Chapter 20: Indirect and Cumulative Effects

20.1 INTRODUCTION

This chapter considers the indirect effects of the Hudson Tunnel Project as well as the Project's cumulative effects when considered in combination with other projects and initiatives that will occur in the Project area within the same timeframe as the Preferred Alternative.

This chapter contains the following sections:

20.2 ANALYSIS METHODOLOGY

During development of this Environmental Impact Statement (EIS), the Federal Railroad Administration (FRA) and NJ TRANSIT developed methodologies for evaluating the potential effects of the Hudson Tunnel Project in coordination with the Project's Cooperating and Participating Agencies (i.e., agencies with a permitting or review role for the Project). The methodologies used for analysis of indirect and cumulative effects are summarized in this chapter.

20.2.1 REGULATORY CONTEXT

The Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act (NEPA), set forth in 40 CFR Part 1500, require Federal agencies to consider the potential for indirect and cumulative effects from a project.

As defined in the regulations, indirect effects are those that are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR § 1508.8(b)). By comparison, direct effects are "caused by the action and occur at the same time and place" (40 CFR 1508.8(a)). Indirect effects can occur in any of the analysis areas evaluated in an EIS, such as changes in land use,

economic vitality, neighborhood character, traffic congestion, air quality, noise, vibration, and water and natural resources. For example, transportation projects that provide new service to a neighborhood may result in indirect effects by inducing new growth in that neighborhood, leading to increased rents.

Cumulative impacts result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions (40 CFR § 1508.7). The CEQ regulations state, "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The direct effects of an individual action may be negligible, but may contribute to a measurable environmental impact when considered cumulatively with other past and/or future projects.

20.2.2 ANALYSIS TECHNIQUES

The analysis of indirect effects focused on the construction and operational effects of the Preferred Alternative, building on the direct effects assessments conducted in all previous chapters of the EIS, to determine whether any of the Preferred Alternative's direct effects have the potential to lead to further, secondary effects. For any potential secondary effects, the analysis used the same methodologies as for analysis of direct effects for the resource area in question, although the study areas and timeframes may be correspondingly larger or longer, respectively. Each of the technical chapters of this EIS includes consideration of potential secondary and indirect effects; this information is summarized below in Section 20.5.

The analysis of cumulative effects considered the incremental effect of the Preferred Alternative's operational and construction-period impacts in conjunction with other local and regional construction projects.

20.2.3 STUDY AREAS

Since the analysis of indirect and cumulative effects builds on the analyses of each technical area evaluated in the EIS, the study area for this assessment was the same as that used for the relevant technical analyses.

20.3 AFFECTED ENVIRONMENT: EXISTING AND FUTURE CONDITIONS

The affected environment analyzed in this chapter is identical to the affected environment analyzed in the preceding technical analysis chapters. Those analyses addressed direct effects on the affected environment, while this chapter analyzes indirect and cumulative effects on the affected environment.

20.4 INDIRECT AND CUMULATIVE IMPACTS OF NO ACTION ALTERNATIVE

In the No Action Alternative, no new Hudson River rail crossing would be created for the National Railroad Passenger Corporation (Amtrak) and NJ TRANSIT's Northeast Corridor (NEC) and the existing crossing, the North River Tunnel, would not be rehabilitated. This alternative assumes that the North River Tunnel would remain in service, with continued maintenance as necessary to address ongoing deterioration to the extent possible. FRA has made the assumption for this EIS that the North River Tunnel would remain functional and in operation at least through the EIS analysis year of 2030, given the uncertainty about the timing and extent of any closure of the tunnel. Since the No Action Alternative is the baseline against which the

impacts of the Preferred Alternative are compared in this EIS, this approach allows for a conservative and rigorous analysis of the impacts of the Preferred Alternative.

However, without a full rehabilitation of the North River Tunnel, damage to the tunnel caused by Superstorm Sandy would continue to degrade systems in the tunnel. This deterioration combined with the tunnel's age and intensity of use would likely lead to increasing instability of rail operations in the tunnel, and may lead to its eventual partial or full closure within or beyond the timeframe in which the Preferred Alternative could be completed. Such an outcome would ultimately lead to adverse indirect effects on regional economic conditions in New Jersey, New York, and the cities in the Northeast that currently benefit from Amtrak's intercity rail service and NJ TRANSIT's commuter service. Without proper maintenance of the transportation infrastructure, delays on Amtrak and NJ TRANSIT service for unplanned maintenance and repairs would continue to worsen. As trans-Hudson travel demand continues to grow, more and more people would be affected as access to work, home, and areas of commerce would be more difficult in New Jersey, New York, and throughout the NEC.

Without full rehabilitation of the North River Tunnel, the increased instability of rail operations and the potential for eventual closure of the tunnel would have wide-ranging impacts on travel in the region and on the region's social, economic, and environmental conditions as a result. Extreme overcrowding and delays in public transportation service would likely occur, and a shift from train to auto travel would result, which would exacerbate already congested conditions on the Hudson River crossings and major roads on both sides of the river and in the region. This would in turn lead to cumulative effects with other projects in the region, particularly those that contribute to congestion and travel delays.

