic pollution: A case study of the Hudson, Phase II. Inform, Inc., New York, NY.

Smith, C.L. 1985. The Inland Fishes of New York State. The New York State Department of Environmental Conservation.

Smith, C.L., ed. 1992. Estuarine Research in the 1980s: The Hudson River Environmental Society Seventh Symposium on Hudson River Ecology.

Stegemann, E.C. 1999. New York's Sturgeon. NY State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources.

Steinberg, N., D.J. Suszkowski, L. Clark, and J. Way. 2004. Health of the Harbor: the first comprehensive look at the state of the NY-NJ Harbor Estuary. Prepared for the New York–New Jersey Harbor Estuary Program by the Hudson River Foundation, New York, NY.

United States Army Corps of Engineers (USACE). 2016. Report of Channel Conditions; Hudson River Channel, New York. April 13, 2016.

United States Environmental Protection Agency (EPA). 2012. National Coastal Condition Report IV. EPA-842-R-10-003. September 2012.

United States Fish and Wildlife Service (USFWS). 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed. USFWS Southern New England–New York Bight Coastal Ecosystems Program, Charlestown, RI.

Waldman, J.R., D.J. Dunning, Q.E. Ross, and M.T. Mattson. 1990. Range dynamics of Hudson River striped bass along the Atlantic Coast. Transactions of the American Fisheries Society 119: 910-919.

Woodhead, P.M. 1990. The Fish Community of New York Harbor: Spatial and temporal distribution of major species. Report to the New York–New Jersey Harbor Estuary Program, New York, NY.

Young, J. 2005. Personal communication from John Young, ASA Analysis and Communication, Inc., and Dr. Fred Jacobs, AKRF, Inc. July 5, 2005.

Zlokovitz, E.R., D.H. Secor, and P.M. Piccoli. 2003. Patterns of migration in Hudson River striped bass as determined by otolith microchemistry. Fisheries Research 63: 245-259.

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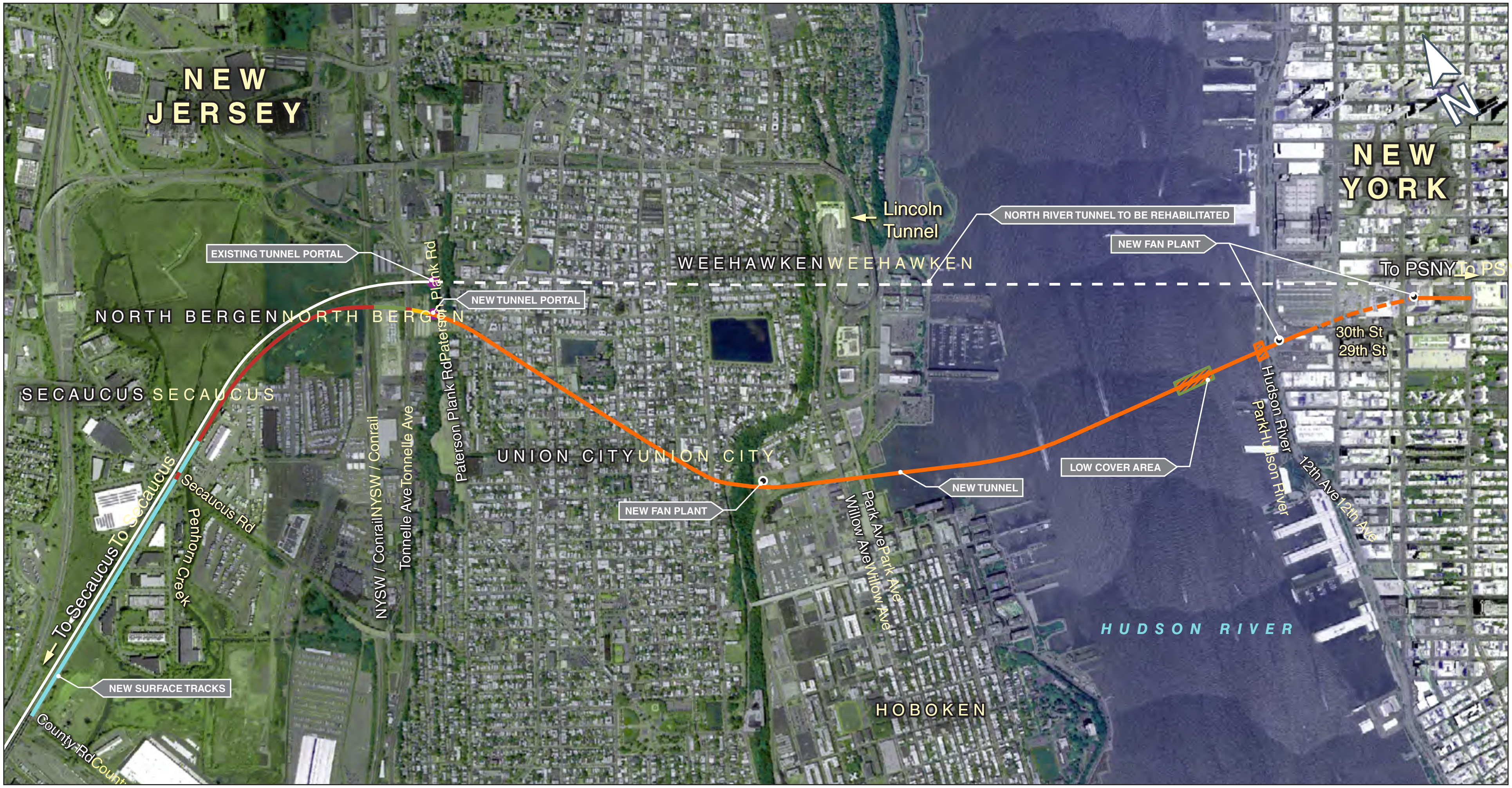


Existing Northeast Corridor

North River Tunnel to be Rehabilitated

Hudson Yards Right-of-Way Preservation

Tunnel Alignment

Tunnel Portal

New Surface Tracks (Viaduct)

New Surface Tracks (Retained Fill)

New Surface Tracks (Embankment)

New Surface Tracks (Retained Cut)

Low Cover Area

New Fan Plants

HUDSON TUNNEL PROJECT

Preferred Alternative

Figure 1

4/9/2017

DRAFT

Delineated Wetland Boundary

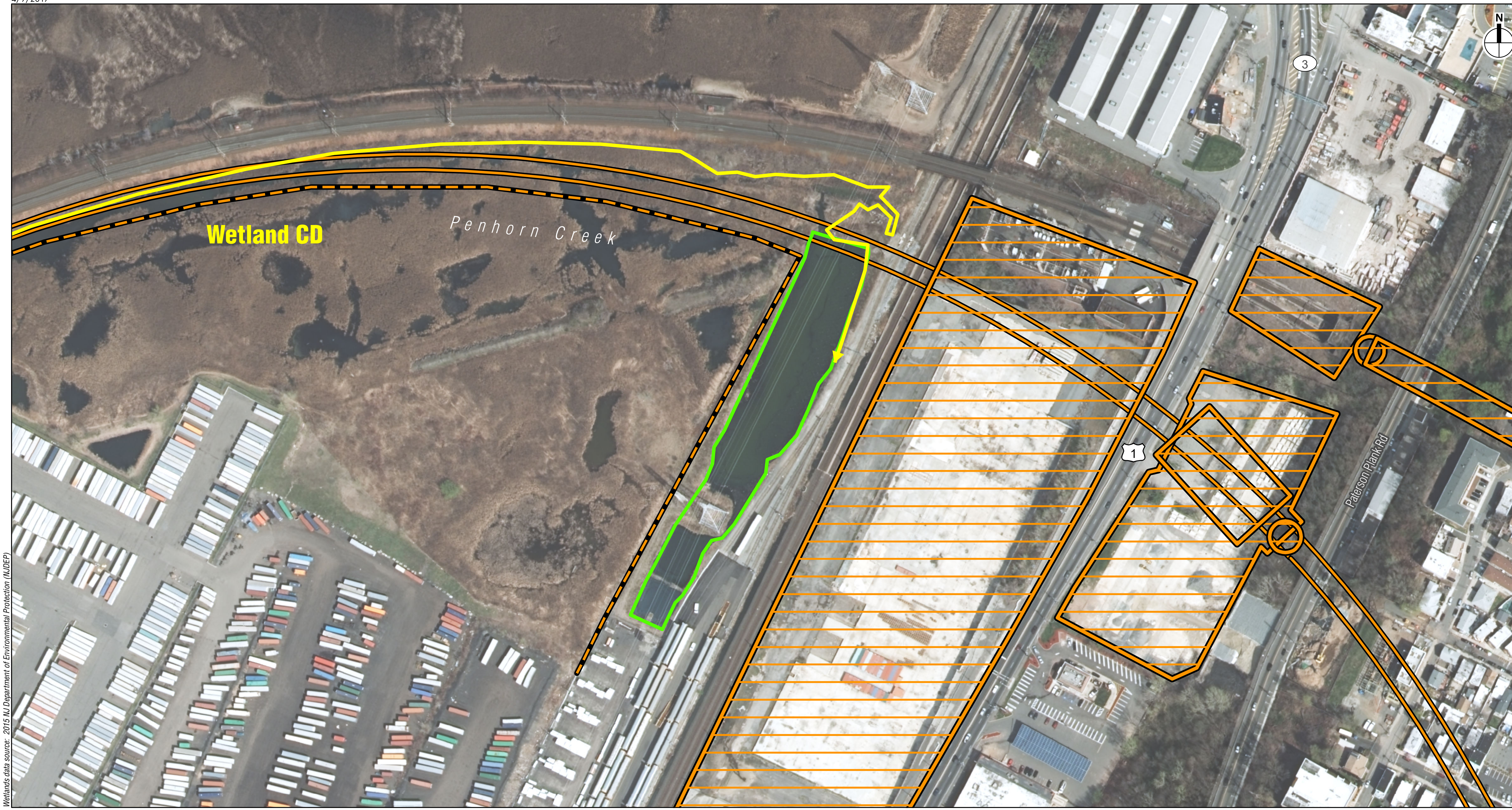
Project Alignments

HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2a

DRAFT



Delineated Wetland Boundary
Construction Access Roads
Project construction and staging areas
Project Alignments
Existing NYS&W Wetland MitigationSite

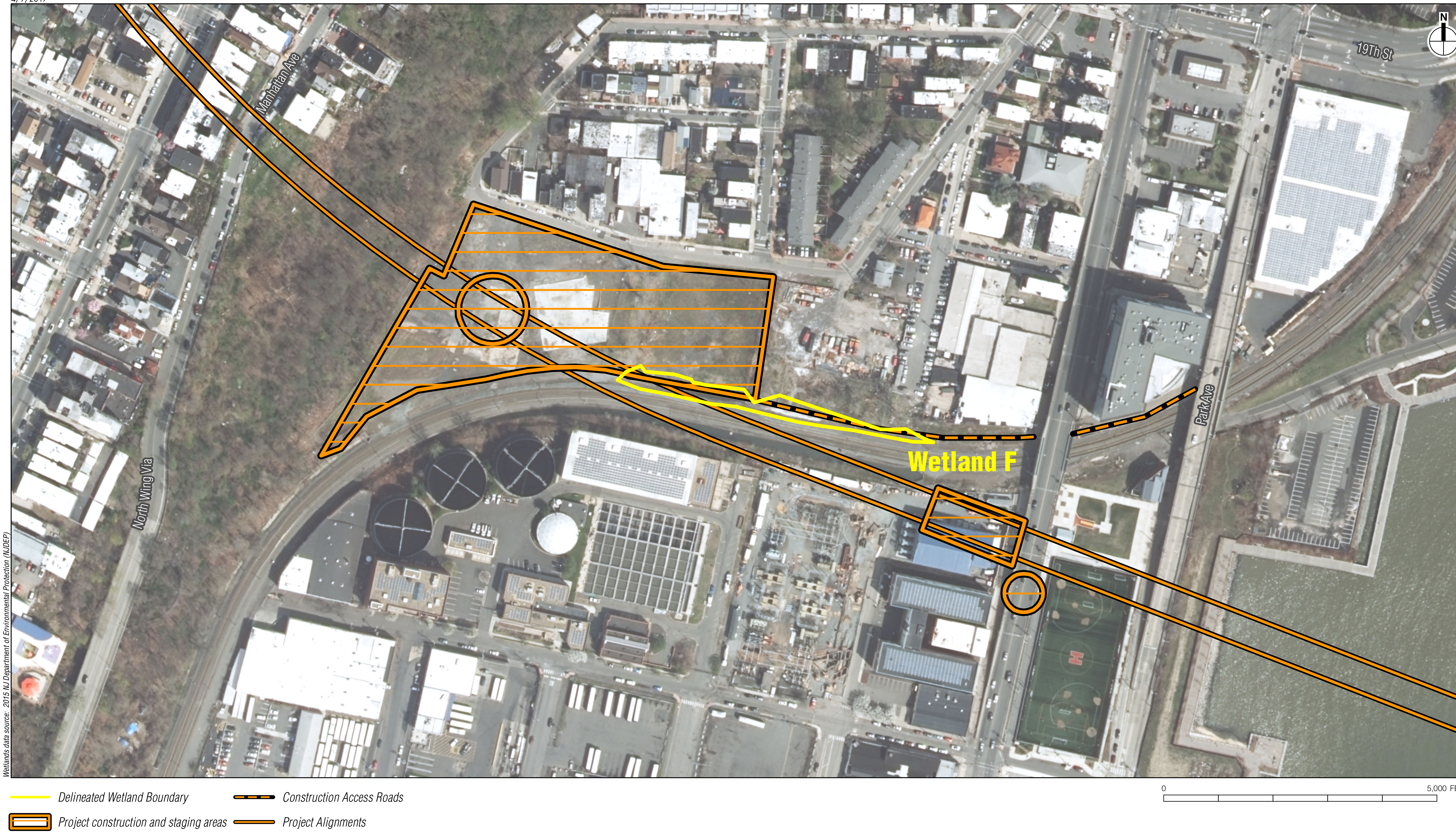
HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2b

