

F.1 INTRODUCTION

This document is the Final Environmental Impact Statement (FEIS) for the Hudson Tunnel Project. The Federal Railroad Administration (FRA) is the lead Federal agency and the New Jersey Transit Corporation (NJ TRANSIT) and the Port Authority of New York and New Jersey (PANYNJ) are joint lead agencies issuing this EIS in accordance with 23 USC § 139, the Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act (NEPA) (40 CFR Parts 1500-1508),¹ and the FRA *Procedures for Considering Environmental Impacts* (FRA's Environmental Procedures, 64 FR 28545, May 26, 1999, as updated in 78 FR 2713, January 14, 2013). Where relevant, the analyses in the EIS also meet the NEPA procedures of the two Cooperating Agencies for the Project—the Federal Transit Administration (FTA) and the U.S. Army Corps of Engineers (USACE)—including the Federal Highway Administration (FHWA) and FTA *Environmental Impact and Related Procedures* (23 CFR Part 771). The EIS also documents compliance with other applicable Federal, New Jersey and New York State, and local environmental laws and regulations. The EIS also meets the requirements of other state and local agencies from which permits or approvals may be sought. These include the New Jersey Department of Environmental Protection (NJDEP) and the New York State Department of Environmental Conservation (NYSDEC). It also meets the requirements of New York City Environmental Quality Review (CEQR), which applies to New York City agencies that may issue approvals for portions of the Project.

This FEIS incorporates analyses and conclusions presented in the Draft Environmental Impact Statement (DEIS) for the Hudson Tunnel Project completed in July 2017. FRA and NJ TRANSIT made the DEIS publicly available on July 6, 2017. FRA coordinated with the U.S. Environmental Protection Agency (EPA) to publish a Notice of Availability of the DEIS in the Federal Register on July 7, 2017, which officially opened the public comment period on the document. The public comment period remained open through the close of business on August 21, 2017, though FRA and NJ TRANSIT continued to consider comments received after that date. During the public comment period, FRA and NJ TRANSIT held three public hearings (held on August 1, 2017 in Manhattan, New York; August 3, 2017 in Secaucus, New Jersey; and August 10, 2017 in Union City, New Jersey) to accept oral comments and written comments, and also accepted written comments submitted via mail, email, and through the Project website. These hearings also served as joint public hearings for public review of the Project's permit application under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, being reviewed by the USACE. Additional information regarding DEIS public outreach is presented in Section 25.4 of Chapter 25, "Process, Agency Coordination, and Public Participation," of this EIS.

¹ This EIS was prepared in accordance with CEQ's regulations implementing NEPA (40 CFR Parts 1500-1508) from 1978, as amended in 1986 and 2005. CEQ comprehensively updated its NEPA implementing regulations effective September 14, 2020; the revised regulations apply to any NEPA process begun after that date. For NEPA reviews initiated prior to September 14, 2020, the lead Federal agency may continue to apply the prior regulations. FRA initiated the NEPA process for the Hudson Tunnel Project in 2016 with publication of a Notice of Intent (NOI) in the Federal Register, and is applying the CEQ regulations that were in effect at the time of that NOI.



F.1.1 CHANGES SINCE DEIS

In addition to incorporating revisions made based on public comments and responses, this FEIS addresses changes related to the identification of a Project Sponsor, and incorporates design refinements for the Preferred Alternative based on engineering advancement since completion of the DEIS as well as new information regarding the affected environment in and near the Project study areas that became available after public release of the DEIS. The identification of a Project Sponsor, design refinements, and new information did not include substantial changes in the proposed action that are relevant to environmental concerns, and they would not result in significant new impacts on the human or natural environment not previously considered in the DEIS. Therefore, FRA has concluded it is not necessary to prepare a Supplemental DEIS, and the environmental review of the Project should proceed with an FEIS. As such, the design refinements and new information have been incorporated into this FEIS.

The FEIS has been revised since completion of the DEIS to include the changes described in this Foreword. Each chapter includes introductory text to describe what changes are incorporated in that chapter. In addition, Section F.3 below summarizes the changes made to each chapter of the EIS following completion of the DEIS.

F.1.2 COMBINED FEIS/ROD

Traditionally, and in accordance with the CEQ regulations, the lead Federal agency issues FEIS and ROD documents separately with a minimum 30-day period between the FEIS and the ROD. However, consistent with 23 USC § 139(n), 49 USC § 24201, and 49 USC § 304a, to the maximum extent practicable, when a USDOT operating administration (including FRA) is a lead Federal agency, it must combine the FEIS and ROD unless:

- The FEIS makes substantial changes to the proposed action that are relevant to environmental or safety concerns; or
- There is a significant new circumstance or information relevant to environmental concerns that bears on the proposed action or the impacts of the proposed action.

The combined FEIS/ROD must meet applicable requirements for both an FEIS and ROD. The format of the FEIS/ROD can be flexible depending on the complexity of the action and other considerations such as accommodating the needs of Cooperating and joint lead Agencies.

The Hudson Tunnel Project FEIS does not include substantial changes to the proposed action in terms of environmental or safety concerns, nor are there significant new circumstances or information relevant to environmental concerns of the proposed action or its impacts. Therefore, FRA is using a combined FEIS/ROD for the Project.

After consultation with FRA, NJ TRANSIT, and the PANYNJ and review of the FEIS and NEPA documentation associated with the Project, FTA is issuing the ROD jointly with FRA, in accordance with the requirements of CEQ (40 CFR § 1505.2) and FTA environmental statute (23 USC § 139(n)(2)). FTA is adopting the Hudson Tunnel Project EIS pursuant to 23 USC § 139(c)(5).

The combined FEIS/ROD includes:

- Identification of the Preferred Alternative and evaluation of reasonable alternatives considered (FEIS, Chapter 2, "Project Alternatives and Description of the Preferred Alternative").
- Summary of public and agency coordination activities that have taken place since the issuance of the DEIS (FEIS, Chapter 25, "Process, Agency Coordination and Public Involvement").
- FRA's and FTA's decision to select the Preferred Alternative as the Selected Alternative and the basis of the decision (ROD, Section 2, "Decision," and Section 3, "Basis of Decision").

- Summary of mitigation measures that will be incorporated into the Project (ROD, Section 4, “Measures to Minimize Harm,” and ROD Attachment A, “Mitigation Commitments”).
- Demonstration of compliance, to the extent practicable, with all applicable environmental laws and executive orders, or provision of reasonable assurance that requirements can be met (ROD, Section 6, “Determinations and Findings Regarding Other Laws”).
- Section 4(f) evaluation and concurrence (FEIS, Chapter 24, “Final Section 4(f) Evaluation”) and Section 4(f) determination (ROD, Section 6, “Determinations and Findings Regarding Other Laws”).
- Discussion of substantive comments received on the DEIS and responses to comments (FEIS, Chapter 28, “Comments and Responses”).

F.1.3 INFORMATION PROVIDED IN THIS FOREWORD

This Foreword includes the following sections:

- F.1 Introduction
 - F.1.1 Changes Since DEIS
 - F.1.2 Combined FEIS/ROD
 - F.1.3 Information Provided in this Foreword
- F.2 Identification of Project Sponsor and Summary of Design Refinements and New Information
 - F.2.1 Identification of Project Sponsor
 - F.2.2 Design Refinements
 - F.2.3 New Information Available
- F.3 Summary of Revisions in this FEIS

F.2 IDENTIFICATION OF PROJECT SPONSOR AND SUMMARY OF DESIGN REFINEMENTS AND NEW INFORMATION

F.2.1 IDENTIFICATION OF PROJECT SPONSOR

On June 29, 2018, the PANYNJ notified FTA that the PANYNJ would serve as the applicant for a grant under the FTA Capital Investment Grant Program, and NEPA Project Sponsor (see **Appendix 1** of this FEIS). On August 17, 2018, the PANYNJ formally notified the FRA about its intent to serve as NEPA Project Sponsor for the Hudson Tunnel Project. Pursuant to 23 CFR § 771.109(c)(2), as a local governmental entity, the PANYNJ subsequently became a joint lead agency for this FEIS. The role of Project Sponsor is defined in Section 1.1.1. of this EIS.