20.5 INDIRECT IMPACTS OF THE PREFERRED ALTERNATIVE

20.5.1 OVERVIEW

As described earlier, indirect effects are the impacts caused by the Preferred Alternative that would occur later in time or farther removed in distance than direct effects, but are still reasonably foreseeable. Indirect effects are sometimes referred to as induced impacts. Indirect effects may occur, for example, if a project changes the extent, pace, and/or location of development and if this change in turn affects environmental resources.

Chapters 5 through 19 of this EIS assess the potential direct and indirect effects of the Preferred Alternative, as appropriate, for a full range of technical areas. The conclusions of those analyses and any additional indirect effects are summarized below.

20.5.2 INDIRECT CONSTRUCTION IMPACTS OF THE PREFERRED ALTERNATIVE

Construction of the Preferred Alternative would result in temporary beneficial and adverse indirect effects during the construction period. In addition to the beneficial direct socioeconomic effects related to construction labor itself and for the production of necessary services and materials, the Preferred Alternative's construction would also result in indirect or secondary economic activity generated from the direct expenditures throughout the regional economy (often referred to as the ripple or multiplier effect). This would include local secondary expenditures made by construction workers who frequent local businesses for dining and other goods and services, as well as similar secondary expenditures made by suppliers of materials and equipment for the Preferred Alternative. These benefits are described further in Chapter 7, "Socioeconomic Conditions," Section 7.6.2.

At the same time, however, construction activities at the Preferred Alternative's staging areas on Tonnelle Avenue in North Bergen, New Jersey; in Hoboken, New Jersey; and near the Manhattan waterfront would result in direct adverse effects to the surrounding areas related to community disruption, temporary closures to businesses near the Project site in the Meadowlands, visual impacts, traffic, noise, and air quality during construction that could in turn temporarily affect development patterns nearby. As described in previous chapters of this EIS, mitigation would be implemented to minimize these effects to the extent practicable.

As discussed in Chapter 6, "Land Use, Zoning, and Public Policy," construction activities for the Preferred Alternative on the Twelfth Avenue staging area in New York would result in temporary delays of up to seven years for potential completion of a separate commercial development on the same site (Block 675 Lot 1). Construction activities on Lot 12 Block 675 for the Preferred Alternative could also result in delays to the completion of a one-story portion of an accessory parking garage and a potential station for the Fire Department of New York Emergency Medical Services (EMS) that will be included in an adjacent private development on West 29th Street, including on Lot 12. The Preferred Alternative could also delay completion of park improvements in the section of Hudson River Park between West 29th and West 34th Streets, because of the Preferred Alternative's construction activities in the park and if funding that would be contributed by a future development on Block 675 Lot 1 is delayed. Once the construction of the Hudson River Tunnel is complete, these developments could be completed. In the New York study area, extensive development is proposed in the surrounding area, and the addition of another construction site to the multiple sites that will be under construction would not slow or otherwise alter the overall pace of development in the Project area.

The purpose of the Hudson Tunnel Project is to enable rehabilitation of the North River Tunnel without major disruptions to passenger rail service into and out of Penn Station New York (PSNY). Therefore, construction activities would not adversely affect rail operations on the NEC and no adverse indirect effect from train delays would occur.

20.5.3 INDIRECT PERMANENT IMPACTS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative would preserve the current functionality of the existing NEC Hudson River rail crossing and strengthen the resilience of the NEC. This would be a direct benefit and would also result in indirect benefits related to maintenance of the transportation system on which the region's economy depends. By improving the resiliency of the NEC, the Preferred Alternative would avoid indirect adverse social, economic, and environmental effects associated with the loss of this critical passenger rail connection. In the long term, the Preferred Alternative would effectively reduce energy consumption and air pollutant emissions in comparison to the No Action Alternative by reducing traffic congestion that would certainly occur were there a forced closure of the rail crossing.

The Preferred Alternative would address maintenance and resilience of the NEC Hudson River crossing and would not increase rail capacity. While the Preferred Alternative would increase the number of tracks crossing beneath the Hudson River between New Jersey and PSNY from two to four, no increase in peak-period rail service could occur without implementation of other future initiatives to expand capacity, such as an expansion of PSNY (see discussion below in Section 20.6.4). At completion of the Preferred Alternative, Amtrak and NJ TRANSIT would operate the same number of peak-period trains using the four tracks beneath the Hudson River as in the No Action Alternative, when only two tracks would be available. Since the Preferred Alternative would not increase rail service over that provided in the No Action Alternative, there would be no corresponding potential for secondary impacts related to increased service.