4/9/2017

DRAFT

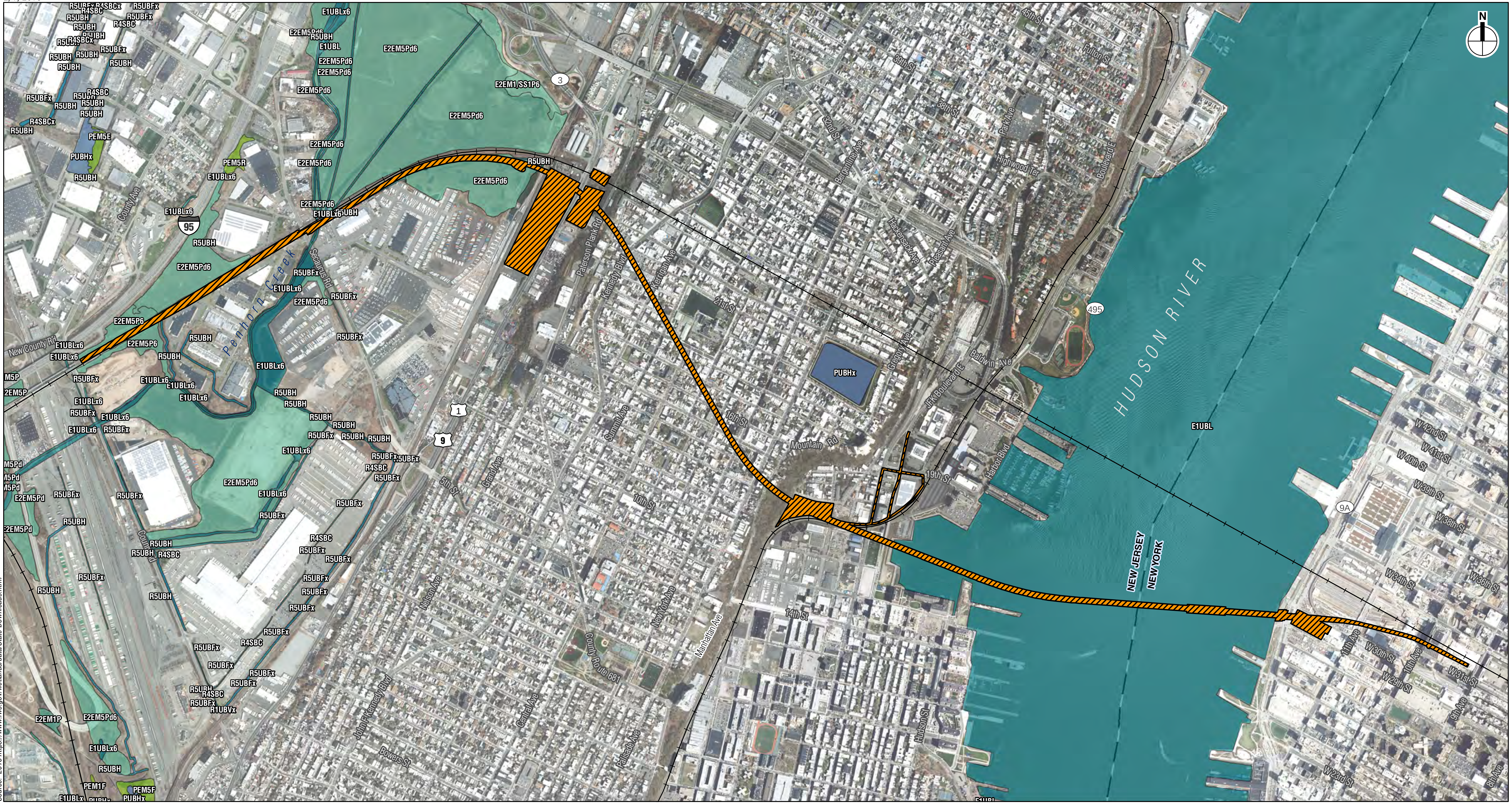


HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2c

2/9/2018



Source: 2016 https://www.fws.gov/wetlands/data/State-Downloads.html

Project Site
Existing Northeast Corridor

Wetland Type (Map Codes)
Freshwater Emergent Wetland (PEM)
Freshwater Pond (PUB, PAB)

Estuarine and Marine Wetland (E2, M2)
Riverine (R)
Estuarine and Marine Deepwater (E1, M1)

0 5,000 FEET

HUDSON TUNNEL PROJECT

Wetlands Mapped by the
National Wetlands Inventory
Figure 3

2/8/2018

Wetlands data source: 2015 NJ Department of Environmental Protection (NJDEP)

Project Site

Wetlands

0 2,000 FEET

HUDSON TUNNEL PROJECT

Wetlands Mapped by the
New Jersey Department of Environmental Protection

Figure 4

HUDSON TUNNEL

FINAL ENVIRONMENTAL IMPACT STATEMENT AND FINAL SECTION 4(f) EVALUATION

APPENDIX 11-5

Information in Support of Section 404(b)(1) Guidelines Analysis

Information in Support of Section 404(b)(1) Analysis

Hudson Tunnel Project

New Jersey and New York

INFORMATION IN SUPPORT OF SECTION 404(B)(1) ANALYSIS

HUDSON TUNNEL PROJECT

NEW JERSEY AND NEW YORK

INTRODUCTION

Section 404 of the Clean Water Act (CWA) prohibits discharges of dredge or fill materials into Waters of the United States (WOTUS), including jurisdictional wetlands, unless permitted to do so by the United States Army Corps of Engineers (USACE). The definition of WOTUS, at 33 CFR § 328.3 (a), includes coastal waters subject to the ebb and flow of the tide and inland waters, lakes, rivers, and streams, including adjacent wetlands and tributaries. The United States Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 CFR Part 230) are the substantive environmental criteria used by the USACE to evaluate permit applications under CWA § 404 (40 C.F.R. § 230.2 (a) (1)). Under these guidelines, an analysis of practicable alternatives is used to determine whether a discharge will be authorized. The overall purpose of the guidelines is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material (40 C.F.R. § 230.1 (a).

This document presents information in support of a Section 404(b)(1) analysis for the Hudson Tunnel Project (hereafter referred to as the Proposed Project). The goal of the Proposed Project is to preserve the current functionality of Amtrak's Northeast Corridor (NEC) service and NJ TRANSIT's commuter rail service between New Jersey and Penn Station New York (PSNY) by repairing the deteriorating North River Tunnel; and to strengthen the NEC's resiliency to support reliable service by providing redundant capability under the Hudson River for Amtrak and NJ TRANSIT NEC trains between New Jersey and the existing PSNY. The supporting information provided herein was developed on the basis of the regulations found in 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

INFORMATION IN SUPPORT OF SECTION 404(b)(1) ANALYSIS

I. Project Description

a. Location – The Proposed Project is located in Secaucus, North Bergen, Union City, and Hoboken, New Jersey, within and underneath the Hudson River in New Jersey and New York, and in western Manhattan, New York.

b. General Description – The Proposed Project is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey on two new surface tracks on berms and a viaduct in the New Jersey Meadowlands, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area where a fan plant and vent shaft would also be located for the Proposed Project, and beneath the Hudson River to connect to the existing approach tracks at Penn

Station New York (PSNY) (see **Figure 1**). Beneath the Hudson River the top (crown) of the proposed Hudson River Tunnel would generally be located 25 to 50 feet below the river bottom. However, in one location in the Hudson River, the Preferred Alternative would involve ground improvement to strengthen the soil of the river bed. This would occur in an area above the tunnel alignment where the tunnel would be relatively shallow below the bottom of the river. Hardening the soil in this area would reduce the risk of difficulties during tunneling and provide long-term protection for the tunnel. The area where in-river ground improvement for the riverbed would occur would be in the New York portion of the alignment beneath the Hudson River. The ground improvement zone would be approximately 1,200 feet long and 110 feet wide (wide enough to encompass both tubes of the tunnel). At its closest point, the construction activity would be about 620 feet from the Manhattan bulkhead. In this 1,200 feet long and 110 feet wide (3-acre) area (the "low-cover area"), the river bottom would be modified through a method called deep soil mixing, where in-place native soils are mixed or blended with cement to form a mixture termed soilcrete to provide stability to the ground above the tunnel (i.e., in-water ground improvement). The Proposed Project will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

c. Authority – The Federal Railroad Administration (FRA) is the lead agency for the preparation of the environmental review and NJ TRANSIT and the Port Authority of New York and New Jersey (PANYNJ) are joint lead agencies for the environmental review of the Hudson Tunnel Project in accordance with the National Environmental Policy Act (NEPA). The PANYNJ is currently the Project Sponsor, and will be responsible for advancing the Project through final design and construction and for meeting the commitments identified in the lead Federal agency's Record of Decision (ROD), including those associated with mitigation. The PANYNJ will remain the Project Sponsor until such time as the Gateway Development Commission (GDC) assumes the role of Project Sponsor. The PANYNJ and GDC anticipate that change will occur prior to the award of Federal financial assistance for the Project.

d. Project Purpose

(1) Basic Project Purpose – To preserve the current functionality of the Northeast Corridor's (NEC) Hudson River passenger rail crossing between New Jersey and New York and strengthen the resilience of the NEC.

(2) Overall Project Purpose – The existing North River Tunnel is a critical NEC asset and is the only intercity passenger rail crossing into New York City from New Jersey and areas west and south. This tunnel, constructed between 1904 and 1908 and opened for service in 1910, is more than 100 years old and was designed and built to early 20th-century standards. Service reliability through the tunnel, already suboptimal because of the tunnel's age and antiquated standards, has been further compromised because of the damage to tunnel components caused by Superstorm Sandy. The Proposed Project would preserve the current functionality of Amtrak's NEC service and NJ TRANSIT's commuter rail service between New Jersey and PSNY by repairing the deteriorating North River Tunnel; and would strengthen the NEC's resiliency to support reliable service by providing redundant capability under the Hudson River for Amtrak and NJ TRANSIT NEC trains between New Jersey and the existing PSNY. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service and by optimizing the use of existing infrastructure.

e. General Description of Fill Material

(1) General Characteristics of Material –

(a) Penhorn Creek – Fill within Penhorn Creek and the jurisdictional wetlands adjacent to the existing NEC will consist of: new surface tracks, constructed in the form of a retained fill supported by retaining walls from the east side of County Road to a point approximately 550 feet east of Secaucus Road; an approximately 3,100-foot-long rail viaduct beginning approximately 550 feet east of Secaucus Road; a rail bridge over a tributary of Penhorn Creek; new culverts and culvert extensions; and a permanent access road. A new weir will be installed on Penhorn Creek downstream of the twin 48-inch culvert extension to replace the existing weir that will be removed along with the inoperable pump station.

(b) Emergent wetland with nexus to Hudson River – Fill within this wetland will comprise culvert(s) and engineered fill for establishment of a construction access road.

(c) Hudson River – Material used for deep soil mixing in the Hudson

River will be a mix of cement grout and water mixed with, the fine-grained silt/clay river bottom sediment to form soilcrete.

(2) Quantity of Material –

(a) Penhorn Creek – Approximately 11,060 cubic yards (CY) of permanent fill will be placed within wetlands and associated open water areas below ordinary high water. Approximately 3,500 CY of temporary fill will be placed in wetlands and associated open water areas.

(b) Emergent wetland with nexus to Hudson River – Engineered fill sufficient to establish a construction access road.