Prior to becoming NEPA Project Sponsor and in addition to continuing its role as a Project Partner, the PANYNJ was a Participating Agency for the DEIS that provided support and assistance to the Project Partners² during development of the preliminary engineering and planning for the Hudson Tunnel Project’s design. In becoming a joint lead agency, the PANYNJ is relying on the efforts of FRA and NJ TRANSIT to date and concurs with the conclusions of this FEIS.

This FEIS clarifies where and how FRA, NJ TRANSIT, and/or the PANYNJ led analyses, made or concurred with impact determinations, hosted and/or participated in public and/or agency meetings, and served in any other capacity in the NEPA process.

² NJ TRANSIT, Amtrak, and the PANYNJ, who are working together to advance the Hudson Tunnel Project, are referred to in this EIS as the Project Partners.



F.2.2 DESIGN REFINEMENTS

Since publication of the DEIS, the Preferred Alternative has changed from what was presented in the DEIS as a result of design advancement and changes made in response to comments received on the DEIS. Amtrak has continued to advance the design of the Preferred Alternative, including incorporating design refinements based on further engineering analysis and information, resulting in some modifications to the design presented in the DEIS. In addition, FRA and NJ TRANSIT, in response to concerns raised during the public comment period and working with Amtrak, have identified ways to reduce the impacts of Project construction, including impacts on local communities near the construction staging areas in New Jersey and New York. Environmental effects of all design refinements are examined in Chapters 5 through 24 of this EIS, and summarized in the descriptions below.

The design refinements since completion of the DEIS include the following (see also **Figures F-1 and F-2**).

F.2.2.1 SURFACE ALIGNMENT IN THE MEADOWLANDS, NEW JERSEY

F2.2.1.1 Track Support Structure Through the Meadowlands

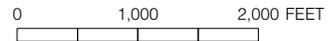
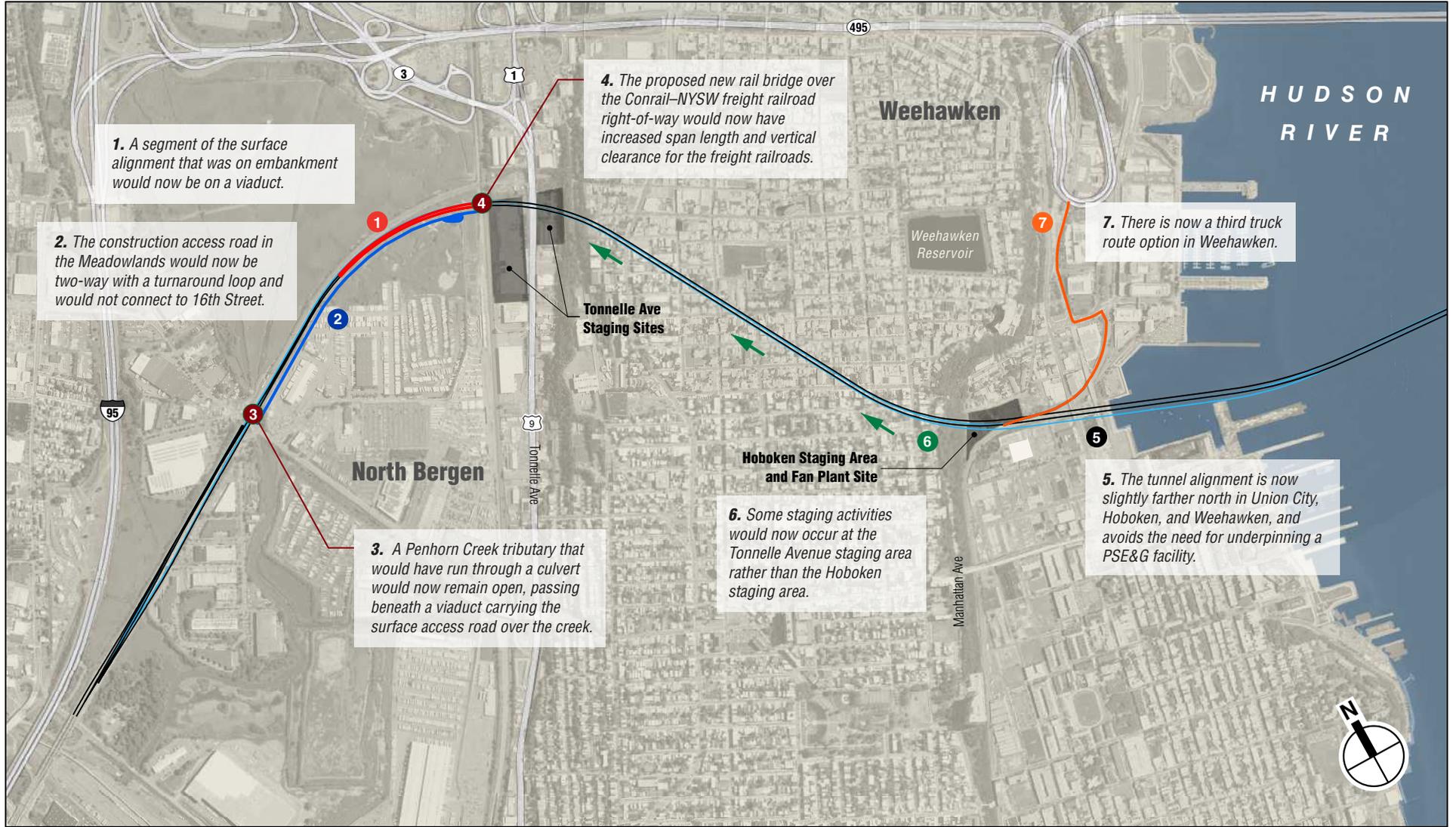
As described and analyzed in the DEIS, the Preferred Alternative included a new surface alignment alongside the existing Northeast Corridor (NEC) between County Road in Secaucus, New Jersey, and the freight railroad right-of-way used by Conrail and the New York, Susquehanna & Western Railway (NYSW) in North Bergen, New Jersey. East of Secaucus Road, the surface alignment was on a viaduct that transitioned to an approximately 1,900-foot-long sloped embankment as the alignment curved away from the NEC through an undeveloped wetland area. The sloped embankment connected to a bridge across the freight rail right-of-way.