20.6 CUMULATIVE IMPACTS OF THE PREFERRED ALTERNATIVE

20.6.1 OVERVIEW

As discussed above in Section 20.2.1, CEQ regulations define cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." The previous chapters of this EIS analyze the effects of the Preferred Alternative in the context of the affected environment (existing conditions including past and present actions) together with other reasonably foreseeable future projects that will occur independently as part of the No Action Alternative. In this manner, the EIS accounts for cumulative impacts in each of the resource-specific technical analysis chapters.

By 2030, when the Preferred Alternative would be completed, a number of other, independent initiatives are currently being planned that could affect future conditions in the Project area, if they are implemented. These projects are in various stages of planning: some are funded and approved, while others are in the early planning stages. Some of these are included in this Project's No Action Alternative, while others are in early stages of planning and therefore are not considered part of the No Action Alternative. Given the long timeframe for the analysis of impacts from the Preferred Alternative, this evaluation considers the Preferred Alternative's potential for cumulative impacts with all of these initiatives.

20.6.2 POTENTIAL FUTURE PROJECTS

20.6.2.1 RAIL SYSTEM IMPROVEMENTS

A number of future projects are currently being implemented or planned that could affect the PSNY rail complex and rail operations through PSNY if they are implemented. These projects, which are in various stages of planning and are not all fully committed, will occur independently of the Hudson Tunnel Project. They include the following:

- **Penn Station Infrastructure Renewal Project:** Amtrak, in partnership with NJ TRANSIT and the Metropolitan Transportation Authority (MTA) Long Island Rail Road (LIRR), is undertaking the Penn Station Infrastructure Renewal Project to strengthen and improve operations and reliability at PSNY. The project will involve accelerated maintenance and repairs to the tracks and systems at PSNY. This work will require track outages for tracks that lead to station platforms. A majority of this work will take place during weekends with little or no disruption to weekday service; however, more extensive work is also required and will be conducted on weekdays, requiring modifications to train schedules. Renewal work is already under way, with major work scheduled to occur in July and August 2017. Additional renewal work will last through 2018, at a minimum, with future work schedules to be developed.
- **Hudson Yards Right-of-Way Preservation Project:** Amtrak is currently constructing a concrete tunnel box along the south side of the LIRR John D. Caemmerer West Side Yard, extending from the north side of 30th Street near Route 9A eastward beneath Eleventh Avenue to Tenth Avenue. This structure is intended to preserve a future location for rail operations, since a large-scale redevelopment, known as Hudson Yards, is being constructed on a platform above the West Side Yard. Construction has been completed on an 825-foot-long section of the concrete casing within the eastern portion of the West Side Yard, between Tenth and Eleventh Avenues, as well as an extension to the concrete casing, a 105-foot portion beneath the viaduct that carries Eleventh Avenue over the railyard. The final section, 500 feet long, will extend from Eleventh Avenue to 30th Street close to Twelfth

Avenue; this section has been fully designed, but construction has not commenced. The Hudson Yards Right-of-Way Preservation Project will be completed prior to completion of the Preferred Alternative, since it will serve as an integral part of the Preferred Alternative's alignment.

- **West Side Yard Perimeter Protection Project:** During Superstorm Sandy, flood waters entered the West Side Yard from the Hudson River, damaging critical infrastructure including trackbeds, switches, and signals, and entering the North River Tunnel's two tubes from their Manhattan portal at Tenth Avenue and their ventilation shaft at Eleventh Avenue. To protect this infrastructure from future flooding, the LIRR is planning a flood protection project that will include perimeter protection and drainage improvements around the West Side Yard, which also encompasses the North River Tunnel's vent shaft and portal. For perimeter protection, a new, permanent wall is proposed, with additional deployable barriers to be implemented across driveways and access points in advance of storm events. The perimeter protection project will provide critical resilience for all the rail elements within the yard complex, including the North River Tunnel portal and vent shaft and the new portal for the Preferred Alternative's new tunnel. This project will protect not only the West Side Yard, but also the other existing railroad infrastructure connected to the yard, including the portal and ventilation shaft for the North River Tunnel, the smaller rail storage yards east of Tenth Avenue, and the tracks and platforms at PSNY. The new perimeter wall will also protect the new portal for the Hudson River Tunnel and the Tenth Avenue fan plant, which would be located above the A Yard tracks.
- **New York-New Jersey River to River Rail Resiliency (R4) Project (LIRR):** This joint MTA and Amtrak project will enable flood protection at multiple tunnel portals used by both Amtrak and LIRR to prevent flooding of the East River Tunnel and North River Tunnel. LIRR has begun procurement for the design of flood barrier protection at the West Side Yard and the Queens portals of the East River Tunnels.
- **NJ TRANSITGRID Project:** The NJ TRANSITGRID Traction Power System Project (NJ TRANSITGRID Project) will create a microgrid[1] to provide highly reliable power to support a core segment of NJ TRANSIT's critical transportation services and infrastructure needs. The project will include a natural gas-fired electric power generating plant with a net generation of approximately 110 megawatts (MW) on a site in Kearny, New Jersey, west of the study area for the Hudson Tunnel Project. The project will also include new infrastructure to provide traction power (i.e., electricity needed to electrify railroad tracks) to enable trains to operate during widespread power failures on a portion of the NJ TRANSIT and Amtrak systems. Under normal conditions the microgrid will have the capacity to import from and export into the larger commercial grid.
- **East River Tunnel Rehabilitation:** Two of the four tubes of the East River Tunnels were flooded during Superstorm Sandy, with water reaching the tunnel roof (i.e., crown) at mid-river. This caused extensive damage within the tunnel. While the tunnel was repaired and brought back to service quickly after the storm, like the North River Tunnel, the affected tubes require complete rehabilitation. Amtrak is planning this rehabilitation, which may begin as early as 2020. The rehabilitation will occur one tube at a time to minimize disruption to rail service, but closure of one tube will nonetheless require service changes for Amtrak, LIRR, and NJ TRANSIT. Amtrak is not planning to rehabilitate the East River Tunnels at the same time as rehabilitation of the North River Tunnel.