(c) Hudson River –The area of deep soil mixing will occur within 3 acres of the Hudson River bottom and will extend upward from the springline (vertical midpoint) of the tunnel alignment to the river bottom, resulting in the placement of 242,000 CY of permanent fill within the 3 acres (of which 2,300 CY would be above the current mudline). This area of ground improvement also includes one cross passage location where the jet grouting/deep soil mixing will be deeper. Approximately 0.7 acres of the entire 3-acre area of ground improvement will be elevated 1 to 2 feet above the current mudline. The remaining 2.3 acres will be approximately level with the current bottom elevation.

f. Proposed Discharge Site

(1) Location –

(a) Penhorn Creek – Penhorn Creek is a tributary of the Hackensack River, located along the border of Secaucus and Jersey City, New Jersey. It drains to the Hackensack River just south of Secaucus Junction Station on the NEC. The portion of the Project consisting of retained fill will extend from County Road to approximately 550 feet east of Secaucus Road. The portion of viaduct will extend approximately 3,100 feet from the eastern edge of the retained fill portion, along the north side of industrial properties over Penhorn Creek and, curving away from the existing NEC, over an undeveloped wetlands area, to the existing NYSW/Conrail right-of-way. A 20-foot-wide access road will run along the south side of the new tracks from Secaucus Road to the NYSW right of way. The western portion of this access road will be on a pile supported open grid steel grating. The remaining portion of the access road will be on a toe berm about 5 feet above existing grade.

(b) Emergent wetland with nexus to Hudson River – This 0.44-acre wetland is located in a drainage ditch within the Hudson-Bergen Light Rail (HBLR) right-of-way in Hoboken. It is north of the tracks and southeast of the proposed site for the Project's Hoboken ventilation shaft and fan plant. This wetland will be filled for construction of an access road for the Proposed Project's construction staging area at the ventilation fan plant and shaft site in Hoboken. Drainage culvert(s) will be installed as part of the construction access road to maintain the existing drainage pattern while the road is in place. Once construction of the Project in this area is complete, the temporary construction access road will either be removed, or it will remain in place for maintenance access to be used by the HBLR.

(c) Hudson River – The low cover area is within the Lower Hudson River, beginning at approximately 70 feet west of the New York pierhead line. It will extend approximately 600 feet west into the 40-foot project depth Federal Navigation Channel, and then about 600 feet into the 45-foot project depth Federal Navigation Channel.

(2) Size –

(a) Penhorn Creek – Permanent fill activities will occur within approximately 4 acres of wetlands and associated open water under USACE jurisdiction, and 0.09 acres within the existing NYSW wetland mitigation site. Temporary impacts will occur within approximately 1.5 acres of wetlands and associated open waters under USACE jurisdiction and 0.05 acres of the NYSW wetland mitigation site, comprising temporary fill, erosion and sediment control measures and construction fencing.

(b) Emergent wetland with nexus to Hudson River – Fill will be placed within this 0.44-acre wetland to establish a construction access road.

(c) Hudson River –Deep soil mixing will occur over a 3-acre area of Hudson River bottom.

(3) Type of Sites/Habitat –

(a) Penhorn Creek – Penhorn Creek and its associated wetlands, and the Penhorn Creek tributary in the Project area contain open water and wetland habitats with associated open waters. Penhorn Creek is a tributary to the Hackensack River and drains a portion of the Meadowlands to the east of the Hackensack River. The ridgeline of the Palisades sill forms the eastern boundary of Penhorn Creek's watershed, and the ridgeline running through Secaucus forms the western boundary of the watershed. Dikes formed by roadway fill constructed across the Meadowlands and the Hackensack River form the northern and southern boundaries of the watershed, respectively. Penhorn Creek's bed elevation is lower than much of the tidal range in the Hackensack River; however, its waters are regulated by a tide gate at St. Paul's Avenue. The National Wetlands Inventory (NWI) shows large areas of estuarine wetlands and smaller areas of freshwater wetlands within the New Jersey study area in the Hackensack Meadowlands. The freshwater wetlands shown on the NWI are riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (designated by USFWS as “R5UBH”). As shown on the NWI, this R5UBH wetland is mapped on Penhorn Creek as it crosses the NEC east of County Road in Jersey City, NJ and the Project alignments and again near Secaucus Road in Secaucus, NJ, and on a wetland area immediately north of the NEC near the NYSW right of way at the eastern edge of the Meadowlands. The estuarine tidal wetlands within the study area include an intertidal wetland (designated by USFWS as “E2EM5P6”) spanning both sides of the NEC from County Road to Penhorn Creek; this wetland is irregularly flooded, oligohaline, and dominated by emergent *Phragmites australis*. Outside Penhorn Creek, the NWI indicates large areas of oligohaline intertidal wetlands along both sides of the NEC east of Secaucus Road that are irregularly flooded, dominated by emergent *Phragmites australis*, and partially drained/ditched (E2EM5Pd6) which is a tributary to Penhorn Creek. An existing wetland mitigation project implemented by NYSW within their right-of-way in compliance with a USACE permit is located within a portion of the area mapped as E2EM5Pd6. In addition, the NWI indicates subtidal wetlands with the following characteristics in small areas close to Penhorn Creek and County Road: subtidal wetlands with an unconsolidated bottom that is permanently flooded, oligohaline, and excavated (E1UBLx6); and subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). Field reconnaissance conducted in fall 2016 confirmed these wetland types and approximate locations. NJDEP-mapped wetlands in the Penhorn Creek area include those with the land use/land cover code, “Phragmites Dominate Interior Wetlands.” They are located along both sides of the NEC in the Meadowlands area between County Road and the NYSW right-of-way. The NJDEP wetlands were also confirmed by site reconnaissance in fall 2016. FRA delineated wetlands within the New Jersey portion of the Project area during November and December 2016 in accordance with USACE’s three-parameter approach for identifying wetlands. Two of these wetlands are located along the NEC and are tidally influenced emergent marshes that correspond with the locations of NWI-mapped wetlands E2EM5P6, R5UBH, E1UBLx6, and E2EM5Pd6. The other two, potentially isolated, emergent wetlands are not associated with any NWI-mapped wetlands. One of these two wetlands is an isolated wetland along the NEC, and the other is located along the HBLR right-of-way in Hoboken. The Hoboken wetland is not mapped by NJDEP, but may have possible nexus to the Hudson River through a tide gate located near Harbor Boulevard in Weehawken.

(b) <u>Emergent wetland with nexus to Hudson River</u> – This 0.44-acre emergent wetland dominated by *Phragmites australis* has been determined to be connected to the Hudson River and under USACE jurisdiction based on the fact that the tide is held back by a tide gate situated beneath the Hudson River Waterfront walkway. It is not mapped by the NWI or NJDEP.

(c) Hudson River – The Project will occur in a tidally-influenced portion of the Lower Hudson River. Saltwater from Upper New York Harbor enters the lower Hudson River Estuary during the flood phase of the tidal cycle and lower salinity water is discharged from the Estuary to the Harbor during the ebb phase. The typical tidal range in the Hudson River is approximately 5 feet (Geyer and Chant 2006). Average tidal velocities near the Project site are about 2.4 feet per second, and the average predicted ebb flow is about 2.6 feet per second (NOAA 2013). Freshwater and higher salinity waters are well mixed during low-flow conditions, but are stratified under higher flow conditions when freshwater inflow from upriver overrides the denser saltwater layer (Moran and Limburg 1986). USACE maintains a Federally-authorized navigation channel at a depth of 45 feet at mean lower low water (MLLW) from the mouth of the Hudson River upstream to approximately 59th Street, and a 40 foot at MLLW project depth Federal Navigation Channel on the outside of the 45 foot channel (USACE 2016). Bathymetric surveys conducted by USACE in April 2016 showed depths ranging from about 36 to 48 feet at MLLW on the eastern side of the navigation channel, and depths from 33 to 51 feet at MLW on the western side of the navigation channel in the Project vicinity (USACE 2016, sheet 5 of 11). Shallower depths were found near or adjacent to piers and other structures, and depths rapidly increased to 40 feet or more over a distance of less than 200 feet from these structures. The National Oceanic and Atmospheric Administration's (NOAA) Nautical Chart #12335 shows current water depths ranging from 3 to 17 feet at MLLW around the piers outside the navigation channel, and from 40 to 54 feet at MLW within the navigation channel. At the edges of the channel, depths range from 20 to 30 feet at MLLW (NOAA 2016). Sedimentation in the lower Hudson River tends to be highest in the shallows on the west side of the river (Geyer 1995). Sedimentation within the interpier areas where current velocities are lower ranges from 1 to 2 feet per year (Smith 1992).

(4) Time and Duration of Discharge –

(a) Penhorn Creek – Construction of the Proposed Project within Penhorn Creek will likely occur over approximately 4 years.

(b) Emergent wetland with nexus to Hudson River – Placement of fill within the wetland to construct the access road will occur during site preparation, estimated to occur over approximately 1.5 years.

(c) Hudson River – The cofferdam containment structure is expected to be staged in multiple sections. The total duration for the construction work in the Hudson River will be up to 26 months. To minimize adverse impacts to overwintering and migrating striped bass, and other migrating anadromous species, installation and removal of the cofferdams will not occur between January 21 and June 30.

g. Disposal Method –

(1) Penhorn Creek –The retaining walls in the area of retained fill will consist of soldier piles and lagging (deep piles combined with timber planks or steel sheeting) with concrete pile caps that are cast in place. Construction activities for the bridge over the Penhorn Creek tributary will involve installing piles and concrete bridge abutments and erecting the steel superstructure for the bridge spans, then adding ballast, rails, and ties on the concrete decks. The viaduct will be constructed by installing piles, erecting the viaduct piers, connecting the piers with pile caps, erecting the steel or precast concrete girders, installing a concrete deck to create the bridge superstructure, and finally installing rails and ties on a ballasted deck. A new construction and maintenance access road would be elevated on a trestle for approximately 315 feet from the right bank of Penhorn Creek to the end of the railroad embankment retaining wall and will comprise open grid steel grating. This open grid steel grating access road will be above the Penhorn Creek tributary. The relocated portion of the Penhorn Creek tributary would be a trapezoidal channel with a natural bottom. Construction of the new culverts and culvert extensions, access road, and the relocation of a portion of the Penhorn Creek tributary will include the installation of a temporary cofferdam and sump pits to divert water flow around the work area to control infiltration of groundwater during placement and anchoring of culverts or extensions. Water removed during cofferdam dewatering will be treated with temporary sediment control measures before being discharged back to surface waters or wetlands.

(2) Emergent wetland with nexus to Hudson River – Construction of the construction access road will involve earthmoving and grading equipment.

(3) Hudson River – The low-cover area will be split into two sections, each of which will be enclosed by a cofferdam (a temporary, watertight structure) that will isolate the water affected by construction from the surrounding river water. By conducting the deep soil mixing in two segments, the area of river bottom disturbed at a given time will be reduced. The cofferdams will consist of king piles and sheet pile walls driven into the river bottom from adjacent barges. Water within the cofferdam will be maintained at a few feet below the river level to maintain water pressure that flows inward to the cofferdam rather than outward. Barges will be moored outside the cofferdam, with construction equipment mounted on the barges. Working from the barges, the soils of the river bottom will be modified using deep soil mixing, which involves

mixing or blending in-place native soils with cement using large diameter augers or paddles that introduce the cement or cement grout into the native soils. The area of deep soil mixing will extend upward from the springline (vertical midpoint) of the tunnel alignment to the river bottom. This area of ground improvement also includes one cross passage location; in this location, the deep soil mixing would be deeper. Deep soil mixing operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to a low strength rock. When ground improvement activities are completed within a given section of the low cover area, the cofferdam will be removed and then installed for the next segment. For about 2.3 acres of the in-river ground improvement zone, the top of the resulting hardened soil will be at approximately the same level as the existing river bottom. For the remaining 0.7 acres, the hardened soil will be about 2 feet above the existing river bottom depth.

II. Factual Determinations

a. Physical Substrate Determination –

(1) Substrate Elevation and Slope –

(a) Penhorn Creek – The Proposed Project will result in new substrate elevations and slope as a result of the new raised right-of-way (including the segments of retained fill and rail viaducts and bridges), an adjacent access road along a portion of the viaduct and the relocated Penhorn Creek tributary, and installation of drainage systems. The proposed retained fill and rail viaduct will be at the same elevation as the existing NEC, 20 to 30 feet above the surrounding properties. The bottom elevation of the relocated segment of the Penhorn Creek tributary will be similar to the existing elevation. The design flood elevation (DFE) for the Proposed Project is the base flood elevation (BFE) plus 5 feet. The BFE ranges from 4 to 9 feet NAVD88. Project elements will be either above the DFE or will be flood-proofed. The DFE will apply to all critical Project structures (i.e., any asset/component which, if impacted by flood waters, could limit functionality of the NEC). The DFE for the Project will therefore range from an elevation of 9 feet NAVD88 to an elevation 16 feet NAVD88.

(b) Emergent wetland with nexus to Hudson River – The access road will be slightly elevated above the surrounding land surface. The BFE at this wetland is 11 feet NAVD88.