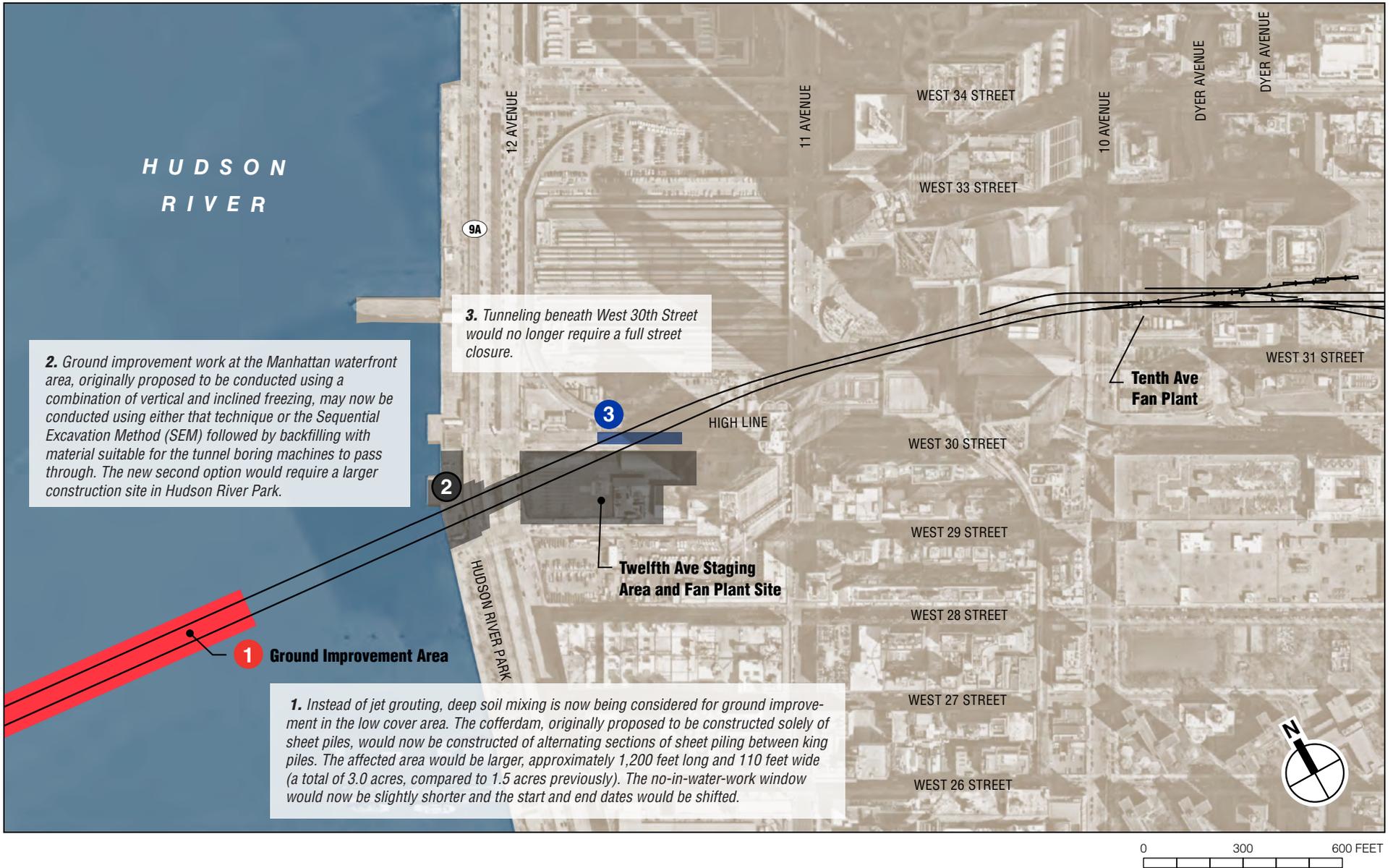
With the design refinement, the Preferred Alternative now replaces the sloped embankment that was between Secaucus Road and the freight rail right-of-way with a viaduct structure at the same height as the previously proposed embankment. This design refinement was made as a result of advanced design, to reduce long-term maintenance issues and costs and to reduce impacts on wetlands. Sloped embankments in soft soils have the potential for settlement and therefore this embankment would have required reballasting over time, which could have led to high ongoing maintenance costs. The new viaduct would reduce the impacts of the Preferred Alternative on wetlands and the overall footprint of the Preferred Alternative there, since a viaduct requires less right-of-way than a sloped embankment.

F2.2.1.2 Temporary and Permanent Access Road for Surface Alignment through the Meadowlands

The design presented in the DEIS included an access road along the southern side of the new surface alignment in the Meadowlands between Secaucus Road and the Conrail–NYSW freight railroad right-of-way. The road would be used both to provide access during construction and as a permanent access road for the new tracks. This permanent road connected to Secaucus Road on the west and to a temporary construction road on the east. That temporary access road began at the end of 16th Street in North Bergen, which is a road that provides access to industrial properties east of Secaucus Road in the Meadowlands. The temporary access road ran through NYSW's lumber reload facility beside the NYSW freight rail right-of-way.

With the refined design, Amtrak shifted the permanent access road northward to run beside the viaduct and eliminated the temporary access road through the NYSW lumber reload facility. Instead, construction vehicles would use a turnaround feature near the freight railroad right-of-way to return to the roadway network via the permanent access road along the viaduct structure, in the same direction from which they came, eliminating the need to have a temporary access road





through the lumber reload facility. This design refinement was made in response to a comment from NYSW regarding the impact to the railroad's lumber reload facility; the design refinement eliminates the impact.

F2.2.1.3 Penhorn Creek Tributary

The DEIS design included a 300-foot-long box culvert to convey a waterway in the Meadowlands, a tributary of Penhorn Creek, beneath the proposed access road in that area. During review of permit applications for the Preferred Alternative, NJDEP provided comments on this culvert. To address those comments, the culvert is no longer included and instead, a portion of the Penhorn Creek tributary would be relocated slightly to the south in a new, trapezoidal channel with a natural bottom. An inoperable pump station on Penhorn Creek would be demolished and removed, and the existing Penhorn Creek weir just south of the NEC alignment would be removed and replaced with a new weir south of the culvert carrying Penhorn Creek. With this design change, the Penhorn Creek tributary would remain open, and the new surface access road would pass over the creek on a viaduct with an open steel grate surface to allow light to reach the waterway. This design modification would reduce Project impacts on the Penhorn Creek tributary.

F2.2.1.4 Bridge over Freight Tracks

The refined design includes modification to the proposed new rail bridge over the Conrail–NYSW freight railroad right-of-way to increase span length and vertical clearance for the freight railroads, in response to comments from Conrail and NYSW. This would reduce Project effects on freight rail operations at this location.

F.2.2.2 NEW HUDSON RIVER TUNNEL AND ASSOCIATED CONSTRUCTION ACTIVITIES IN NEW JERSEY

F2.2.2.1 Subsurface Tunnel Alignment

The DEIS considered a subsurface tunnel alignment in New Jersey that passed directly beneath a recently constructed PSE&G substation building in Hoboken, between Clinton and Willow Avenues south of the Hudson-Bergen Light Rail (HBLR) tracks. The DEIS noted that this building would need to be underpinned during construction.

As the Project design advanced after completion of the DEIS, Amtrak further developed the construction techniques that would be required to underpin and protect the PSE&G substation building. Because of the sensitive nature of the building and its deep foundation supports, extensive underpinning would be needed that would be complex, risky, time-consuming, and disruptive to the surrounding area. As a result, FRA, NJ TRANSIT, and the other Project Partners, in consultation with PSE&G, determined that the subsurface tunnel alignment for the Preferred Alternative should avoid underpinning work to the maximum extent practicable. As such, Amtrak adjusted the underground alignment by shifting it northward approximately 30 feet so that the alignment would no longer pass beneath the substation building, and no underpinning would be required. This would also shift the below-grade Hoboken ventilation shaft approximately 28 feet farther north. The location of the Project's permanent Hoboken fan plant would remain unchanged. The shift in the alignment would result in small changes to the specific subsurface property easements required in Union City, Weehawken, and Hoboken.

F2.2.2.2 Construction Staging and Sequencing Approach in New Jersey

The DEIS described and analyzed a proposed construction sequencing and staging approach for the new Hudson River Tunnel in which construction would occur at two sites in New Jersey: the Tonnelle Avenue staging area on Tonnelle Avenue in North Bergen, and the Hoboken staging area at the border between Hoboken and Weehawken adjacent to the Shades neighborhood of Weehawken. Construction of the segment of the new Hudson River Tunnel under the Palisades



(i.e., between Tonnelle Avenue and the Hoboken ventilation shaft) would be staged from the Tonnelle Avenue staging area in North Bergen, and construction of the segment of the new tunnel under the Hudson River (i.e., between the Hoboken ventilation shaft site and Manhattan) would be staged from the Hoboken staging area in Hoboken, which is adjacent to Weehawken. This sequencing approach would have allowed the Palisades tunnel segment and the Hudson River tunnel segment to be constructed simultaneously, which could have allowed two different Project contractors to construct the two different tunnel segments.