[1] A microgrid, as defined by the U.S. Department of Energy (DOE), is a local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously (per DOE web page found at http://energy.gov/articles/how-microgrids-work).

- **Moynihan Station Project:** The Moynihan Station Project will create a new passenger rail station within the historic James A. Farley Post Office Building (Farley Building), which is across Eighth Avenue from PSNY and was designed by the same architecture firm as the original Penn Station building. Like the existing PSNY station facilities, the Farley Building is above the tracks and platforms of PSNY. The project will create a new grand train hall for passengers and improved passenger amenities. The project is advancing in phases, and the first phase is now substantially complete. Phase 1 includes the West End Concourse Expansion to create access to PSNY's tracks and platforms through the Farley Building, expand and rehabilitate the underground connecting corridor between the new West End Concourse and existing PSNY, and new and reconfigured entrances for the Eighth Avenue subway lines (A/C/E) at PSNY. The next phase, now in construction, will include a new train hall, internal pedestrian circulation space, and commercial development in the Farley Building, including transit-oriented and destination retail as well as other commercial uses.
- **Penn-Moynihan Station Complex Train-Shed Hardening Project:** The Port Authority of New York and New Jersey will add flood protection measures at the PSNY complex. This project will waterproof the entire complex and green the moats of the Farley Building. Once installed, these strategies will protect the existing transit facilities from damage during periods of heavy rainfall or stormwater accumulation and provide additional protection for the train-shed and emergency ventilation system.
- **East Side Access Project:** MTA is currently constructing the East Side Access Project, which will allow LIRR trains to travel to Grand Central Terminal in addition to PSNY. The project includes a new lower-level LIRR terminal beneath the existing terminal at Grand Central, a new tunnel from Queens to Grand Central, and many other improvements. The project is planned for completion by the end of 2022. Once complete, LIRR is anticipating a substantial increase in service with trains serving both Manhattan terminals. At PSNY, LIRR plans to run the same number of trains as today, but with shorter train lengths.
- **Metro-North Railroad Penn Station Access:** MTA is also proposing a project to allow Metro-North Railroad trains to travel to PSNY in addition to Grand Central Terminal. The project includes three miles of new track on existing right-of-way in the Bronx, and four new stations in the Bronx. Service to PSNY would not begin until after the East Side Access Project is complete. The MTA is completing a multi-year analysis of future rail operations at PSNY to gain a better understanding of operations that can be run at the station.
- **Empire Corridor High Speed Rail Program:** The Empire Corridor is the principal passenger and freight rail route through New York State, and extends between New York City and the Canadian border at Niagara Falls. The FRA and the New York State Department of Transportation (NYSDOT) are seeking to introduce higher train speeds on this key route and to improve reliability, travel times, service frequency, and passenger amenities with the goals of making rail travel along the corridor more desirable and increasing ridership. FRA and NYSDOT are currently preparing a Tier 1 EIS for the Empire Corridor High Speed Rail Program; a Draft EIS was published in January 2014. The Tier 1 EIS document addresses broad, corridor-level issues; the conclusion of the Tier 1 process will be the selection of a Preferred Alternative and a series of additional studies, proposals, and projects.
- **Gateway Program:** The Gateway Program is a comprehensive program of strategic rail infrastructure improvements designed to preserve and improve current services and create new capacity that will allow the doubling of passenger trains on the NEC between Newark, New Jersey, and PSNY. The Gateway Program will increase track, tunnel, bridge, and station capacity, eventually creating four mainline tracks between Newark and PSNY, though the specific details of most of the capacity-enhancing elements are still under

development.[2] In addition to capacity expansion, the Gateway Program also includes preservation projects to update and modernize existing infrastructure and repairs to infrastructure elements that are damaged due to age or events such as Superstorm Sandy. The Gateway Program is in the planning and design phase and is included in the NEC FUTURE Preferred Alternative (described in more detail below), but certain discrete, non-capacity-enhancing projects that are components of the Gateway Program, including the Hudson Tunnel Project and Portal North Bridge, are proceeding ahead of the rest of the program as critical infrastructure projects with their own independent utility.