(c) Hudson River –Approximately 0.7 acres of the 3-acre ground improvement area (approximately 120 feet wide and 270 feet long) will be elevated 1 to 2 feet above the existing mudline (i.e., river bottom).

(2) Sediment Type –

(a) Penhorn Creek – The Proposed Project will result in a change in sediment type in the locations of the retained fill, the relocated portion of the Penhorn Creek tributary which will be a natural bottom, the footprints of the concrete piles for the viaduct and bridge, and access road, which will consist of either concrete or mechanically stabilized earth walls and organic soils and/or engineered fill, and rock. The existing sediment outside the footprint of fill placement will be unaffected.

(b) Emergent wetland with nexus to Hudson River – The existing hydric soil will be covered by engineered fill.

(c) Hudson River – The Proposed Project will result in alteration of the sediment characteristics within the 3-acre low cover area, where fine-grained silt/clay sediments will be mixed with cement grout (termed “soilcrete”). The resulting soilcrete would be similar to a firm or dense soil substrate and would not lead to leaching or resuspension that could adversely affect sediment quality. Beyond the limited low-cover area, there will be no changes in sediment type.

(3) Dredged/Fill Material Movement –

(a) Penhorn Creek – Erosion and sediment control measures will be implemented in accordance with the stormwater pollution prevention plan (SPPP) to control movement of soil, rock and gravel outside the Project area. Material will be placed to minimize movement outside the Project footprint.

(b) Emergent wetland with nexus to Hudson River – Erosion and sediment control measures will be implemented in accordance with the SPPP to minimize movement of material outside the footprint of the construction access road.

(c) Hudson River – Soil improvement through deep soil mixing within the 3-acre low cover area will be conducted within cofferdams, minimizing the potential for the grout/cement mixture to extend beyond the footprint of the soil improvement area and for increases in suspended sediment. Additionally, cofferdams will not be removed until the improved soil has hardened.

(4) Physical Effects on Benthos –

(a) Penhorn Creek – The Proposed Project will result in the permanent loss of approximately 4 acres of emergent wetlands and associated benthic habitat along the existing NEC between Allied Interlocking and the new tunnel portal. The permanent loss of the 4 acres of wetlands adjacent to the existing NEC will be properly mitigated for through the purchase of mitigation credits. These mitigation activities are described in greater detail in the "Conceptual Compensatory Mitigation Plan."

(b) Emergent wetland with nexus to Hudson River – The Proposed Project will result in the loss of 0.4 acres of wetland in Hoboken during construction. Any invertebrates currently using this wetland area will be lost due to construction of the access road. After construction is complete, the construction access road will either be removed or it will remain in place to be used as maintenance access for the HBLR. The 0.4 acres of impacts to this wetland will be mitigated through the purchase of mitigation credits, as described in greater detail in the "Conceptual Compensatory Mitigation Plan."

(c) Hudson River – The Proposed Project will result in the permanent conversion of 3-acres of soft silty bottom habitat to soilcrete (i.e., grout/cement mixed with soft sediment). Approximately 0.7 acres of soilcrete area (approximately 120 feet wide and 270 feet long) would be between 1 and 2 feet above the existing mudline (i.e., river bottom). This elevated portion of the soilcrete would provide habitat for encrusting organisms, which would provide some foraging habitat for fish. However, because it will be higher than the surrounding river bottom, this area may have a lower potential to accumulate sediment that would provide soft-bottom habitat for benthic invertebrates and would not, therefore, provide forage habitat to soft-bottom feeding fish species such as windowpane, skates, and summer and winter flounder. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS and the New York State Department of Environmental Conservation (NYSDEC), for five years to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 2.3 acres of soilcrete for five years post-construction. In addition to the monitoring, NYSDEC is requesting additional mitigation for the modification to 3 acres of bottom habitat within the Hudson River (see the "Conceptual Compensatory Mitigation Plan" for additional details on mitigation). With these measures in place, the Project would not adversely impact benthos.

(5) Other Effects – N/A.

(6) Actions Taken to Minimize Impacts to Physical Substrates –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The plan will include measures such as the installation of silt fences, hay bales and/or fabric filters at the construction periphery, and vegetative stabilization of soils to prevent sedimentation. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Preferred Alternative's BMPs for construction. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), will be considered where feasible to minimize temporary impacts to wetlands.

(b) Emergent wetland with nexus to Hudson River – Erosion and sediment control measures will be implemented in accordance with the SPPP.

(c) Hudson River – A Pollution Prevention Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during king and sheet pile installation and deep soil mixing activities conducted from construction barges. The grout/cement mixture will be contained within cofferdams.

b. Water Circulation, Fluctuation and Salinity Determinations

(1) Water

(a) Salinity –

• Penhorn Creek – The installation of culverts along in the New Jersey portion of the Project area, the relocation of a portion of the Penhorn Creek tributary, and the replacement of the Penhorn Creek weir, are designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. Therefore, the Proposed Project will not result in an adverse effect to salinity levels in Penhorn Creek.

•Emergent wetland with nexus to Hudson River – The loss of this wetland will not result in any changes in salinity of the Hudson River.

• Hudson River – The installation of the cofferdams and the replacement of soft bottom sediment with soilcrete that will be at the same elevation as that of the existing sediment within the 3-acre low-cover area will not affect the salinity of the Hudson River.

(b) Water Chemistry – The Proposed Project will result in temporary resuspension of sediments during construction in Penhorn Creek, relocation of a portion of the Penhorn Creek tributary, and the Hudson River (during installation and removal of cofferdams) that could temporarily affect water chemistry; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of erosion and sediment control measures, such as silt fences in the Penhorn Creek area and during construction of the temporary construction access road in Hoboken. The installation of culverts along in the New Jersey portion of the Project area and replacement of a weir on Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The soilcrete will not result in adverse impacts to water quality of the Hudson River. Therefore, the Proposed Project will not result in a long-term change in water chemistry within the Project site.

(c) Clarity –

- Penhorn Creek – The Proposed Project will result in a temporary resuspension of sediments during construction in Penhorn Creek that could temporarily affect water clarity; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of sediment and erosion control measures, such as silt fences. The installation of culverts, replacement of a weir along Penhorn Creek, and relocation of a portion of the Penhorn Creek tributary are designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The Proposed Project will not result in a long-term change in water clarity in Penhorn Creek and its surrounding wetlands.
- Hudson River – The Proposed Project will result in a temporary resuspension of sediments during construction in the Hudson River during installation and removal of cofferdams that could temporarily affect water clarity; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, cofferdams will not be removed until the improved soil has hardened. The Proposed Project will not result in a long-term change in water clarity in the Hudson River.

(d) Color –

- Penhorn Creek – The Proposed Project will result in a temporary resuspension of sediments during construction in Penhorn Creek and its surrounding wetlands that could temporarily affect water color; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of sediment and erosion control measures, such as silt fences. The installation of culverts, replacement of a weir along Penhorn Creek, and relocation of a portion of the Penhorn Creek tributary are designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The Proposed Project will not result in a long-term change in water color in Penhorn Creek or its surrounding wetlands.

- Hudson River – The Proposed Project will result in a temporary resuspension of sediments during construction in the Hudson River during installation and removal of cofferdams that could temporarily affect water color; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, cofferdams will not be removed until the improved soil has hardened. The Proposed Project will not result in a long-term change in water color in the Hudson River.

(e) Odor – The Proposed Project is not expected to result in a change in odor within any portion of the Project site.

(f) Taste – The Proposed Project is not expected to result in a change in taste within any portion of the Project site.

(g) Dissolved Gas Levels –

- Penhorn Creek – Dissolved gas levels in Penhorn Creek and surrounding wetlands may be temporarily impacted during construction as sediments are disturbed. Upon completion of construction, dissolved gas levels are expected to return to pre-construction conditions. Additionally, the installation of culverts and replacement of a weir along Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek.
- Hudson River – Dissolved gas levels may be locally altered during construction as a result of increased suspended sediments. However, the average tidal current in the Hudson River is 1.4 knots (Geyer and Chant 2006), which is strong enough to maintain sufficient flushing throughout the Project site so as not to affect overall dissolved gas levels in the Hudson River.

(h) Nutrients –

- Penhorn Creek – The Proposed Project, through extension of culverts, relocation of a portion of the Penhorn Creek tributary, and replacement of a weir within Penhorn Creek will maintain sufficient flushing within the wetlands associated with Penhorn Creek so as not to result in an increase in nutrient concentrations. The culvert extensions will be of the same diameter as the existing culverts to maintain flow within the creek.
- Hudson River –The installation of soilcrete within the 3-acre low cover area will not affect nutrient levels within the Hudson River. The resulting soilcrete will be similar to a firm or dense soil substrate and will not lead to leaching or resuspension that could release nutrients to the river. Cofferdams will not be removed until the soilcrete is hardened.

(i) Eutrophication –

- Penhorn Creek – The extension of culverts, relocation of a portion of the Penhorn Creek tributary, and replacement of the weir on Penhorn Creek will maintain sufficient flushing within Penhorn Creek and its surrounding wetlands. Therefore, the Proposed Project will not have the potential to result in eutrophication.

- Hudson River – The installation of soilcrete within the 3-acre low cover area will not have the potential to result in eutrophication of the Hudson River. The soilcrete will be similar to a firm or dense soil substrate and will not lead to leaching or resuspension that could release nutrients to the river that would promote eutrophication.

(j) Others – N/A.

(2) Current Patterns and Water Circulation

(a) Current Patterns and Flow –

- Penhorn Creek – The Proposed Project will not result in changes to current patterns and flow within Penhorn Creek. Existing culverts beneath the NEC at the Penhorn Creek pump station will be extended to accommodate the Project, and will maintain or exceed their existing capacity. The existing weir just south of the NEC at the Penhorn Creek pump station will be removed as part of the Proposed Project, but a new weir will be installed downstream of the twin 48-inch culvert extension to maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands. The relocation of a portion of the Penhorn Creek tributary to a trapezoidal channel with a natural bottom will maintain flow within the tributary. The project does have the potential to affect current pattern and water circulation in the wetlands associated with Penhorn Creek. The existing culverts beneath the NEC are critical drainage elements that will be carefully maintained during culvert extension and construction in order to minimize impacts to flow patterns within wetlands and discharges to Penhorn Creek. New culverts will be constructed beneath the permanent access road adjacent to the viaduct and at the outlet to the NYSW wetland mitigation site. With these measures in place, the Proposed Project will not result in adverse impacts to current patterns and flow.

- Hudson River – Temporary impacts to current patterns and flow will occur during construction of the 3-acre low cover area. Flow patterns immediately adjacent to the cofferdams will be altered during construction. Once construction is complete and the cofferdams are removed, current patterns and flow will be expected to return to pre-construction conditions.

(b) Velocity –

- Penhorn Creek – The placement of fill and relocation of drainage swales and culverts may result in changes in velocity in Penhorn Creek. The proposed culverts are designed to minimize adverse impacts to the hydrology of Penhorn Creek and the surrounding wetlands.

- Hudson River – Temporary changes in velocity may occur during construction of the 3-acre low cover area in small, localized areas surrounding the cofferdams and in small, localized areas around the elevated 0.7 acres of soilcrete. Once construction is complete and the cofferdams are removed, velocity will be expected to return to pre-construction conditions. The 0.7-acre elevated portion will not result in permanent, large-scale changes in velocity in the Hudson River.

(c) Stratification –

- Penhorn Creek – The Proposed Project will not result in a change in stratification within Penhorn Creek. The proposed culverts and culvert extensions will be sized to maintain the existing flow pattern and will not contribute to stratification of the creek.
- Hudson River – The conversion of 3 acres of Hudson River bottom sediment to soilcrete will not result in a change in the existing stratification pattern within the Hudson River. About 2.3 acres of the soilcrete will be approximately level with the surrounding riverbed while the remaining 0.7 acres will be elevated 1 to 2 feet above the existing river bottom. This change in elevation will not modify overall flow patterns such that stratification is affected.

(d) Hydrologic Regime –

- Penhorn Creek – The Proposed Project will not alter the hydrologic regime of Penhorn Creek. The culvert extensions will be the same size as the existing culverts to maintain the existing flow pattern. The proposed culverts will be designed to minimize adverse impacts to the hydrology of Penhorn Creek and the surrounding wetlands. A new weir installed downstream of the twin 48-inch culvert extension will maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands.
- Hudson River – Flow patterns immediately adjacent to the cofferdams will be altered during construction. There may be small-scale changes in flow in the vicinity of the 0.7-acre elevated portion of the soilcrete area; however, the changes will be minor and not will affect the overall hydrologic regime of the Hudson River.

(3) Normal Water Level Fluctuations –

(a) Penhorn Creek – Water level fluctuations will not be affected in Penhorn Creek. A new weir installed downstream of the twin 48-inch culvert extension will maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands. The new culverts and culvert extensions have been design to maintain the wetland hydrology.