In the construction approach described in the DEIS, a maximum of 21 trucks per hour would arrive at and then depart from the Tonnelle Avenue staging area bringing supplies and materials and removing excavated rock and soil, and a maximum of 16 trucks per hour would arrive at and then depart from the Hoboken staging area bringing supplies and materials and removing excavated soil. Construction activities at the Tonnelle Avenue staging area would last 11 years (including support for the new Hudson River Tunnel and for rehabilitation of the existing North River Tunnel). Construction activities at the Hoboken shaft site in this approach would last seven years (including construction of a vertical shaft from the surface to the tunnel, construction of the river segment of the Hudson River Tunnel, and construction of a new ventilation fan plant).

During the public comment period, residents of the Weehawken neighborhood adjacent to the Hoboken staging area—an area that is known as the Shades—and neighboring communities submitted numerous comments. Residents were primarily concerned about the intensive construction activity proposed in close proximity to their neighborhood over a seven-year period, about the timeframe for daily construction activities on the site, and about the heavy truck traffic through Weehawken, where many intersections are congested throughout the day. To address the concerns raised by residents and elected officials in Weehawken and nearby communities, FRA and the Project Partners have developed a revised construction staging and sequencing approach that will reduce the impact to local residents near the Hoboken staging area without substantially increasing impacts to other communities and resources or affecting the Project's effectiveness in meeting its purpose and need. FRA and NJ TRANSIT presented conceptual information about this revised construction approach to residents of Weehawken, North Bergen, and nearby areas at two public meetings held, after the close of the public comment period, in Weehawken (January 18, 2018) and North Bergen (January 30, 2018).

With the revised construction staging and sequencing approach, most construction activity related to building the new segment of tunnel beneath the river would be shifted from the Hoboken staging area to the Tonnelle Avenue staging area; a single Project contractor would construct the Palisades and Hudson River segments of the tunnel sequentially, moving from west to east, rather than simultaneously. Excavated materials would be removed from the tunnel and deliveries would be made to the tunnel primarily through the Tonnelle Avenue staging area. At the Hoboken staging area, construction activities would still be required to create the vertical shaft at the site that would become a ventilation shaft and emergency access point for the new Hudson River Tunnel, to support the tunneling activities that are occurring primarily at Tonnelle Avenue, and to build the ventilation fan plant above the shaft. In this approach, a maximum of 26 trucks per hour would arrive at and then depart from the Tonnelle Avenue staging area bringing supplies and materials and removing excavated rock and soil, and a maximum of 8 trucks per hour would arrive at and then depart from the Hoboken staging area bringing supplies and materials and removing excavated soil.

The revised construction staging and sequencing approach would substantially reduce the level of construction activity at the Hoboken staging area, to address concerns raised by the residents and elected officials of nearby communities. As part of this approach, peak trucking activity would be reduced from 16 trucks per hour to a maximum of 8 trucks per hour in each direction. At the same time, the revised construction approach would not substantially increase impacts to other

communities. While the revised approach would shift some construction activity to the Tonnelle Avenue staging area, it would not alter the overall character of activities at Tonnelle Avenue that FRA and NJ TRANSIT analyzed in the DEIS. In either the DEIS approach or the modified approach, a total of 11 years of construction activities would occur at the Tonnelle Avenue staging area. In either the DEIS approach or the modified approach, noise levels exceeding FTA's criteria for construction noise impacts would occur as a result of these construction activities, including truck movements, at residences above the Tonnelle Avenue staging area and associated truck route. Both the DEIS approach and the modified approach would result in traffic impacts at intersections along Tonnelle Avenue resulting from trucking activities, with the same intersections adversely affected.

Weehawken residents were also concerned about the hours of construction at the Hoboken staging area presented in the DEIS, which involved two shifts each weekday extending to 11 PM. The revised construction approach proposes trucking activities at the Hoboken staging area that will not extend past 10 PM. As the Project design advances, the Project Sponsor, in cooperation with the other Project Partners, will continue to evaluate whether construction hours can be reduced further, at least for some of the construction activities, without adversely affecting the Project's overall schedule.

F.2.2.2.3 Truck Routes Through Weehawken

The DEIS described and analyzed two potential routes that could be used by trucks to arrive at and depart from the Hoboken staging area ("haul routes"). These routes, referred to as haul route Options 1 and 2, would use a combination of local roads, including the service roads beside the Park Avenue and Willow Avenue viaducts between 19th Street and the HBLR, and a new off-street haul route along the north side of the HBLR right-of-way between Park Avenue/Willow Avenue and the staging area. Both routes would also use 19th Street and JFK Boulevard East to reach the regional highway network.

In response to comments from residents and elected officials from Weehawken, FRA and the Project Partners have identified a third possible truck route option that would shift trucks away from local roads and the Shades neighborhood. This route, haul route Option 3, would use the same new off-street route for trucks along the north side of the HBLR right-of-way, and would follow the HBLR right-of-way all the way to 19th Street without using Willow Avenue or Park Avenue. This would shift trucks away from local roads for a longer distance than Options 1 or 2. The three potential truck routes are shown in Figure 3-7 in Chapter 3, "Construction Methods and Activities." All three haul route options are evaluated in the FEIS. The potential new truck route would result in reduced traffic impacts relative to the other proposed haul routes, and would shift construction-related noise impacts from residences near Willow Avenue and Park Avenue to the new residences at 800 Harbor Boulevard.

In this area, the DEIS described that NJDEP was proposing its Rebuild by Design project, which included a new flood wall running along the south/east side of the HBLR right-of-way. Since completion of the DEIS, the Rebuild by Design project has advanced and now the proposed flood wall will run along the south side of the HBLR and then cross to the north/west side of the tracks close to 19th Street. This would occupy some of the area planned for the Option 3 truck route and could make the Option 3 truck route infeasible. The Project Partners are evaluating how to accommodate the presence of the floodwall in conjunction with use of haul route Option 3 and will continue to investigate the utility of this truck route option given the conflict with the final alignment NJDEP selected for the Rebuild By Design flood wall.

F.2.2.3 CONSTRUCTION IN THE HUDSON RIVER

The DEIS described a proposed technique for hardening the river bottom close to the Manhattan shoreline where the new Hudson River Tunnel would be relatively shallow beneath the riverbed.



Hardening the river bottom in this area would facilitate use of a Tunnel Boring Machine there and ultimately, protect the tunnel below the river bottom. In that area, the DEIS described enclosing the work zone in the river within a cofferdam—a temporary, watertight structure that would isolate the water affected by construction from the surrounding river water. To create the cofferdam, construction workers would drive sheet pile walls (i.e., steel sheet sections with intersecting edges) into the river bottom from adjacent barges, similar to pile driving. The construction workers would then harden the river bottom within the cofferdam, by injecting a mix of cement grout, water, and compressed air at high pressure to mix with and partially replace the soil. This technique is referred to as jet grouting. In the DEIS design, the area where jet grouting would harden the river bottom would be approximately 550 feet long and 120 feet wide (a total of 1.5 acres) and would begin approximately 200 feet west of the New York pierhead line, extending westward into the Hudson River's main navigational channel. The jet grouting area would affect approximately 100 feet of the main navigational channel that the USACE maintains in the Hudson River and approximately 450 feet of the adjacent “wing” channel, a navigation channel the USACE maintains at a shallower water depth.