The Portal Bridge is a two-track movable bridge that carries the NEC across the Hackensack River between Newark Penn Station and Frank R. Lautenberg Secaucus Junction Station. This bridge is more than 100 years old and has reached the end of its useful life; malfunctions in the mechanical components of the bridge can cause extensive delays on the NEC. The bridge will be replaced by a new high-level, fixed-span bridge with two tracks parallel to, and north of, the existing bridge. Final design and permitting for this bridge, referred to as the Portal North Bridge, are complete.

- **NEC FUTURE:** The purpose of the NEC FUTURE program is to create a comprehensive investment plan to improve current and future intercity and commuter passenger rail service along the NEC rail corridor between Washington, D.C., and Boston, Massachusetts. With the NEC FUTURE Preferred Alternative, FRA proposes a series of investments to upgrade aging infrastructure and improve the reliability, capacity, connectivity, performance, and resiliency of passenger rail service on the NEC, while promoting environmental sustainability and economic growth. FRA initiated NEC FUTURE in early 2012 and released a Tier I Final EIS in December 2016. The Preferred Alternative consists of an investment program that grows the role of rail by identifying numerous upgrades and state-of-good-repair projects along the length of the NEC. The Preferred Alternative includes all of the elements of the Gateway Program discussed above. A new two-track tunnel under the Hudson River into Midtown Manhattan, which as explained above has independent utility, is a critical element of the NEC FUTURE Preferred Alternative.

20.6.2.2 OTHER DEVELOPMENT AND INFRASTRUCTURE PROJECTS

As described in Chapter 6A, "Land Use, Zoning, and Public Policy," Section 6A.4, a number of development and/or infrastructure projects are planned in the study area in both New Jersey and New York.

In Weehawken, New Jersey, large-scale waterfront redevelopment will continue within the Lincoln Harbor Redevelopment Area just north of Weehawken Cove, where vacant parcels just beyond the study area boundaries will be redeveloped with a mix of retail, office, and residential uses similar to other new waterfront properties in Weehawken. Additionally, the Lincoln Tunnel Helix Replacement Program will replace the Lincoln Tunnel Helix, which is approaching the end of its useful life. The schedule for this project, which would occur just outside the study area, is not yet known but may overlap with construction of the Preferred Alternative.

In Hoboken, New Jersey, the New Jersey Department of Environmental Protection is proposing the Rebuild By Design project, an infrastructure initiative to reduce frequent flooding in Hoboken

[2] One capacity-enhancing element, Portal South Bridge, has already been planned. In addition to the new Portal North Bridge, a second bridge is also proposed to carry the NEC over the Hackensack River. This bridge, Portal South Bridge, would be a two-track bridge south of and parallel to the new north bridge. Portal South Bridge is proposed as part of the Gateway Program to facilitate an increase in capacity on the NEC. The Project is beyond the early conceptual stage but is not funded for construction.

resulting from major storm surges, high tides, and heavy rainfall events. That project proposes numerous green infrastructure elements, such as landscaped berms and levees and bioretention basins, to resist and delay flooding. The Rebuild By Design project is proposing three features near the Hudson Tunnel Project site: (1) a flood barrier along the east side of Park Avenue in Hoboken; (2) replacement of Harborside Park/Cove Park with a new signature park that incorporates barriers and other structures to resist flooding; and (3) a below-grade pump station in the vicinity of Hoboken's wastewater treatment plant, on the south side of the Hudson-Bergen Light Rail (HBLR) right-of-way. The Rebuild By Design project is currently in the planning stages and a Final EIS (FEIS) evaluating its impacts was completed in June 2017.[3] Depending on the availability of funding, work on the Rebuild By Design project's "resist" features to protect against storm surge may begin in 2019 and end in 2022, with other project features added later.

In Manhattan, several large-scale developments and a number of individual development projects are proposed or under construction on the Project site and within the study area. In May 2017, the New York City Department of City Planning (NYCDCP) released a planning study, *Block 675 Planning Framework*,[4] that provides an overall vision in terms of land use, density, massing, and urban design for the block between West 29th and West 30th Streets and Eleventh and Twelfth Avenues where the Twelfth Avenue staging area, ventilation shaft, and fan plant would be located with the Preferred Alternative (Manhattan Block 675). The document proposes rezoning the block to allow a mix of land uses and proposes a building massing rhythm that would increase from south to north and from west to east in response to the existing built context and allow views of the city and toward the Hudson River.

On the Twelfth Avenue fan plant site, a high-rise commercial and/or hotel building may be built in the future under the current zoning. In addition, consistent with the Block 675 Planning Framework, NYCDCP is currently evaluating a rezoning for the eastern portion of Block 675 that would likely result in two high-rise developments on the eastern portion of the block near Eleventh Avenue. This would include a residential tower up to 700 feet tall on West 29th Street at Eleventh Avenue and a 510-foot-tall residential tower on West 30th Street at Eleventh Avenue. This rezoning is referred to as the Block 675 East project.