(b) Hudson River – Approximately 0.7 acres will be elevated 1 to 2 feet above the existing river bottom within the ground improvement area. The elevated soilcrete extends approximately 1,200 feet across a

4,500-foot-wide portion of the Hudson River, and only occupies 110 feet of the 153-mile river length that is tidal (Levinton and Waldman 2010); therefore, the Proposed Project will not adversely affect normal water level fluctuations.

(4) Salinity Gradients –

(a) Penhorn Creek – The Proposed Project will not affect the salinity gradient in Penhorn Creek. Penhorn Creek is controlled by a tide gate at St. Paul's Avenue. Salinity gradients are highly dependent on this tide gate. The Proposed Project will not affect operation of the tide gate; as such, no long-term changes in salinity gradients are anticipated as a result of the Proposed Project.

(b) Hudson River – The Proposed Project will not result in changes to salinity gradients within the Hudson River.

(5) Actions Taken to Minimize Impacts –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek during installation and extension of drainage culverts and other construction activities that have the potential to discharge sediment to waters that discharge to Penhorn Creek. The quantity of fill material has been minimized from the design in the Draft Environmental Impact Statement (DEIS). The sloped embankment that was originally proposed between about 550 feet east of Secaucus Road to approximately Tonnelle Avenue was replaced by a pile-supported rail viaduct, resulting in a reduction of fill by about 40 percent (approximately 16,100 CY of permanent fill and approximately 8,450 CY of temporary fill). Fill material will be placed so as to minimize discharges outside the footprint of the embankment and access road. Culverts will be sized to maintain the existing flows within Penhorn Creek and to minimize changes in flow within the wetlands. A new weir installed downstream of the twin 48-inch culvert extension will maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), will be considered where feasible to minimize temporary impacts to wetlands.

(b) Hudson River – Construction activities within the low cover area will occur within an area enclosed by temporary cofferdams used to protect the surrounding waters. The cofferdams will be installed in either two or three separate sections/segments in order to minimize the area of the river that is disturbed at any one time. Cofferdams will not be removed until the soilcrete has hardened.

c. Suspended Particulates and Turbidity Determination –

(1) Expected changes – The Proposed Project will result in temporary, minor increases in suspended particulates and turbidity.

(2) Effects on Chemical and Physical Properties of the Water Column –

(a) Light Penetration –

- Penhorn Creek – There may be short-term, minor impacts on light penetration during construction of the Proposed Project as sediments are resuspended during construction, resulting in increased turbidity; however, the use of sediment and erosion control measures will minimize these short-term impacts. The viaduct will be positioned between 18 and 19 feet above the surface of the wetlands and located immediately south of the NEC tracks. This elevation above the emergent wetland combined with the southern exposure will allow sufficient sunlight to reach the wetland during periods of the day to support the existing plant community. The access road over the Penhorn Creek tributary will comprise open grid steel grating that will allow light penetration. Therefore, no long-term adverse effect on light penetration as a result of the Proposed Project is anticipated.
- Hudson River – The installation and removal of cofferdams will result in short-term, temporary, and minor impacts on light penetration as a result of sediment resuspension. These impacts will cease once construction is complete and will not result in long-term adverse effects on light penetration.

(b) Dissolved Oxygen (DO) –

- Penhorn Creek – There is potential for short-term, minor changes in DO levels during construction of the Proposed Project in Penhorn Creek and its associated wetlands as sediments are resuspended; however, suspended sediment will dissipate upon cessation of sediment-disturbing activities and DO levels will be expected to return to pre-construction levels.
- Hudson River – The average tidal current in the Hudson River is 1.4 knots (Geyer and Chant 2006), which is strong enough to maintain sufficient flushing throughout the Project site so as not to affect the potential for changes in DO during construction. Following construction, the presence of the soilcrete will not have the potential to affect DO concentration.

(c) Toxic Metals and Organics –

- Penhorn Creek – All of the properties within the Meadowlands portion of the Project site are mapped as having historical fill, which could include dredged material, construction and demolition waste, other solid wastes (including municipal garbage) and ash. As such, historical fill material can contain heavy metals, PCBs, pesticides, SVOCs, VOCs and other hazardous materials. For much of the 20th Century, unregulated dumping of solid waste took place in the Meadowlands. As such, there is the potential for contamination for activities requiring excavation such as culverts and outlet structures. Construction would be completed as a Linear Construction Project (LCP) under the oversight of an assigned Licensed Site Remediation Professional (LSRP). The LSRP would prepare a Materials Management Plan and would oversee the reuse (where suitable) or disposal of all project-related contaminated materials.

- Hudson River – Excess material generated during deep soil mixing will be disposed of in accordance with State and Federal regulations and will not have the potential to adversely affect the Hudson River.

(d) Pathogens –

- Penhorn Creek – The Proposed Project, through extension of culverts, installation of new culverts, relocation of a portion of the Penhorn Creek tributary, and replacement of the weir, will maintain sufficient flushing within Penhorn Creek and its surrounding wetlands so as not to result in an increase in pathogens. The Proposed Project, and in particular the modifications to the NYSW wetland mitigation site will be designed so as not to adversely affect the operation of North Bergen CSO outfall 011A and the water quality improvements resulting from the discharge from the CSO to the NYSW wetland mitigation site.
- Hudson River – The installation of the soilcrete within the 3-acre low cover area will not adversely affect pathogen concentrations within the Hudson River.

(e) Aesthetics –

- Penhorn Creek – Temporary increases in suspended sediment during construction may impact aesthetics of the water column in Penhorn Creek and surrounding wetlands; however, once construction is complete and sediment disturbing activities cease, aesthetics of the water column are anticipated to return to pre-construction conditions. Culverts will be sized to maintain the hydrology of the wetlands associated with Penhorn Creek so as not to affect the aesthetics of the Project area.
- Emergent wetland with nexus to Hudson River – Upon completion of construction, the temporary access road will either be removed, topography restored within the drainage and the area stabilized and seeded to restore a vegetated wetland; or the access road will remain in place to be used as maintenance access for the HBLR. The 0.4 acres of impacts to this wetland will be mitigated through the purchase of mitigation credits.
- Hudson River – Temporary increases in suspended sediment during construction may impact aesthetics of the water column in the Hudson River immediately surrounding the construction site; however, once construction is complete and sediment disturbing activities cease, aesthetics of the water column are anticipated to return to pre-construction conditions. The 0.7-acre elevated portion of soilcrete will not affect Hudson River aesthetics.

(f) Others as Appropriate – N/A.

(3) Effects on Biota –

(a) Primary Production, Photosynthesis, Suspension/Filter Feeders, and Sight Feeders – Increases in suspended sediment during construction could temporarily impact primary production, photosynthesis, suspension/filter feeders, and sight feeders; however, sediment suspension will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities.

(b) Actions taken to Minimize Impacts – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The plan will include measures such as the installation of silt fences, hay bales and/or fabric filters at the construction periphery, and vegetative stabilization of soils to prevent sedimentation. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Preferred Alternative's BMPs for construction. Deep soil mixing will be done within cofferdams to minimize the potential for discharges to the Hudson River, and cofferdams will not be removed until the soilcrete has hardened. A Pollution Prevention Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during sheet pile installation and deep soil mixing activities conducted from construction barges. Consultation with NMFS with respect to additional measures to minimize potential impacts to Essential Fish Habitat and anadromous fish during migration was completed on March 17, 2021. As a result of consultation with NMFS, FRA will not conduct in-water construction activities, such as installation and removal of cofferdam structures, from January 21 through June 30 to minimize potential impacts to overwintering and migrating striped bass and to migrating anadromous species such as alewife and blueback herring. Once the cofferdams are completed, activities associated with the deep soil mixing could occur and will not have the potential to adversely impact Essential Fish Habitat. Any materials containing toxic metals or organics that may be recovered will be disposed of in accordance with federal, state and local regulations.

d. Contaminants –

(1) Total Suspended Solids –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation (and associated contaminants) into Penhorn Creek during installation and extension of drainage culverts and other construction activities that have the potential to discharge sediment to waters that discharge to Penhorn Creek.

(b) Hudson River – Installation and removal of cofferdams may result in temporary increases in suspended sediment containing low to moderate levels of contamination. Any sediments and associated contaminants resuspended during installation and removal of the cofferdams will be expected to be localized and will dissipate quickly with the tidal currents. Resuspended sediment will be expected to settle out over sediment with similar levels of contamination, and thus will not result in adverse impacts to sediment quality. Ground stabilization through deep soil mixing will be contained within the cofferdams and will not result in increased turbidity or contaminant resuspension in the river. Additionally, cofferdams will not be removed until the soilcrete is hardened. The deep soil mixing will result in alteration of the sediment characteristics from soft bottom to soilcrete within the 3-acre low-cover area.

Actions taken to Minimize Impacts – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Proposed Project's Best Management Practices (BMPs) for construction. A Pollution Prevention Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during king and sheet pile installation and deep soil mixing activities conducted from construction barges. Any materials containing toxic metals or organics that may be recovered will be disposed of in accordance with federal, state and local regulations.

e. Aquatic Ecosystems and Organisms Determination –

(1) Effects on Plankton, Nekton, and Benthos –

(a) Penhorn Creek – There will be a permanent loss of 4 acres of emergent wetlands that will result in adverse effects on plankton, nekton, and benthos within this footprint. These adverse effects will be offset through the purchase of wetland mitigation credits within the same 8-digit Hydrologic Unit Code (HUC-08) watershed, as outlined in the "Conceptual Compensatory Mitigation Plan."

(b) Hudson River - The 3-acre low cover area within the Hudson River of fine-grained silt/clay sediments will be permanently lost to infaunal macroinvertebrates and the species that prey on them. This area will initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete. Approximately 2.3 acres of soilcrete will be level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete at sedimentation rates typical of the Lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates. The remaining 0.7 acres will be elevated above the existing river bottom. The entire 3 acres will be monitored for 5 years post-construction to assess its recovery as fish foraging habitat. In addition to the monitoring, NYSDEC has requested additional mitigation for the 3 acres (consultation is ongoing). No changes will occur to the tidal regime, salinity, DO or water quality in this location. Therefore, the Proposed Project will not result in adverse effects to plankton, nekton and benthos in the Hudson River. The loss of the 0.4-acre emergent wetland with a nexus to the Hudson River will not affect plankton, nekton and benthos of the Hudson River.

(2) Effects on Aquatic Food Web –

(a) Penhorn Creek – The permanent loss of 4 acres of emergent wetlands may affect the aquatic food web along Penhorn Creek and its associated wetlands. These effects will be offset by the purchase of wetland mitigation credits within the same 8-digit Hydrologic Unit Code (HUC-08) watershed, as outlined in the "Conceptual Compensatory Mitigation Plan." The minimal loss of bottom habitat within the Penhorn Creek as a result of the Proposed Project will not result in adverse impacts to the aquatic food web. To minimize impacts to anadromous species spawning run in Penhorn Creek, no in-water or sediment generating activities and pile driving will occur between March 1 through June 30.

(b) Hudson River – The permanent loss of 3-acres of soft bottom sediment and its replacement with soilcrete will not adversely affect the aquatic food web within the Hudson River. When compared to the width and length of the river, the alteration of a 3-acre area is negligible. Additionally, sediments are expected to settle over the 2.3-acre portion of soilcrete over time, resulting in available habitat for aquatic organisms. The loss of the 0.4-acre emergent wetland with a nexus to the Hudson River will not affect the aquatic food web of the Hudson River. Consultation with NMFS with respect to additional measures to minimize potential impacts to Essential Fish Habitat and anadromous fish during migration was completed on March 17, 2021. As a result of consultation with NMFS, FRA will not conduct in-water construction activities, such as installation and removal of cofferdam structures, from January 21 through June 30 to minimize potential impacts to overwintering and migrating striped bass and to migrating anadromous species such as alewife and blueback herring. Once the cofferdams are completed, activities associated with the deep soil mixing could occur and will not have the potential to adversely impact Essential Fish Habitat.