Based on further analysis during Project engineering, the Project Partners are now proposing modifications to the Project construction activities in the Hudson River from what FRA and NJ TRANSIT described and evaluated in the DEIS:

- **Addition of king piles to proposed cofferdams:** The Project Partners are now proposing that the cofferdams in the Hudson River consist of alternating sections of sheet piling between king piles, which are large-diameter, hollow cylindrical steel piles that provide additional strength and stability to larger cofferdam structures. Construction workers on barges would use vibratory hammers to drive the cofferdam piles (including sheet piling and king piles) into the river bottom.
- **Use of a different technique for hardening the soil:** The Project Partners are now proposing a technique known as deep soil mixing to harden the soil 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. Like jet grouting, this technique creates soil-cement with greatly increased strength and reduced compressibility.
- **Protection of a larger area:** Based on additional engineering assessments since completion of the DEIS as well as information from geotechnical borings from the river bottom, 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 (a total of 3.0 acres, compared to 1.5 acres with the DEIS design). This would affect approximately 600 feet of the USACE's main navigation channel and 600 feet of the wing channel. During construction, the affected area in the Hudson River's main navigation channel would increase from 200 feet to 600 feet, but the majority of the main navigation channel (which is approximately 2,000 feet wide in the affected area) would remain open for navigation. FRA is coordinating with the USACE and the U.S. Coast Guard (USCG) regarding the increased encroachment on the main navigation channel to minimize any potential adverse impacts on navigation during construction.

The expanded in-water construction activities for the Preferred Alternative would not extend east of the pierhead line, which is the boundary of Hudson River Park in New York City; however, the in-water work would be fairly close (70 to 100 feet from the park boundary (pierhead line)), and boaters moving between the navigation channel and the park's boathouse at Pier 66 and nearby moorings would need to avoid the construction zone, which may be inconvenient but would not limit boaters' access to and from the channel. While this proximity may be inconvenient, it would not result in proximity impacts that would substantially impair the recreational features of the boathouse or the moorings.

- **Modified staging approach for in-water construction work:** In the design analyzed in the DEIS, the construction work in the Hudson River to harden the river bottom along the tunnel alignment would occur in three separate stages to minimize the area of the river that is disturbed at any one time. Each stage would begin immediately after the conclusion of the previous stage. Stages 1 and 2 of the in-water work would each take approximately 4.5 months to complete, and Stage 3 would take approximately 3.5 months. Including time for mobilization and demobilization, the total duration of the in-water work for the DEIS design would be 15 months.

With the design modifications, based on preliminary design, the Project Partners are proposing to conduct the in-river work in two stages, each 600 feet long. If construction workers conduct the work in two stages, the total duration for each stage would be 13 months, or 26 months total. If the work is conducted with the two stages overlapping, the total duration for the construction work in the Hudson River would be up to approximately 25 months, 10 months longer than with the DEIS design. The Project Partners will continue to refine the design for the in-river work, in coordination with the USACE and in consultation with the National Marine Fisheries Service (NMFS), to minimize the potential for adverse construction impacts in the Hudson River and will identify the final staging approach in coordination with the USACE and USCG. More information on this change to the Project is provided in Chapter 3, "Construction Methods and Activities," Section 3.3.5.

- **Modified dates when installation and removal of the cofferdams could occur:** The DEIS design also specified that installation or removal of the cofferdam sheet pile would not occur between November 1 and April 30 (the "no-work window"), to minimize the potential for adverse impacts to aquatic species in the Hudson River that are overwintering and migrating during that time, as recommended by NMFS during consultation pursuant to Section 7 of the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act, which establishes and protects Essential Fish Habitat (EFH). The no-work window would not apply to work conducted within the cofferdam once it is completely installed; work inside the completed cofferdam could occur at any time of the year. Based on further consultation with NMFS following completion of the DEIS, the Project Partners are now proposing a no-work window of January 21 to June 30.

FRA conducted ongoing consultation with NMFS regarding these changes to the Project design and their potential for effects on EFH and species protected under Section 7 of the ESA as well as designated critical habitat. In several emails and letters in March 2018 and March and April 2021, NMFS concurred that the revised Project would not adversely affect EFH and may affect, but is not likely to adversely affect, any species listed as threatened or endangered or any critical habitat. Through this consultation, NMFS did not request any additional mitigation beyond what was described in the DEIS

F.2.2.4 CONSTRUCTION IN NEW YORK

F2.2.4.1 Ground Improvement in the Manhattan Waterfront Area

The DEIS described a proposed technique for ground improvement along the tunnel alignment in the Manhattan waterfront area, including in Hudson River Park, to harden the soil. This would allow construction workers to excavate the tunnel alignment beneath the surface rather than through cut-and-cover excavation. To harden the soft soils between the Manhattan bulkhead and the Twelfth Avenue shaft site, the DEIS described a vertical ground freezing approach. With this approach, construction workers would use a combination of grouting and ground freezing, a technique that involves installation of a network of underground pipes and then circulation of a freezing agent through the pipes until the ground around the pipes freezes solid. The freezing agent would be chilled at one or more freeze plants, typically in work trailers nearby, and would



circulate from the freeze plants, through the pipes, and back to the freeze plants again for recharging.

With the DEIS design for the Manhattan waterfront area, construction workers would install freeze pipes oriented vertically or diagonally from the ground surface on both sides of Twelfth Avenue (New York State Route 9A) and in the roadway median, as well as in portions of the West 30th Street Heliport in Hudson River Park. This ground freezing approach would require short-term disruption to portions of Twelfth Avenue to allow construction workers to install the pipes and short disruptions to Twelfth Avenue, including the Route 9A bikeway, and the Hudson River Park walkway to allow workers to dig a trench across; the trench would be decked over immediately to allow the roadway/bikeway and walkway to reopen. This construction activity would require that a portion of the West 30th Street Heliport be used as a construction staging area. The heliport's fueling facility, including two fueling pads; one landing pad; and the heliport's southern driveway and parking area, would be closed to accommodate the staging area. In addition, the DEIS described that during installation and removal of the freeze pipes (a total duration of nine months), a portion of the Hudson River Park walkway (half the width of the walkway for about 150 linear feet) would be closed. With the DEIS design, construction activities affecting the Manhattan waterfront area would last approximately 1.5 years.

Based on further analysis during Project engineering, Amtrak is now considering a second option for ground improvement in the Manhattan waterfront zone, using an underground mining technique called Sequential Excavation Method (SEM) in combination with ground freezing and grouting. The FEIS describes and evaluates both design options for ground improvement at the Hudson River waterfront. This will provide design and construction flexibility as the Project progresses after the completion of the NEPA process. Using SEM techniques in this section of the tunnel alignment would reduce the risk associated with tunneling through the Manhattan bulkhead by allowing construction workers to remove portions of the bulkhead structure within the tunnel horizon by using excavators, rather than having this structure in place when the large Tunnel Boring Machines being used to construct the underground tunnels reach this point of the tunnel alignment.

With this second design option, there would be a temporary construction shaft in the southern part of the West 30th Street Heliport. The temporary shaft would be directly above the alignment of the new tunnel's new tubes, so that it could provide access to the tunnel alignment. It would be situated near the bulkhead, but not directly above the bulkhead's foundation, which slopes eastward underground from the water's edge. The shaft would be approximately 110 feet long, to encompass both tubes of the new tunnel, and 25 feet wide, to provide enough space for workers and materials to enter and exit.

Prior to SEM excavation, workers would conduct ground improvement using a combination of grouting and ground freezing, with freeze pipes installed horizontally from within the temporary construction shaft at the heliport and possibly also in vertical or diagonal orientations, as with the first design option described above. Once the tunnel alignment has been treated through freezing and grouting, the temporary shaft at the heliport would be the starting point for SEM tunnel excavation toward the bulkhead and toward Twelfth Avenue. This second design option would have the same duration as the first option, 1.5 years.

During excavation of the shaft at the heliport and subsequent construction activities there, trucks would enter and leave the heliport, crossing the Route 9A bikeway and the park's walkway, to deliver materials and remove soils. At the heliport, two landing pads and the fueling facility (consisting of an above-ground fueling tank and two fueling pads) in the southern part of the heliport, as well as the southern heliport driveway and parking area, would need to be closed to accommodate the construction shaft and staging area. Thus, this option would affect one more landing pad than the ground freezing option discussed in the DEIS.