North of West 30th Street, three major redevelopment projects (the Eastern Rail Yard, Western Rail Yard, and Manhattan West, collectively referred to as Hudson Yards) will result in a new high-rise neighborhood built on platforms above the railyard; these developments will include extensive residential, commercial, hotel, retail, cultural, and public open space uses. Additionally, a number of smaller development projects are proposed nearby. Open space improvements are proposed at the High Line with the development of the Tenth Avenue spur, and at Hudson River Park, where improvements are proposed from 29th to 34th Street that will be complete prior to the start of construction for the Preferred Alternative.

Outside the study area, several additional projects are proposed or currently under construction just north of the development in and near Hudson Yards. These include the expansion of the Javits Center, located at West 34th Street and Eleventh Avenue, which is scheduled for completion in 2021, and the redevelopment of the Javits Center's truck marshalling yard, which is scheduled to begin in 2021. In addition, the existing Port Authority Bus Terminal, located at 42nd Street and Eighth Avenue, will be replaced with a new facility at or near its current location before the 2030 analysis year.

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[3] http://www.nj.gov/dep/floodresilience/rbd-hudsonriver-feis.htm.

[4] https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/block-675-planning-framework/block-675-presentation-0517.pdf.

Together, the Manhattan developments will cause substantial cumulative effects in the study area. In the short term, the neighborhood will experience extensive ongoing construction activity that will likely continue well beyond the 2030 analysis year, and which will bring with it substantial construction-generated traffic (due both to the presence of construction vehicles on the roadways and to roadway closures resulting from construction activity), construction noise and vibration, pollutant and greenhouse gas emissions, and the visual disruption associated with construction barriers and roadway and sidewalk closures.

In the long term, development in the Hudson Yards district will substantially change the character of the study area, creating a new neighborhood and bringing a sizeable new population to the area. This will constitute a substantial change in land use and socioeconomic conditions within the district. The visual character of the area will also change dramatically. Because of the prominent position of the Hudson Yards district adjacent to the open expanse of the Hudson River, the increase in scale will be a noticeable change to the visual environment for viewer groups on the Hudson River and in New Jersey, as well as for local viewer groups in Manhattan, particularly those in Hudson River Park and along the High Line. The visual and urban design context of the High Line and Hudson River Park will change substantially, and large new shadows will fall on these open space resources from new mid- and high-rise buildings and skyscrapers constructed in the new Hudson Yards district.

The High Line in particular will undergo a dramatic change of setting at its northern end. When this segment of the park first opened, it ran through an area with older low-rise structures and undeveloped lots, particularly at the Western Rail Yard. The larger scale development projects within the Hudson Yards district will convert this relatively open environment to one of mid- to high-rise buildings and skyscrapers with more limited views and additional shadows will fall on the elevated High Line structure.

20.6.3 CUMULATIVE CONSTRUCTION IMPACTS OF THE PREFERRED ALTERNATIVE

20.6.3.1 RAIL SYSTEM IMPROVEMENTS

Most of the transportation system improvements outlined above in Section 20.6.2.1 may have construction activities that occur at the same time as construction activities for the Preferred Alternative could overlap with other construction of rail system improvements in and near PSNY and on the NEC. To the extent that these projects do overlap, construction would be carefully coordinated so that existing NEC service could be maintained without disruption. If possible, work in A Yard would be coordinated with and perhaps accelerated by the Penn Station Infrastructure Renewal Project, a maintenance program part of which is planned to be undertaken during the summer months of 2018.

As noted above, Amtrak is not planning to rehabilitate the East River Tunnels at the same time as rehabilitation of the North River Tunnel occurs and therefore there would be no cumulative effect from construction of the two projects together. If any overlap is necessary, operational plans will be put in place for both normal and emergency operations to ensure that any adverse effects to service would be minimized to the maximal extent possible.

20.6.3.2 OTHER DEVELOPMENT AND INFRASTRUCTURE PROJECTS

20.6.3.2.1 New Jersey Study Area

In Hoboken and Weehawken, the Lincoln Harbor Redevelopment, the Rebuild By Design project, and the Lincoln Tunnel Helix Replacement Program could undergo construction concurrently with the Preferred Alternative; in that case, the construction period effects of the Preferred Alternative would interact with the effects of the other two development projects.

During the construction period, the Preferred Alternative would involve construction activities at the Hoboken staging area on West 18th Street, as well as ground improvement and underpinning work in the vicinity of Willow Avenue (further detail is provided in Chapter 3, "Construction Methods and Activities"). Sizeable numbers of construction personnel and vehicles would access the construction activities at these locations; specific numbers would depend on the location and stage of construction. Chapter 5A, "Traffic and Pedestrians," provides information on the worst-case traffic volumes that would occur during construction and their impacts on the local street network near the construction staging areas..