(3) Effects on Special Aquatic Sites –

(a) Sanctuaries and Refuges – The Proposed Project site falls within one of the 15 designated Significant Coastal Fish and Wildlife Habitats, the Lower Hudson Reach. The NYSDEC designated the Lower Hudson Reach as a Significant Coastal Fish and Wildlife Habitat in part because it provides an important wintering habitat for young-of-the-year, yearling, and older striped bass. In addition, the Lower Hudson Reach is one of the few large tidal river mouth habitats in the Northeastern United States, which is part of the greater Hudson River Estuary system that supports a diverse and historically highly productive ecosystem of fish and invertebrate species (Briggs and Waldman 2002, NYDOS 1992). The permanent modification of 3 acres of bottom habitat within the Lower Hudson Reach due to the soil improvement through deep soil mixing will not adversely affect habitat for young-of-the-year, yearling and older, or spawning striped bass since striped bass spawning and larval habitat occur in fresh waters well upriver of the low-cover area. While overwintering habitat for juvenile striped bass occurs throughout the Hudson River, the highest abundance of overwintering juveniles is nearly 90 miles upstream of the study area. Likewise, the Proposed Project will not have adverse effects on aquatic habitat for other fish and invertebrate species, or on migratory birds that use the region. The permanent modification of 0.7 acres within the 3-acre low-cover area where soilcrete would be elevated above the mudline would not result in adverse impacts to aquatic biota given the ubiquity of soft-bottom habitat elsewhere in the lower Hudson River. In-water construction activities in the 3-acre soil improvement area will have the potential to result in temporary increases in suspended sediment that will be localized and expected to dissipate quickly and will not result in adverse impacts to aquatic biota. Installation of the king and sheet piles for the cofferdam structures used for the two of ground improvement will result in temporary increases in underwater noise levels that will not be expected to exceed the threshold for physiological injury to fishes. Fish will likely avoid ensonified portions of the river in proximity to the cofferdam while the piles are driven and return when in-water work is complete. The majority of the river’s width would likely remain non-ensonified during pile driving. Consultation with NMFS with respect to additional measures to minimize potential impacts to Essential Fish Habitat and anadromous fish during migration was completed on March 17, 2021. As a result of consultation with NMFS, FRA will not conduct in-water construction activities, such as installation and removal of cofferdam structures, from January 21 through June 30 to minimize potential impacts to overwintering and migrating striped bass and to migrating anadromous species such as alewife and blueback herring. Once the cofferdams are completed, activities associated with the deep soil mixing could occur and will not have the potential to adversely impact Essential Fish Habitat. The temporary loss of foraging habitat within and in the vicinity of the soil improvement area, when compared to the available suitable habitat that will still be available within the lower Hudson River, would not result in adverse effects to striped bass or other aquatic biota. In addition to occurring within a NYSDEC-designated Significant Coastal Fish and Wildlife Habitat, the project area from the shoreline of Manhattan west to the pierhead line are part of the state-designated Hudson River Park Estuarine Sanctuary. Construction in this section of the project area is limited to work below the substrate of the river and will not affect resources within the Hudson River Park Estuarine Sanctuary.

(b) Wetlands – Construction of the Preferred Alternative, including the retained embankment, access roads, culverts, and a pile-supported viaduct, will result in permanent impacts to 4 acres of emergent wetlands along the existing NEC between Allied Interlocking and the new tunnel portal. A construction access road will result to the loss of 0.4 acres of emergent wetlands in Hoboken. Prior to construction, existing culverts under the NEC surface tracks will be extended and additional box culverts installed to maintain drainage and minimize indirect permanent impacts to wetlands. A new weir will be installed downstream of the twin 48-inch culvert extension to replace the old weir that will be removed with the inoperable pump station. This new weir will maintain surface water elevations in the upstream portion of Penhorn Creek and associated wetlands. A culvert will be installed for a construction access road to the Hoboken shaft site and staging area within the small 0.4-acre wetland to maintain drainage between the portions of the wetland not directly affected by the placement of the access road. Following construction, the access road will either be removed, topography of the drainage restored and the ditch stabilized and seeded with suitable native vegetation in accordance with the SPPP; or, the road will remain in place as a permanent access road for the HBLR. Mitigation for the placement of fill in this wetland will comprise purchase of mitigation credits. Installation of erosion and sediment control measures and security fencing will temporarily impact 1.4 acres of emergent wetlands. Implementation of erosion and sediment control measures (e.g., hay bales and silt fences) in accordance with the Stormwater Pollution Prevention Plan (SPPP) required under NJPDES General Permit NJ0088323 for Construction Activity

Stormwater (General Permit 5G3) will minimize indirect impacts to wetlands due to deposition of soil and other material. Following the completion of construction, wetlands temporarily affected during construction will be restored back to original topography and stabilized in accordance with the SPPP.

(c) Mud Flats – There are no mudflats within the Project site.

(d) Vegetated Shallows – The open water areas within the wetlands surrounding the Project site, and the NYSW wetland mitigation site contain populations of floating marsh pennywort. The Project Sponsor will develop and implement a transplantation plan for the floating marsh-pennywort populations in consultation with NJDEP prior to initiating construction activities affecting Penhorn Creek.

(e) Coral Reefs – There are no coral reefs within the Project site.

(f) Riffle and Pool Complexes – There are no riffle and pool complexes within the Project site.

(4) Threatened and Endangered Species –
New Jersey:

There are no Federal threatened or endangered species or critical habitats designated by the United States Fish and Wildlife Service within the New Jersey portion of the Project area. State-listed endangered, threatened, special concern, and rare species listed by the New Jersey Natural Heritage Program as having the potential to occur near the Project site in New Jersey include glossy ibis (*Plegadis falcinellus*; special concern), little blue heron (*Egretta caerulea*; special concern), osprey (*Pandion haliaetus*; threatened), snowy egret (*Egretta thula*; special concern), yellow-crowned night-heron (*Nyctanassa violacea*; threatened), black-crowned night-heron (*Nycticorax nycticorax*; threatened), barn owl (*Tyto alb*a; special concern), and floating marsh-pennywort (*Hydrocotyle ranunculoides*; endangered). In order to minimize impacts to migratory birds with the potential to breed in the vicinity of the proposed project, vegetation clearing and/or initial placement of fill material will not occur in the primary breeding period for most bird species (April through July) and will instead occur between October 1 and March 14 (i.e., prior to or after the breeding season), to prevent birds from attempting to breed where additional construction activity would later occur. The Proposed Project will result in permanent impacts to 4 acres of emergent wetlands and associated open water habitat associated with Penhorn Creek, and there will be some potential changes in hydrology that will be minimized through the design of culvert structures and replacement of a weir that will maintain water flow. Noises generated during construction of the Preferred Alternative will likely not have long-lasting or adverse effects to threatened and species of special concern birds potentially occurring in the area. The wildlife communities in the Project area have been established under noisy existing conditions associated with the urban environment. Visual and auditory disturbances during construction would have the potential to temporarily displace some individuals of some species from the immediate vicinity of the site of activity, but the construction activities would not be expected to increase levels of disturbance to the extent that these species would altogether abandon the area. The noisiest construction activity in the New Jersey portion of the study area, including the Meadowlands surrounding Penhorn Creek, would be the impact driving of piles to support the viaduct and other portions of the surface alignment. Pile driving noise may potentially displace birds and other wildlife from the immediate surroundings. The pile driving is estimated to last approximately one year. Birds and other wildlife would instead seek alternative breeding habitat nearby, which is abundant in the marshes around Penhorn Creek and elsewhere in the greater Meadowlands area. For this reason, and because pile driving would only span the breeding season of one year, construction of the Preferred Alternative will not adversely affect the size or viability of wildlife populations.

The permanent loss of 4.4 acres wetland areas will represent a negligible reduction in the amount of such habitat available to the state-listed birds potentially in the area and will not impact the size or viability of their local populations. An abundance of interior wetland habitat surrounding Penhorn Creek will remain once the Project is in place, and glossy ibis, little blue heron, osprey, snowy egret, yellow-crowned night heron, black-crowned night heron, and barn owl will all have the same potential to occur in this area as at present. In 2019, NJDEP determined that on the basis of additional populations of floating marsh-pennywort documented in the vicinity of the project site, the Preferred Alternative would not adversely impact the local population due to the extent of suitable habitat and amount of plants that would be left undisturbed. Therefore, the Preferred Alternative would not result in adverse impacts to the floating marsh-pennywort.

<u>Hudson River</u>:
Federally-listed aquatic species that are considered by NMFS to have the potential to occur in the Hudson River near the project site include Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*). Because the lower Hudson River Estuary is used by shortnose and Atlantic sturgeon primarily for migration rather than extended occupation for feeding or reproduction, it is unlikely that construction would significantly affect these species. Atlantic sturgeon are more likely to occur in deep water habitat of the Hudson River in the vicinity of the Project site during migration to and from upriver foraging, overwintering, and/or spawning grounds. It is unlikely that individuals of either species would occur in the vicinity of the Project site except perhaps as occasional transients. The potential for project vessel interaction with sturgeon is extremely minimal, as barges will be moored-in-place in relatively deep water during in-water work, and two small vessels will be used periodically to transport personnel and materials to the site. Because any impacts to water or sediment quality associated with the Project’s in-water construction activities in the low-cover area will be localized and temporary, the deep channel habitat typically used by shortnose and Atlantic sturgeon is unlikely to be adversely

affected during construction. Increased underwater noise during installation and removal of each cofferdam will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with the potential onset of recoverable physiological injury. While cofferdams will be installed in deeper waters of the river along the margins of the deep navigation channel, the majority of the channel will not be affected by increased underwater noise generated by the Proposed Project, and sturgeon would be able to avoid the portion of the river in proximity to the cofferdams in favor of suitable habitat in the vicinity. Avoidance of the ensonified area would constitute a temporary loss of foraging habitat within the avoided section of the river. However, given the small distance a sturgeon would need to swim to avoid the ensonified area, and due to the large width of the river, this movement will not interfere with any essential behaviors. FRA received concurrence from NMFS under Section 7 of the Endangered Species Act that the soil improvement activities within the low-cover area are not likely to adversely affect ESA-listed species under following conditions: in-water construction would occur during the period of July 1 through January 20 with cofferdams installed in two sections; the area surrounded by the cofferdam would be checked for sturgeon prior to deep soil mixing and if any sturgeon become entrapped within the cofferdam area, work would cease and NOAA Fisheries would be notified; and, the cofferdams would not be removed until the improved soil is hardened.

New York:
There are no Federal threatened or endangered spices or critical habitats designated by the United States Fish and Wildlife Service within the New York portion of the Project area. State listed endangered, threatened, and special concern species listed by the New York Natural Heritage Program as having the potential to occur within a half-mile of the Project site in New York include peregrine falcon (*Falco peregrinus*; endangered) and yellow bumblebee (*Bombus* (*Thoracobombus*) *fervidus*; unlisted species identified as of conservation concern). Construction activities for the Proposed Project will occur primarily subsurface, although there will be above-ground construction at the Twelfth Avenue staging area. Neither construction activities nor the permanent operation of the Project will adversely affect existing habitats on the High Line. Therefore, there will be no loss of habitat for the yellow bumble bee. There will also be no potential impact to peregrine falcon nesting sites, which in New York City are limited to bridges and the rooftops of tall buildings. Urban peregrine falcons have a particularly high tolerance for noise and indirect human disturbance (White et al. 2002), and will not be affected by any construction activities of the Project. Urban peregrine falcons primarily prey upon rock doves (DeMent et al. 1986, Rejt 2001), whose abundance will not change as a result of the Project. Prey availability and foraging habitat therefore will not be affected. Overall, peregrine falcons will not be adversely affected by the Proposed Project and will have the same potential to occur in the Project area as at present.

(5) Other Wildlife

(a) Fish – The Proposed Project has the potential to result in temporary impacts to fish within the Hudson River during the installation of soilcrete for the in-water soil improvement. These impacts include temporary increases in suspended sediments, movement of construction vessels through the water column, shading by the barges moored-in-place at the work site, and underwater noise associated with the sheet pile cofferdam installation/removal and vessel activity. These impacts are expected to be short-term and not result in long-term adverse impacts to fish. As such, there would be no significant adverse effect to fish as a result of the Proposed Project.

(6) Actions to Minimize Impacts to Aquatic Ecosystems and Organisms – The following measures implemented by the Proposed Project will minimize impacts to aquatic ecosystems and organisms within the Hudson River:

- Use of cofferdams in the low-cover area to contain deep soil mixing activities, in accordance with best management practices for minimizing silt and as recommended by NMFS for the protection of sturgeon.
- Installation and removal of king piles and sheetpile in the Hudson River low-cover area with a vibratory hammer. Turbidity curtains will be used during cofferdam removal and cofferdams would not be removed until the improved soil has hardened.
- The area surrounded by the cofferdam would be checked for sturgeon prior to deep soil mixing. Should sturgeon become entrapped within the cofferdam area, work would cease and NOAA Fisheries would be notified.
- Sheet and king pile installation and removal would not occur from January 21 through June 30 to avoid impacts to overwintering and migrating striped bass and other anadromous fish.
- In order to minimize potential behavioral impacts to migrating subadult and adult Atlantic sturgeon, sequencing cofferdam installation so that it commences in the section closest to the shore and moves outward toward the channel.
- To minimize impacts to anadromous species spawning in Penhorn Creek, no in-water or sediment generating activities and pile driving would occur from March 1 through June 30.
- In the 0.7-acre area of the river bottom where the soilcrete would extend above the existing mudline, implementation of a five-year monitoring program following completion of construction, in consultation with USACE, NMFS, and NYSDEC, to assess recovery as fish foraging habitat. Also monitor the recovery of the remaining 2.3 acres of soilcrete for five years post-construction. Regular monitoring reports will be submitted to USACE, NMFS, and NYSDEC and will be made available on the Project website. In

addition to the monitoring, NYSDEC is requesting additional mitigation for the modification of bottom habitat within the Hudson River. NYSDEC recommendations include contribution to the Estuarium at Pier 26 within Hudson River Park or purchase of credits from the Saw Mill Creek Wetland Mitigation Bank on Staten Island. Consultation with NYSDEC is ongoing.

f. Proposed Disposal Site Determination –

(1) Mixing Zone Determination – The areas immediately adjacent to the placement of fill in Penhorn Creek for the installation of the culvert extensions, and within the footprint of the embankment and gravel access roads in the wetlands and adjacent to the 3-acre low-cover area within the Hudson River will serve as an appropriate mixing zone. It is expected that sediments resuspended as a result of the placement of fill will be minor, temporary, localized, and will settle quickly upon cessation of sediment disturbing activities.