During the public review period on the DEIS, the Hudson River Park Trust (HRPT) provided comments about the importance of the West 30th Street Heliport in providing revenue for the park. In their comments, HRPT noted that if heliport operations are adversely affected and this affects the payments that the heliport operator makes to HRPT, this could in turn adversely affect HRPT's ability to maintain Hudson River Park. The Project Sponsor, in cooperation with the other Project Partners, will coordinate with the heliport operator and HRPT to minimize disruption to the heliport operation to the extent practicable.

The use of SEM in combination with ground freezing would also affect a larger portion of the paved pedestrian walkway in Hudson River Park: the full width of the walkway for approximately 200 linear feet (an area about 20 feet wide and 200 feet long, or 4,000 square feet) would be closed and incorporated into the adjacent construction staging site. To allow continued walkway access, an 8-foot-width of the adjacent Route 9A bikeway would be converted into a temporary walkway. This would narrow the bikeway from 15 feet to 10 feet for the length of the staging area, about 200 feet. Pavement markings would separate the walkway from the bikeway.

F.2.2.4.2 Construction Activities in West 30th Street

In the DEIS, FRA and NJ TRANSIT described and evaluated a construction staging approach in New York in which the new tunnel would be constructed across West 30th Street using cut-and-cover construction. Based on further engineering and in consideration of comments from the New York City Department of Environmental Protection regarding the Project's potential impacts on a large sewer main located under West 30th Street, Amtrak is now proposing a modified construction approach for the tunnel under West 30th Street. With the new construction approach, the new tunnel would be constructed using SEM. The soils around the tunnel alignment would require ground treatment prior to tunneling to improve the soil strength. Construction workers would conduct the ground treatment from the surface in both vertical and diagonal orientations. Some excavation from the surface would occur first, for temporary relocation of the sewer main onto the Twelfth Avenue staging area in advance of tunnel construction. After tunnel excavation is complete, the sewer would be returned to West 30th Street. Both construction options remain under consideration. The FEIS assesses the potential impacts of both options to provide design and construction flexibility as the Project progresses after the NEPA process is complete.

The DEIS described that cut-and-cover construction in West 30th Street would involve full closure of the street at the construction zone for up to three years. During ongoing consultation with Project stakeholders, representatives of Manhattan Community Board 4 raised concerns about disruptions to traffic from a full closure of West 30th Street, which provides a connection from Twelfth Avenue to the Dyer Avenue entrance to the Lincoln Tunnel. As a result, the Project Partners now anticipate that at least one lane of West 30th Street would remain open throughout construction (other than the potential for short-term outages of up to several days related to sewer relocation).

F.2.2.5 CHANGE TO PROJECT CONSTRUCTION SCHEDULE

The DEIS presented the Project Partners' anticipated schedule for construction of the Hudson Tunnel Project. As described in the DEIS, construction of the new Hudson River Tunnel would begin in mid-2019 and be complete in mid-2026, a duration of approximately seven years. Once the new tunnel is complete and in operation, rehabilitation of the North River Tunnel would begin in late 2026 and be complete in mid-2030, a duration of approximately three and a half years.

Following completion of the DEIS, Amtrak developed a revised staging approach for construction activities in New Jersey associated with construction of the new tunnel, as described earlier (in Section F.2.2.2). This resulted in changes to the sequencing and durations of a number of proposed construction activities.



In addition, the construction start date would now occur later. As a result, the Project Partners anticipate that construction of the new Hudson River Tunnel could begin in 2022 and be complete in 2030; rehabilitation of the North River Tunnel would begin in 2030 and be complete in 2033. With the change in the start of the Project's construction, the years when peak construction activities would occur are also changed by approximately three years.

F.2.3 NEW INFORMATION AVAILABLE

In addition to the design modifications described above, new information related to conditions in the Project study area has been incorporated into the FEIS analyses.

Since completion of the DEIS, the COVID-19 global health crisis has resulted in substantial decreases in the number of people traveling by rail. This FEIS does not assess the long-term implications of the COVID-19 global health crisis, since any evaluation at this time would be speculative. This FEIS assumes that in the long-term, rail ridership will recover and return to previous levels.

The new information related to the affected environment that has been incorporated into the FEIS analyses includes the following.

F.2.3.1 CHANGES TO AFFECTED ENVIRONMENT IN PROJECT STUDY AREA

Since completion of the DEIS, some of the projects FRA and NJ TRANSIT identified in the Project study area have advanced, some are now complete, and some are delayed. In addition, NJ TRANSIT and the PANYNJ have identified several new projects that were not considered in the DEIS. These changes are incorporated in the FEIS, including the following (for more detail, see Chapter 4, "Analysis Framework," Section 4.3.3):

- **Changes in New Jersey:** New information regarding other projects that are proposed or planned for construction before or at the same time as the Preferred Alternative have been added to the analysis to consider impacts of the Preferred Alternative on, and the cumulative impacts of the Preferred Alternative with, those projects. These include the recently completed Hudson Mews development in North Bergen, the Hoboken Heights development currently under construction in Union City, the new residential building at 800 Harbor Boulevard in Weehawken, and the proposed reconstruction of the Willow Avenue bridge over the HBLR in Hoboken.
- **Changes in New York:** The discussion about buildings planned in the New York study area has been updated to reflect updated information about projects in the study area, including completion of many buildings at Hudson Yards, completion of Moynihan Train Hall; and the current status of projects now in construction on the same block where the Twelfth Avenue staging site and fan plant are proposed (the Manhattan block between Eleventh and Twelfth Avenues and West 29th and West 30th Streets, Manhattan Block 675). The discussion has also been revised to include additional projects not described in the DEIS, including the Western Rail Yard Infrastructure Project, the West 33rd Street Viaduct, the proposed High Line extension to Moynihan Train Hall, and the Empire Station Complex development project near Penn Station New York (PSNY).

In addition, the building on the east side of Tenth Avenue between West 31st and West 33rd Streets where the Tenth Avenue fan plant for the Preferred Alternative is proposed is now referred to as 450 West 33rd Street throughout the FEIS, rather than the Lerner Building as it was described in the DEIS.

F.2.3.2 AMTRAK'S NORTH RIVER TUNNEL INTERIM RELIABILITY IMPROVEMENTS PROGRAM

Given the changes to the construction schedule for the Project, in 2020, Amtrak began the North River Tunnel Interim Reliability Improvements Program to accelerate immediate maintenance and repair in the tunnel prior to its full rehabilitation. Through that program, Amtrak is examining options for a variety of repairs and improvements to the North River Tunnel with the goal of improving safety and reliability for the public over the next decade in advance of comprehensive rehabilitation. Measures that Amtrak identifies for implementation will advance into preliminary engineering, followed by construction beginning in 2022. Concepts that do not require advanced design will commence sooner.

The measures that Amtrak has identified as priorities include leak mitigation for water infiltrating the tunnel and affecting systems, which is contributing to signal failures and deterioration of metal components and cables; drainage and track improvements to address deterioration and geometry issues; implementation of an enhanced inspection and asset management program that will identify problems more quickly; detailed signal system investigations with targeted equipment replacement; stray current monitoring and mitigation; and other proactive steps in advance of problems.

Amtrak expects that targeted interventions developed through this program can temporarily mitigate many of the maintenance issues in the North River Tunnel that result in train delays and may accomplish limited permanent repairs, but they cannot deliver the comprehensive rehabilitation of the North River Tunnel contemplated as part of the Hudson Tunnel Project and necessary for the long-term preservation and safe use of the tunnel.

Based on Amtrak's evaluation, Amtrak states that the improvements that they will implement as part of the North River Tunnel Interim Reliability Improvements Program will substantially improve rail operations through the tunnel in the near term, but will not eliminate the need for a complete rehabilitation of the North River Tunnel in the long term to address safety concerns and the damage and ongoing deterioration caused by Superstorm Sandy.