The construction of the Preferred Alternative would contribute additional vehicular traffic, construction noise and vibration, pollutant and greenhouse gas emissions, and congestion to the area near the Hoboken staging area, which would already experience similar construction-related effects from the Lincoln Harbor Redevelopment and Rebuild By Design projects. In particular, construction traffic would be routed along roadways in Weehawken that would likely also be used by construction vehicles from the other development projects, including Willow and Park Avenues, 19th Street, and JFK Boulevard East. Additionally, both the Preferred Alternative and the Rebuild By Design project would include project elements in the same or nearby locations in Hoboken, such as where the tunnel alignment would cross beneath the Rebuild By Design wall at Park Avenue south of the HBLR alignment and the new below-grade pump station near the wastewater treatment plant at Clinton Street south of the HBLR. Coordination between the Rebuild By Design and Hudson Tunnel Project design teams is ongoing to ensure that the two projects can proceed without conflicts. If construction of the Preferred Alternative occurs concurrently with construction of either or both of the other development projects described here, the Project Sponsor would coordinate with the other projects to ensure that adverse traffic impacts are avoided or mitigated.

20.6.3.2.2 New York Study Area

As described above, in addition to the Preferred Alternative, a large number of development projects are currently undergoing construction or are scheduled to be constructed in the near future within the Manhattan portion of the study area. The construction-period effects of the Preferred Alternative would amplify this already complicated condition throughout the Hudson Yards district.

During the construction period, the Preferred Alternative would involve construction activities at several locations in the Hudson Yards district. Primary staging of all Manhattan construction activities would occur at the Twelfth Avenue staging site located on the western end of the block between West 29th and West 30th Streets and Eleventh and Twelfth Avenues (Block 675); construction of a tunnel access and ventilation shaft and of the Twelfth Avenue fan plant would also take place at this location. Cut-and-cover construction would occur in West 30th Street adjacent to the staging area, and also in Tenth Avenue between West 31st and West 33rd Streets. Ground improvement work would be undertaken in Hudson River Park and in Twelfth Avenue between West 29th and West 30th Streets. Sizeable numbers of construction personnel and vehicles would access the construction activities at these locations; specific numbers would depend on the location and stage of construction (further detail is provided in Chapter 3, "Construction Methods and Activities").

The construction of the Preferred Alternative would contribute additional vehicular traffic and roadway closures, construction noise and vibration, pollutant and greenhouse gas emissions, and congestion to an environment with substantial construction activity. Open space users in Hudson River Park and on the High Line would experience the additional noise, air quality, and visual effects of multiple large-scale construction projects adjacent to these parks. Where appropriate, the analyses of construction impacts in previous chapters of this EIS account for the potential simultaneous construction of multiple projects and their cumulative effects. For certain

environmental issues, however, there is no potential for cumulative effect related to wide-spread construction and therefore it is not addressed. Specifically, for air quality and noise, construction impacts are localized and do not accumulate with the noise and air emissions of other projects to result in cumulative impacts. The Project Sponsor will coordinate with the developers of nearby projects and with the City of New York regarding construction activities in Manhattan, to reduce the potential for conflicts or cumulative adverse effects.

20.6.4 CUMULATIVE PERMANENT IMPACTS OF THE PREFERRED ALTERNATIVE

When the Preferred Alternative is complete, it would provide redundancy and resiliency on the NEC, providing a substantial benefit to rail passengers. However, as described earlier, the Preferred Alternative would not result in an increase in capacity on the NEC between New Jersey and PSNY, and no increase in service over the No Action Alternative would occur. Therefore, there would be no cumulative effect of increased train service with other rail improvement projects or development projects in the study area.

20.6.4.1 TRANS-HUDSON CAPACITY EXPANSION

As described above, the NEC FUTURE program considers the role of rail passenger service in the context of current and future transportation demands and evaluates the appropriate level of capacity improvements to make across the NEC. Through NEC FUTURE, FRA is currently evaluating the need for and effects of overall capacity improvements to NEC rail services, including trans-Hudson service envisioned in the Gateway Program. The Gateway Program is a comprehensive program of strategic rail infrastructure improvements designed to improve current services and create new capacity that will allow the doubling of passenger trains on the NEC between Newark, New Jersey and PSNY, eventually creating four mainline tracks between Newark and PSNY. In addition to capacity expansion, the Gateway Program also includes repairs to infrastructure elements that were damaged during Superstorm Sandy. Both programs include new Hudson River tunnel investments similar to the Preferred Alternative. It is anticipated that the two investments programs would seek to incorporate the additional trackage provided by the Project into their eventual configurations, allowing for additional trans-Hudson rail capacity.