(2) Determination of Compliance with Applicable Water Quality Standards – The Proposed Project will not adversely affect the ability for Penhorn Creek and the Hudson River to meet applicable water quality standards.

(3) Potential Effects on Human Use Characteristics –

(a) Municipal and Private Water Supplies – The project will have no effect on municipal or private water supplies west of the Palisades, in the Hudson River, or in the New York portion of the Project.

(b) Recreational and Commercial Fisheries – The New Jersey portion of the Project site does not contain recreational or commercial fisheries resources. The low-cover area is within the New York side of the Hudson River and will be approximately 1,200 feet long and 110 feet wide. A work zone, approximately 100 feet wide around the cofferdams will be established for barges and other construction equipment. Measures will be taken during construction to warn maritime traffic, including recreational boaters, of the construction zone and to ensure the continued safety of boaters. Therefore, there will be minimal, temporary effects on recreational and commercial boating on the Hudson River that will not adversely affect the river's usefulness as a recreational or commercial fisheries resource during construction. Once construction is completed, there will be no substantive change to the river that would affect fisheries. Approximately 2.3 acres of the low-cover area is expected to be covered with sediments over time that forage species can colonize.

(c) Water-Related Recreation –
Penhorn Creek is not used for water-related recreation. As stated

above, the construction zone around the low-cover area in the Hudson River will not exceed 1,200 feet long and 220 feet wide and effects on recreational activities on the Hudson River will be minimal and temporary, and will not adversely affect the river's usefulness as a recreational resource during construction. The whole width of the Hudson River is navigable and used by small human-powered watercraft including canoes and kayaks, and there are several launches in the Project vicinity. After construction of the Project is complete and the cofferdams removed, there will be no permanent impact to water-related recreation on the river.

(d) Aesthetics – During construction of the Project, construction activity will be visible in the Meadowlands in the area between County Road and Tonnelle Avenue. The activity will be visible from the parking lots and loading docks at the rear of the buildings during the construction of the new tracks and accompanying infrastructure. The Project will include a work zone within the Hudson River. The work will be conducted in two stages, the total duration for each stage would be 13 months. The total duration for the construction work in the Hudson River would be up to 26 months. At the closest point, the work zone will be about 620 feet from the Manhattan shoreline. This construction zone will include an in-water work zone enclosed by a cofferdam (barrier) extending above the water line, and barges anchored around the barrier from which work will be conducted. Viewed from the shoreline or from nearby boats, this work zone will appear similar to other equipment barges periodically moored along the Manhattan shoreline. Given the large expanse of the Hudson River and the distance from the shore, this temporary construction activity will not notably obstruct views from New Jersey or Manhattan.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves – Four parks (which all received Green Acres funding) are located in proximity to the Project's Hoboken construction staging site or local truck routes: the 19th Street Basketball Courts; 1600 Park; Harborside/Hoboken Cove Park; and the Hudson River Waterfront Walkway. Potential impacts to these parks include increased noise levels from construction and increased construction vehicle traffic. Impacts from increased noise levels will generally be temporary (noise impacts to the 19th Street Basketball Courts may occur over four years) and will not constitute adverse impacts to these parks. The Proposed Project's tunnel alignment will pass directly beneath three open spaces that are part of NJDEP's Green Acres Program: 1600 Park, Harborside/Hoboken Cove Park, and the Hudson River Waterfront Walkway. For these parks, subsurface easements must be obtained from the City of Hoboken, and approval of the subsurface easements must be obtained in accordance with the Green Acres Program. The acquisition of the easements will not have an impact on the public's access to or use of these parks. Coordination with the NJDEP Green Acres Program will occur during final design of the Proposed Project to initiate the Green Acres approval process. There are two publicly accessible open spaces near the Proposed Project alignment and construction activities in New York, Hudson River Park and the High Line. The Project will have a direct impact on Hudson River Park, as the Project's tunnel alignment will pass directly beneath the park, and portions of the park will be used for construction activities. A small area of the park will be closed temporarily during construction but all park features would continue to be accessible. Construction noise and views of construction equipment will be buffered by temporary barriers installed along the limits of construction staging. No physical disruption to the High Line will occur during construction of the Preferred Alternative. The new tunnel route would pass beneath the High Line within the concrete casing currently being constructed along the southern side of the West Side Yard, and construction activity directly beneath the High Line will occur entirely within the concrete casing structure. One portion of the High Line may experience elevated levels of noise between Monday and Friday as a result of construction, but the High Line is more heavily used on weekends, and visitors will consequently be able to enjoy the remainder of the area during the week. The Preferred Alternative's Twelfth Avenue fan plant will be located across Route 9A from Hudson River Park and across West 30th Street from the High Line. This tall new structure (its maximum height will be no more than 145 feet, less than the height of other proposed development projects in the immediate vicinity) will change the visual context of the immediate area but will be one of many new tall buildings being developed in the New York study area.

g. Determinations of Cumulative Effects on the Aquatic Ecosystem – Cumulative effects on the aquatic ecosystem as a result of the Proposed Project include the loss of 4.4 acres of emergent wetlands and associated open water habitats along the existing NEC between Allied Interlocking and the new tunnel portal, loss of 0.44 acres of emergent wetlands in Hoboken, temporary impacts to 1.4 acres of emergent wetlands and associated open water habitats, and alteration of the sediment characteristics within the 3-acre low cover area in the Hudson River. The permanent loss of 0.44 acres of wetlands will mitigated through the purchase of wetland mitigation credits, as outlined in the "Conceptual Compensatory Mitigation Plan." The Proposed Project will result in a temporary resuspension of sediments during construction in Penhorn Creek and the Hudson River (during installation and removal of cofferdams) that could temporarily affect water chemistry; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of sediment and erosion control measures, such as silt fences in the Penhorn Creek area. The installation of culverts along in the New Jersey portion of the Project area, the relocation of a portion of the Penhorn Creek tributary, and the replacement of a weir in Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. Upon completion of construction, the 3-acre low cover areas in the Hudson River will initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete, providing some foraging habitat for benthic feeders once the area is colonized. The soilcrete will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the 2.3-acre portion of the soilcrete area at sedimentation rates typical of the Lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates. The 3-acre low cover area will be monitored for 5 years post-construction; additionally, mitigation through either the purchase of mitigation credits or a contribution to the Estuarium[1] at Pier 26 within Hudson River Park will be coordinated with NYSDEC.

h. Determinations of Secondary Effects on the Aquatic Ecosystem –The Proposed Project has the potential to result in indirect impacts to the NYSW wetland mitigation site and adjacent wetlands due to changes in hydrology and hydraulics associated with the loss of wetland area and change in the discharge point from the wetland mitigation site to the adjacent wetland. Permanent impacts to the NYSW wetland mitigation site will be mitigated through the purchase of mitigation credits in consultation with NJDEP and USACE.

The viaduct will be a solid structure positioned between 18 and 19 feet above the surface of the wetlands and located immediately south of the NEC tracks. This elevation above the emergent wetland combined with the southern exposure, will allow sufficient sunlight to reach the wetland during periods of the day to support the existing plant community and minimize secondary effects to these wetlands.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation – No adaptations of the Section 404(b)(1) Guidelines were made within this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem – The §404(b)(1) Guidelines prohibit discharges of dredged or fill material into WOTUS if a practicable alternative to the proposed discharge exists that would have less adverse impacts on the aquatic ecosystem, including wetlands, as long as the alternative does not have other significant adverse environmental impacts (40 CFR § 230.10 (a)). An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology,

[1] https://www.bire.org/news/hudson-river-park-pier-26-estuarium-project-awarded-to-clarkson-university

and logistics in light of overall project purpose. This section analyzes practicable alternatives to the proposed action.

(1) Alternative 1 – No Action Alternative – Under the No Action Alternative no new passenger rail tunnel across the Hudson River would be constructed. The No Action Alternative would only implement those projects that are necessary to keep the existing North River Tunnel in service and provide continued maintenance as necessary to address ongoing deterioration and maintain service. The No Action Alternative is not a practicable alternative because it does not preserve the current functionality of passenger rail service between New Jersey and PSNY, does not repair the deteriorating North River Tunnel, and does not strengthen the NEC's resiliency to support reliable passenger rail service by providing redundant capability under the Hudson River.

(2) Alternative 2 – The Proposed Project – In order for the Proposed Project to meet the Project's purpose and need, it must maintain current levels of train service on the NEC for Amtrak and NJ TRANSIT while the North River Tunnel is being rehabilitated. To do this, the alignment of the Proposed Project's new tunnel is constrained by a number of geographic considerations, which limit the potential project alignment at its western and eastern ends, where it must connect to the NEC and the existing tracks at PSNY. Several tunnel alignment options were considered within these geographic constraints to establish a "least environmentally damaging practicable alternative." This alternative is the Proposed Project, which includes a new two-track tunnel beneath the Palisades and Hudson River connecting the existing NEC in the New Jersey Meadowlands to the existing PSNY approach tracks in New York. This alternative will have a ventilation shaft, associated fan plant building, and construction staging area on a site just east of the Palisades in Hoboken, New Jersey (with small portions of the site also located in Union City and Weehawken, New Jersey). Requirements for the Proposed Project that were analyzed prior to deciding on a Preferred Alternative are discussed below:

Meadowlands

The Project must be located within the New Jersey Meadowlands, because it must connect to the NEC, which is already located on a berm within the New Jersey Meadowlands. The track connections will be accomplished in a new interlocking (a system of switches, signals, and track connections that connects multiple tracks, so that trains can move between the tracks) that begins just east of County Road and Secaucus Junction Station in Secaucus, New Jersey. Within the Meadowlands, the new track will be located largely on a viaduct, with segments on bridges. The western end of the Meadowlands section will be closest to the existing NEC berm, since this is the area where tracks will begin to diverge from the NEC. In this area, the widened embankment will be supported by a retaining wall along its southern edge because the tracks will be close to adjacent businesses and use of a retaining wall for a widened embankment will reduce the land area needed for the new tracks. Beyond the section supported by the retaining wall, approximately 3,100 feet of the new alignment will be supported on a viaduct. A viaduct is proposed here rather than a retaining wall or berm, because the proximity of adjacent businesses limits the space available for new right-of-way and the location of Penhorn Creek and the need for new replacement drainage features in this portion of the right-of-way means that a berm is not practicable. The viaduct will then curve away from the NEC to connect to the new tunnel portal location, which is approximately 600 feet south of the existing North River Tunnel portal. The length of the alignment where this viaduct is proposed will include the rail right-of-way and an adjacent service road that will provide access during construction and serve as a vital fire/life/safety road following construction during the operational phase of the railroad. This curved portion of the new alignment that will cross through an area of wetlands, including the northern portion of the established and federally approved New York Susquehanna & Western (NYSW) Railway's wetland mitigation site.

A viaduct is proposed in this section rather than a widened embankment (as proposed earlier in the Project design) or another structure, reducing impacts to wetland and open water areas by approximately 3 acres.

<u>Hoboken</u>

The alternatives analysis conducted in coordination with the Project's NEPA review considered multiple alignments for the tunnel that would in turn have different ventilation shaft and construction staging area locations. The alignment selected best met the Project's goals and objectives because of its shorter time to implement and smaller impact on the environment and surrounding community.