F.2.3.3 POTENTIAL ALTERNATIVE APPROACHES FOR REHABILITATION OF THE NORTH RIVER TUNNEL

The DEIS described the urgent need for rehabilitation of the North River Tunnel, and the importance of conducting that rehabilitation without adversely affecting Amtrak and NJ TRANSIT service into and out of PSNY. Based on that need, the DEIS presented that a primary purpose of the Hudson Tunnel Project is to repair the North River Tunnel while maintaining uninterrupted commuter and intercity rail service.

As part of DEIS development, FRA and NJ TRANSIT conducted a multi-step alternatives development and evaluation process to identify Build alternatives that meet the purpose and need for the Project. The proposed Project, including construction of a new Hudson River Tunnel followed by rehabilitation of the North River Tunnel, was the only alternative that met the alternatives development criteria, and was identified as the Preferred Alternative in the DEIS.

Since FRA issued the DEIS in 2017, information became available about other rehabilitation approaches that might allow for rehabilitation of the North River Tunnel while it remains in service. FRA, NJ TRANSIT in its role as an operator of rail service in the tunnel, and Amtrak in its role as an operator of rail service in the tunnel and as lead for design of the tunnel rehabilitation, examined these potential approaches for the North River Tunnel rehabilitation to determine whether they met the alternatives development criteria.



The alternative rehabilitation approaches include the methodology that New York State's Metropolitan Transportation Authority used in 2019 and 2020 to conduct an in-service rehabilitation of a tunnel on the L subway line and a methodology for an in-service rehabilitation for the North River Tunnel in a 2020 review prepared for the Gateway Program Development Corporation by London Bridge Associates. Based on the specific engineering requirements for the North River Tunnel, the tunnel's heavy train volumes throughout the day, and the lack of alternative rail access from west of the Hudson River, these in-service approaches to rehabilitation cannot be reliably conducted without material delays to commuter and intercity rail service, and thus would not meet the purpose and need of the Project. For more information on these in-services approaches to rehabilitation, see Section 2.3.3.2 of Chapter 2, "Project Alternatives and Description of the Preferred Alternative."

F.2.3.4 NEW INFORMATION AFFECTING ANALYSIS OF NOISE AND VIBRATION

During the public comment period for the DEIS, residents of North Bergen commented that the noise of train horns as trains approach the North River Tunnel is intrusive and should be included in the noise analysis. At that time, Amtrak required that eastbound trains approaching the North River Tunnel sound their horns at a point approximately 1,320 feet before (west of) the tunnel portal. This was a safety requirement to protect railroad workers who might be using a pedestrian crossing close to Tonnelle Avenue, an area where Amtrak maintenance employees sometimes stage and mobilize maintenance activities. More recently, Amtrak has shifted the location where eastbound horns must sound their horns to a point closer to Tonnelle Avenue. With the Project, these requirements for trains using the North River Tunnel would remain in place and there would be no requirement for trains approaching the new Hudson River Tunnel to sound their horns, since there would be no worker crossing over the new tracks. FRA, and NJ TRANSIT revised the noise analysis for the FEIS to account for the noise of train horns as trains approach the North River Tunnel portal.

FRA and NJ TRANSIT conducted the noise analysis for the DEIS following procedures described in the FTA guidance manual, *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006. After FRA and NJ TRANSIT completed the DEIS noise and vibration analyses and issued the DEIS, FTA published a revised guidance manual (*Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018).

FRA, NJ TRANSIT, and the PANYNJ have revised the noise analysis in Chapter 12A, "Noise," using the updated methodology and information about train horn noise for trains approaching the North River Tunnel portal in New Jersey. These changes do not affect the conclusions presented in the DEIS related to noise impacts.

F.2.3.5 BASE FLOOD ELEVATION MAPPING

The assessment of the Hudson Tunnel Project's resilience to future flooding events in the DEIS described the current base flood elevations on the Federal Emergency Management Agency's (FEMA) preliminary Flood Insurance Rate Maps (FIRMs). For both the New Jersey and New York portions of the Project study area, FRA and NJ TRANSIT consulted the latest preliminary FIRMs available at that time, dated January 2015. Since completion of the DEIS, FEMA has published updated preliminary FIRM information, effective August 2019, for the New Jersey portion of the Project study area on its website. On this updated map the base flood elevation in the Meadowlands portion of the Project study area is now lower than on the 2015 map. This information is now incorporated in this FEIS.

F.2.3.6 REVISED METHODOLOGY FOR EVALUATING IMPACTS FOR PROJECT COMPONENTS IN NEW YORK CITY

The DEIS described that in preparing the analyses presented in the DEIS, FRA and NJ TRANSIT followed FRA's *Procedures for Considering Environmental Impacts* as well as other applicable guidance and regulations. In addition, whenever applicable and practicable, FRA and NJ TRANSIT conducted the analyses in accordance with local environmental review policies and guidance. In this way, this EIS will fulfill any applicable state and local environmental review requirements to support review of the document by state and local agencies from which permits or approvals are required for the Project. The analysis of Project components and elements located in New York City complied with the guidance of the 2014 *City Environmental Quality Review (CEQR) Technical Manual*. The *CEQR Technical Manual* was developed by the City of New York specifically for evaluation of the environmental impacts of projects proposed in New York, based on local conditions and issues. These criteria for adverse impacts are well suited for evaluation of effects in New York City and were therefore also used for purposes of NEPA, unless specific, more stringent NEPA criteria exist.

In 2020, New York City published a revised guidance manual, the 2020 *CEQR Technical Manual*. FRA, NJ TRANSIT, and the PANYNJ have revised the analysis in the FEIS using the updated methodology. This change does not affect the conclusions of the analyses of Project components located in New York City.

F.3 SUMMARY OF REVISIONS IN THIS FEIS

In addition to this Foreword, this FEIS includes one other new chapter, Chapter 28, "Comments and Responses." Chapter 28 summarizes the comments that were received on the DEIS during the public comment period and provides responses to those comments.

The chapters of this FEIS have been revised in response to comments on the DEIS and to reflect the design refinements and new information described above. Each chapter has been revised to reflect that the PANYNJ is currently the Project Sponsor, and to include a summary of changes to the chapter since the DEIS. The following is a summary of the additional changes reflected in this FEIS:

- **Chapter 1, Purpose and Need:** There have been no substantive changes to the purpose and need for the Project in this chapter since publication of the DEIS, but this chapter has been revised to reflect the addition of the PANYNJ as Project Sponsor and joint lead agency for the FEIS and to further clarify agency roles and responsibilities. The chapter now provides additional information about the NEC FUTURE Program and the Project's relationship to proposed capacity enhancement for the NEC, and the discussion of existing conditions in the North River Tunnel is updated.
- **Chapter 2, Project Alternatives and Description of the Preferred Alternative:** This chapter has been revised to reflect the design modifications discussed above and to address new alternatives suggested after publication of the DEIS.
- **Chapter 3, Construction Methods and Activities:** This chapter has been revised to reflect the design modifications related to construction methods and staging and sequencing discussed above.
- **Chapter 4, Analysis Framework:** This chapter has been revised to reflect the changes in the affected environment and new information discussed above.
- **Chapter 5A, Traffic and Pedestrians:** This chapter has been revised to reflect the design modifications related to construction methods and staging and sequencing discussed above.

The analyses of impacts of construction traffic on local roadways near the Tonnelle Avenue staging area and the Hoboken staging area were revised to reflect new worst-case traffic volumes associated with the revised construction staging and sequencing approach. In addition, an analysis was conducted of potential traffic impacts if construction workers park at a separate location from the Hoboken staging area. For New York, the analysis of impacts of construction traffic on local roadways was revised to reflect the design modification that will allow at least one lane of West 30th Street to remain open during construction. In addition, a pedestrian safety analysis was conducted for each study area, to respond to community comments about the potential for conflicts between construction traffic and pedestrians. The chapter has also been revised to address the change in the construction schedule for the Project.