As described in Chapter 1, “Purpose and Need,” the Hudson Tunnel Project addresses a specific need stemming from the deterioration of the existing North River Tunnel and therefore is considered independently from the capacity-enhancing projects analyzed in NEC FUTURE and proposed in Gateway Program planning documents. The Preferred Alternative addresses maintenance and resilience of the NEC Hudson River crossing and would not increase rail capacity. Although the Project may ultimately be an element of a larger program to expand rail capacity, it is a separate project from any larger initiative that would meet an urgent need to preserve existing service and is being evaluated accordingly. Once the Project is complete, no service changes from the future background condition are anticipated and therefore no indirect or cumulative impacts related to rail operations would occur. Ultimately, no increase in service between Newark Penn Station and PSNY could occur until other substantial infrastructure capacity improvements, such as those considered as part of NEC FUTURE, including the Gateway Program, are built in addition to expanded trans-Hudson capacity. Those improvements would be the subject of one or more separate design, engineering, and environmental reviews.

Nonetheless, the Preferred Alternative would not preclude other future projects to expand rail capacity in the area and could serve as a component of such projects. In the future, if other initiatives, such as those envisioned in the NEC FUTURE and Gateway Programs, are implemented and enhanced capacity to provide additional service between Newark Penn Station

and PSNY becomes available, the new tracks under the Hudson River, incorporated as part of the Preferred Alternative, could be used for that service.

20.6.4.2 RESILIENCY IMPROVEMENTS

As a resiliency investment in NEC rail infrastructure that is a critical transportation asset of the New York metropolitan region, the Hudson Tunnel Project would improve the resiliency of this infrastructure and of the region as a whole. Several other ongoing and planned projects would also invest in the resiliency of the region's passenger rail infrastructure, including the Penn Station Infrastructure Renewal Project, West Side Yard Perimeter Protection Project, R4 Project, NJ TRANSITGRID Project, Penn-Moynihan Station Complex Train-Shed Hardening Project, East River Tunnel rehabilitation, and Portal North Bridge. Together, these projects will provide a cumulative resiliency improvement greater than the sum of the individual parts, which will create a cumulative benefit to the resiliency of this rail infrastructure and the region as a whole.

20.6.4.3 LOCALIZED EFFECTS

When construction is complete, the Preferred Alternative would have few visible, above-grade elements: the new surface tracks along the NEC in New Jersey leading into a new tunnel portal near the existing tunnel portal in North Bergen; a new fan plant in Hoboken, and a new fan plant near Twelfth Avenue in New York. Depending on the final configuration, some component of the Preferred Alternative's Tenth Avenue fan plant may also be visible. These components of the Preferred Alternative would not have the potential for cumulative effects with other projects nearby. The preceding chapters of this EIS evaluate the effects of these elements of the Preferred Alternative on their setting for a full range of technical issues.

In New Jersey, the new surface tracks and tunnel portal would be close to the existing NEC and would not alter the visual or neighborhood character of the nearby areas or result in noise impacts or other adverse impacts. Similarly, the new Hoboken fan plant would not be noticeable beyond the immediate area and would not result in adverse land use, visual, air quality, noise, or any other impacts to the surrounding area.

In New York, the Preferred Alternative's new Twelfth Avenue fan plant would join the other new high-rise buildings in the neighborhood. As described in Chapter 6A, "Land Use, Zoning, and Public Policy," the fan plant could be developed as an approximately 150-foot-tall freestanding structure or, alternatively, incorporated into a larger building on the site. Regardless of how it is developed, the fan plant would contribute incrementally to the dramatic changes in the scale and use of the Hudson Yards district occurring as part of the No Action Alternative. However, the fan plant would result in a relatively minor increase in the overall height and bulk of a single structure in the new, transformed Hudson Yards district, and would be in character in terms of bulk and scale with the other developments. Therefore, it would not contribute in a meaningful way to the cumulative changes in the scale, socioeconomic characteristics, and visual character of the area. Similarly, it would not contribute substantially to the cumulative changes in the visual and urban design context or shadow coverage of the High Line and Hudson River Park.

20.7 MEASURES TO AVOID, MINIMIZE, AND MITIGATE IMPACTS

The Preferred Alternative will include a number of measures to avoid, minimize, and mitigate impacts, detailed throughout the previous chapters of this DEIS. These measures will also serve to avoid, minimize, and mitigate indirect and cumulative effects. Key measures include the following:

- Careful coordination of railroad improvements that will affect PSNY operations and NEC service to minimize disruptions to service. The Project Sponsor will coordinate work in A Yard with the Penn Station Infrastructure Renewal Project that Amtrak will undertake in PSNY.
- Coordination between the Hudson Tunnel Project and other development projects nearby to minimize conflicts and cumulative impacts during construction. In New Jersey, this includes the Lincoln Harbor Redevelopment, the Rebuild By Design project, and the Lincoln Tunnel Helix Replacement Program. In New York, it includes the many development projects planned and under way around the Project site in the Hudson Yards area.
- Coordination between the Hudson Tunnel Project and the Rebuild By Design project during continuing design and engineering for each project, to ensure that the two projects do not have conflicting designs.
- Coordination between the Hudson Tunnel Project and NYCDCP regarding design goals for Block 675, so that the Twelfth Avenue fan plant is consistent with the goals for overall design in the vicinity.

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