The selected alignment option will result in impacts to a 0.4-acre wetland area in Hoboken, located in a drainage ditch adjacent to the north side of the Hudson-Bergen Light Rail right-of-way. This area will be filled for use as part of the Project's construction staging area. Once construction has been completed, the construction access road will either be removed, or it will remain in place for maintenance access. Other alignment options that avoided this wetland area would result in greater environmental and community impacts in other respects.

c. <u>Compliance with Applicable State Water Quality Standards</u> – The proposed placement of materials is expected to comply with the conditions anticipated to be issued by the NYSDEC and the NJDEP under Section 401 water quality certification for the project.

d. <u>Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act</u> – The proposed placement of materials is not expected to violate the toxic effluent standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act of 1973 –The proposed placement of materials will be in compliance with the Endangered Species Act. FRA received concurrence from NMFS under Section 7 of the Endangered Species Act that the Proposed Project is not likely to adversely affect ESA-listed species under NMFS jurisdiction. There are no Federally-listed species under the jurisdiction of the USFWS within the project area.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 – The Proposed Project has no potential to adversely affect any designated marine sanctuaries.

g. Evaluation of Extent of Degradation of the Waters of the United States –

(1) Significant Adverse Effects on Human Health and Welfare – The placement of materials for the Proposed Project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems – The placement of materials for the Proposed Project will not result in significant adverse effects on life stages of aquatic life and other wildlife. The permanent loss of 4.5 acres of emergent wetlands as a result of the Proposed Project along the existing NEC and in Hoboken will be mitigated through the purchase of wetland mitigation credits within the same HUC-08 watershed. The placement of materials in the Hudson River will change the elevation of 0.7 acres of substrate. The change from soft bottom to hard bottom in the 3-acre low cover area is likely to be temporary, prior to sedimentation of the surface that is expected to occur overtime. The 3-acre low cover area will be monitored for 5 years post-construction to assess its recovery as fish foraging habitat. Fill placed within the 0.4-acre emergent wetland impacted by the temporary construction access road will either be removed following construction, the area restored to the original drainage topography and stabilized with suitable native plant species; or, the road would remain in place for use by the HBLR and appropriately mitigated for through the purchase of mitigation credits. With inclusion of appropriate mitigation and enhancement measures and post-construction monitoring, the placement of materials for the Proposed Project will not result in significant adverse effects on aquatic life and other wildlife dependent on aquatic ecosystems.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity,

Productivity and Stability – The permanent loss of 4.5 acres of emergent wetlands as a result of the Proposed Project will be mitigated through the purchase of wetland mitigation credits within the same HUC-08 watershed. The placement of materials in the Hudson River will change the elevation of 0.7 acres of substrate. The change from soft bottom to hard bottom in the 3-acre low cover area is likely to be temporary, prior to sedimentation of the surface that is expected to occur overtime. The 3-acre low cover area will be monitored for 5 years post-construction to assess its recovery as fish foraging habitat. With inclusion of appropriate mitigation and enhancement measures and post-construction monitoring, the placement of materials for the Proposed Project will not result in significant adverse effects on aquatic ecosystem diversity, productivity, and stability.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Values – The placement of materials for the Proposed Project will not result in significant adverse effects on recreational, aesthetic, and economic values.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – Proposed measures are as follows:

-Culverts associated with the surface alignment are designed to avoid changes in hydrology, and therefore to minimize secondary wetland impacts due to changes in hydrology.

- Use of open grid steel grating for the access road above the Penhorn Creek tributary to minimize shading impacts.

-Replacement of the weir that will be removed with the inoperable pump station along Penhorn Creek to maintain water level elevations in upstream portions of Penhorn Creek and associated wetlands.

-Development and implementation of mitigation for direct wetland impacts in consultation with NJDEP and USACE, likely including the purchase of mitigation credits from an approved mitigation bank within the same watershed unit as the Project site.

-Implementation of erosion and sediment control measures (e.g., hay bales, silt fences, and post-construction stabilization with seeding and mulch, straw or hay) set forth in an SPPP and site-specific soil erosion and sediment control plan.

-Use of low ground-pressure vehicles and marsh matting within the Meadowlands where feasible and where required by regulatory agencies.

-Restoration of disturbed wetlands, back to original topography and stabilize with wetland vegetation, following the completion of construction.

-Inclusion of a culvert within the small wetland area in Hoboken that would be affected by the construction haul route.

-Following construction, either removal of the Hoboken haul route and restoration of topography and stabilization of soil with wetland vegetation in accordance with the SPPP; or, appropriate mitigation for the permanent use of the haul route by the HBLR.

-Implementation of erosion and sediment control measures in accordance with

the SPPP to minimize the potential for sedimentation into Penhorn Creek.
-During installation of culverts and culvert extensions in Penhorn Creek, and relocation of a portion of the Penhorn Creek tributary, use of best management measures developed in consultation with NJDEP to minimize sediment resuspension (e.g., cofferdam or turbidity curtain) while at the same time maintaining flow within the creek. To protect the anadromous species spawning run in Penhorn Creek, no in-water or sediment generating activities and pile driving will occur from March 1 through June 30.
-In the Meadowlands portion of the Project alignment (west of the Conrail / NYSW freight right-of-way) and along the off-street haul route Option 3, limit tree and vegetation clearing and/or initial placement of fill material to the period between October 1st and March 14th (i.e., prior to or after the breeding season, which is April through July), to prevent birds from attempting to breed where additional construction activity would later occur.
-Limiting pile driving within wetlands in the Meadowlands to the fall and winter to minimize impacts to breeding birds.
-Implementation of stormwater BMPs for construction of the Hoboken fan plant.
-Use of a comprehensive stormwater management system to treat Project runoff and meet all local and State requirements prior to discharge to existing drainage systems.
-Use of cofferdams in the low-cover area to contain deep soil mixing activities, in accordance with best management practices for minimizing silt and as recommended by NMFS for the protection of sturgeon.
-Installation and removal of steel sheetpile and king piles in the Hudson River low-cover area with a vibratory hammer.
-Use of turbidity curtains during cofferdam removal.
-Limiting sheetpile and king pile driving installation and removal to protect overwintering striped bass and migrating anadromous species in the Hudson River.
-Limiting any in-water or sediment generating activities and pile driving so that these activities do not occur from March 1 through June 30 to protect anadromous species spawning run in Penhorn Creek.
-In order to minimize potential behavioral impacts to migrating subadult and adult Atlantic sturgeon, sequencing cofferdam installation so that it commences in the section closest to the shore and moves outward toward the channel. The area surrounded by the cofferdam will be checked for sturgeon prior to deep soil mixing. Should sturgeon become entrapped within the cofferdam area, work would cease and NOAA Fisheries will be notified.
-Monitoring the 3-acre low cover area for five years following completion of construction, in consultation with USACE, NMFS, and NYSDEC, to assess its recovery as fish foraging habitat. In addition to the monitoring, NYSDEC is requesting additional mitigation for the modification to 3 acres of bottom habitat within the Hudson River. NYSDEC recommendations include contribution to the Estuarium at Pier 26 within Hudson River Park or purchase of credits from the Saw Mill Creek Wetland Mitigation Bank on Staten Island. Consultation with NYSDEC is ongoing.

i. On the Basis of the Guidelines. the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material (specify which) is (select one) –

(1) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

REFERENCES

Briggs, P. T. and J. R. Waldman. 2002. Annotated list of fishes reported from the marine waters of New York. Northeastern Naturalist. 9: 47-80.

DeMent, S.H., J.J. Chisolm, Jr., J.C. Barber, and J.D. Strandberg. 1986. Lead exposure in an “urban” peregrine falcon and its avian prey. Journal of Wildlife Diseases 22:238-244.

Geyer, W.R. 1995. Final Report: Particle trapping in the lower Hudson Estuary. Submitted to the Hudson River Foundation, New York, NY.

Geyer, W.R., and R. Chant. 2006. The Physical Oceanography Processes in the Hudson River Estuary. In: J.S. Levinton and J.R. Waldman (eds.) The Hudson River Estuary. Cambridge University Press, New York, NY.

Moran, M.A., and K.E. Limburg. 1986. The Hudson River Ecosystem. In: K.E. Limburg, M.A. Moran, and W.H. McDowell (eds.) The Hudson River Ecosystem. Springer-Verlag, New York, NY. pp. 6-40.

National Marine Fisheries Service (NMFS). 2016. Letter from Mark Murray-Brown, NMFS, to Sandy Collins, AKRF, re response to request for information on threatened and endangered species. December 8, 2016.

National Oceanic and Atmospheric Administration (NOAA). 2013. Current station locations and ranges. Available https://www.tidesandcurrents.noaa.gov/currents10/tab2ac4.html. Revised October 15, 2013.

New York State Department of State (NYSDOS). 1992. Significant Coastal Fish and Wildlife Habitats Program: A part of the New York Coastal Management Program and New York City’s approved Waterfront Revitalization Program.

Rejt, L. 2001. Feeding activity and seasonal changes in prey composition of urban Peregrine Falcons Falco peregrinus. Acta Ornithologica 36:165–169.

Smith, C.L., ed. 1992. Estuarine Research in the 1980s: The Hudson River Environmental Society Seventh Symposium on Hudson River Ecology.

United States Army Corps of Engineers (USACE). 2016. Report of Channel Conditions; Hudson River Channel, New York. April 13, 2016.

White, C.M, N.J. Clum, T.J. Cade, and W.G. Hunt. 2002. Peregrine Falcon (Falco peregrinus). In The Birds of North America, No. 660 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

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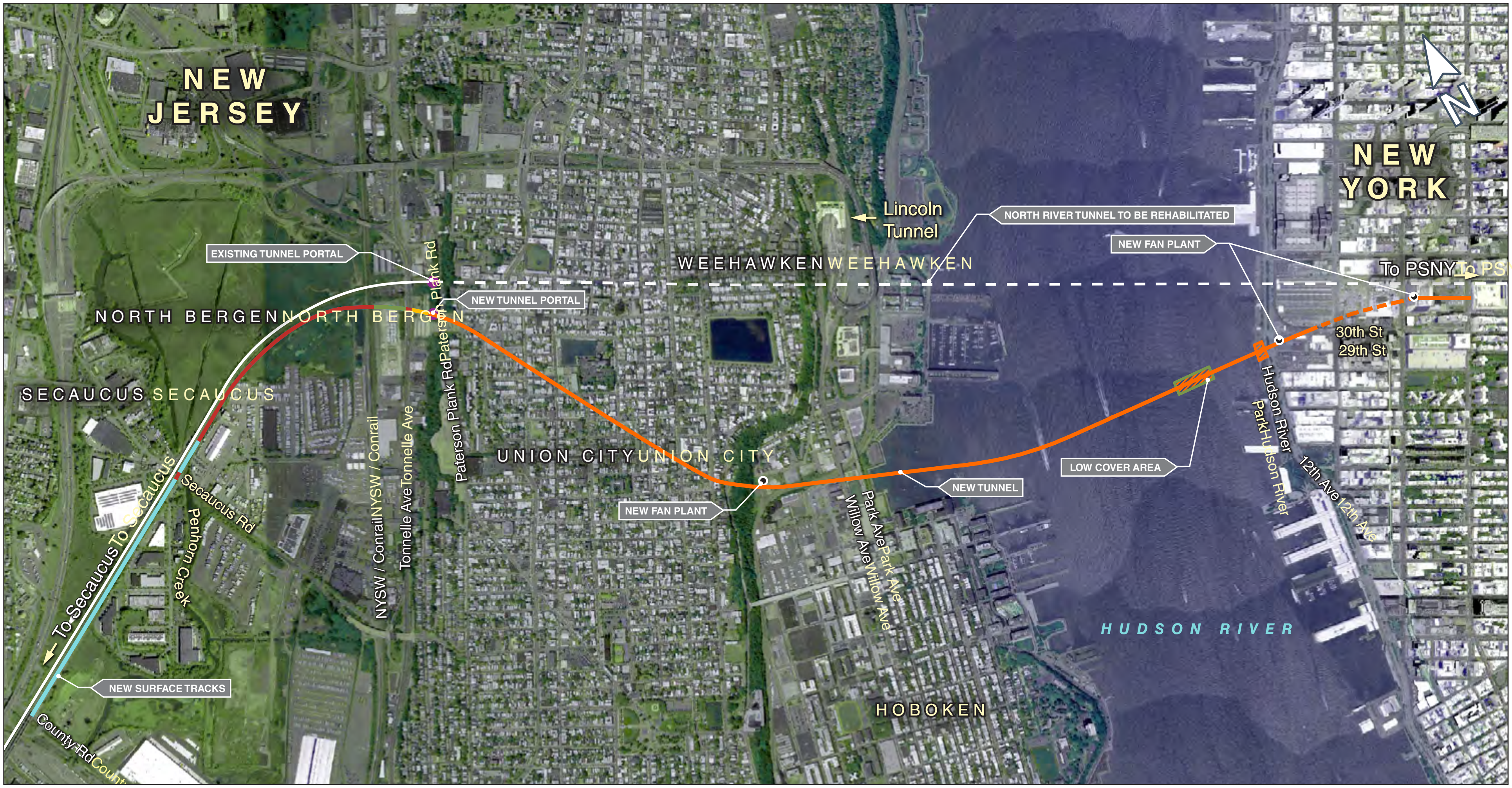

	Existing Northeast Corridor		New Surface Tracks (Viaduct)		Low Cover Area
	North River Tunnel to be Rehabilitated		New Surface Tracks (Retained Fill)	•	New Fan Plants
	Hudson Yards Right-of-Way Preservation		New Surface Tracks (Embankment)		
	Tunnel Alignment		New Surface Tracks (Retained Cut)		
	Tunnel Portal				

HUDSON TUNNEL PROJECT

Preferred Alternative
Figure 1