- **Chapter 5B, Transportation Services:** There have been no substantive changes in this chapter since publication of the DEIS. Minor revisions were made to clarify text in response to comments and to describe updated current conditions in the affected environment.
- **Chapter 6A, Land Use, Zoning and Public Policy:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project (e.g., modifications to surface tracks and tunnel alignment), the changes to construction methods and staging and sequencing, and the changes in the affected environment. In addition, revisions were made in response to comments to expand and clarify the discussion related to Hudson River Park.
- **Chapter 6B, Property Acquisition:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, including the addition of a third potential haul route for access to and from the Hoboken staging area, the changes to construction methods and staging, and the changes in the affected environment.
- **Chapter 7, Socioeconomic Conditions:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. It incorporates updated information on population and employment in the study area. In addition, revisions were made in response to comments to expand and clarify the discussion related to Hudson River Park.
- **Chapter 8, Open Space and Recreational Resources:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment, including new parks now present in the study area since the DEIS was published. In particular, this chapter incorporates revisions related to the potential new construction methodology in Hudson River Park. In addition, revisions were made in response to comments to expand and clarify the discussion related to Hudson River Park.
- **Chapter 9, Historic and Archaeological Resources:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project. The chapter describes additional consultation in accordance with Section 106 that has occurred following completion of the DEIS. In addition, the discussion of mitigation measures has been updated to reflect the measures agreed to in consultation with signatories and Consulting Parties during development of the Programmatic Agreement (PA) prepared in accordance with Section 106 of the National Historic Preservation Act (Section 106).
- **Chapter 10, Visual and Aesthetic Resources:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment.
- **Chapter 11, Natural Resources:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project and the changes to construction

methods and staging. In particular, this chapter reflects the reduction in impacts to wetlands in the Meadowlands and changes to construction methods in the Hudson River. In addition, the chapter includes updated information related to consultation with resource agencies in accordance with applicable natural resources regulations.

- **Chapter 12A, Noise:** The DEIS included one chapter that evaluated both noise and vibration, Chapter 12, “Noise and Vibration.” In the FEIS, this chapter is divided into two parts (Chapter 12A, “Noise,” and Chapter 12B, “Vibration”) to simplify the discussion. In addition, the noise analysis has been revised to reflect the changes to construction methods and staging, new information related to train horn noise near the New Jersey tunnel portal, and the revised methodology described in the new (2018) FTA guidance manual, as described in Section F.2.3.4. The noise analysis is updated to include new receptors near the Tonnelle Avenue staging area and Hoboken staging area and fan plant site that were not present when the DEIS was prepared. The analysis of effects in Weehawken and Hoboken also now incorporates the potential influence of reflected noise off the Palisades cliff, in response to comments. For both New Jersey and New York, it includes more refined information on construction equipment that may be used at the construction sites. More detailed tables are provided to better explain the results related to construction impacts.
- **Chapter 12B, Vibration:** The DEIS included one chapter that evaluated both noise and vibration, Chapter 12, “Noise and Vibration.” In the FEIS, this chapter is divided into two parts (Chapter 12A, “Noise,” and Chapter 12B, “Vibration”) to simplify the discussion. In addition, the vibration analysis has been revised to reflect the changes to construction methods and staging, and the revised methodology described in the new (2018) FTA guidance manual, as described in Section F.2.3.4. The vibration analysis is updated to include new receptors near the Tonnelle Avenue staging area and Hoboken staging area and fan plant site that were not present when the DEIS was prepared. For both New Jersey and New York, it includes more refined information on construction equipment that may be used at the construction sites. It also provides revised hours when blasting could occur at residential locations in New Jersey and New York to comply with local regulations. Additional information on the proposed vibration monitoring program that will be implemented during Project construction is now described in the chapter, in response to comments.
- **Chapter 13, Air Quality:** This chapter has been revised to reflect changes to applicable regulations and the regulatory context, the design modifications related to construction methods and staging, and more refined information on construction equipment that may be used at the construction sites.
- **Chapter 14, Greenhouse Gas Emissions and Resilience:** This chapter has been revised to reflect updated information related to flooding and resilience, the design modifications related to the permanent features of the Project and the changes to construction methods and staging, and more refined information on construction equipment that may be used at the construction sites. It also includes a discussion of FTA guidance related to assessing greenhouse gas emissions.
- **Chapter 15, Geology and Soils:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. It now presents additional information related to geologic faults in New Jersey, the construction methods the Project Sponsor would use to manage risk related to those faults, and how the Preferred Alternative would protect the cliff face of the Palisades.
- **Chapter 16, Contaminated Materials:** This chapter has been revised to reflect current regulations and guidance related to contaminated materials, and to include an expanded

discussion of measures that the Project Sponsor will implement to protect the public and workers from potential exposure to contaminated and hazardous materials during construction, including construction activities on sites where contaminated soils or groundwater may be present and trucking of excavated soils that may include contaminants or hazardous materials.

- **Chapter 17, Utilities and Energy:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. In addition, minor revisions were made to clarify text in response to comments.
- **Chapter 18, Safety and Security:** This chapter has been revised to update information on regulatory context and to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. A description of the role of train horns for trains approaching the North River Tunnel is included, in response to comments received during the public comment period for the DEIS. In addition, minor revisions were made to clarify text in response to comments.
- **Chapter 19, Public Health and Electromagnetic Fields:** This chapter has been revised to reflect the revised conclusion of the noise analysis, based on changes to construction methods and staging. Minor revisions were also made to clarify text in response to comments.
- **Chapter 20, Indirect and Cumulative Effects:** This chapter has been revised to reflect the changes in the affected environment discussed above. It also now includes an expanded consideration of the Hudson Tunnel Project's relationship to rail capacity expansion on the NEC between Newark, New Jersey and PSNY.
- **Chapter 21, Coastal Zone Consistency:** This chapter has been revised to reflect revisions made to other chapters of the FEIS, since the analysis of coastal zone consistency considers the Project's impacts in a range of different areas.
- **Chapter 22, Environmental Justice:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. The chapter provides updated information on Project impacts in environmental justice communities and an updated description of the coordination FRA and NJ TRANSIT undertook with local environmental justice communities to identify and reduce adverse impacts during construction.
- **Chapter 23, Commitment of Resources:** This chapter has been revised to respond to comments and to provide more information on how the No Action Alternative would affect long-term productivity.
- **Chapter 24, Final Section 4(f) Evaluation:** This chapter has been revised to reflect the design modifications related to the permanent features of the Project, the changes to construction methods and staging, and the changes in the affected environment. In addition, the discussion of mitigation measures has been updated to reflect the measures agreed to in consultation with signatories and Consulting Parties during development of the PA in accordance with Section 106. For Hudson River Park, the Draft Section 4(f) Evaluation described that FRA anticipated that the proposed construction activities for the Preferred Alternative would qualify as an exception from Section 4(f) as a temporary occupancy of land that would be so minimal as not to constitute a Section 4(f) use. Based on further discussion with HRPT, the official with jurisdiction for that park, FRA has concluded that the proposed construction activities would result in a use of that Section 4(f) resource. As required by the Section 4(f) regulations, FRA has coordinated with the U.S. Department of the Interior

regarding the Draft Section 4(f) Evaluation and this revised Final Section 4(f) Evaluation, and that coordination is now described in this evaluation.

- **Chapter 25, Process, Agency Coordination, and Public Involvement:** The chapter has been revised to reflect additional agency coordination and public involvement activities undertaken following publication of the DEIS and to reflect the addition of the PANYNJ as Project Sponsor and a joint lead agency for the FEIS.
- **Chapter 26, List of Preparers:** This chapter has been revised to reflect the addition of the PANYNJ as a joint lead agency.
- **Chapter 27, Distribution of EIS:** The chapter has been revised to describe the distribution of the FEIS, in addition to distribution of the DEIS.
- **Chapter 28, Comments and Responses:** This chapter is entirely new to the FEIS and provides a summary of, and responses to, the comments received during the public comment period for the DEIS. *