Chapter 21: Indirect and Cumulative Effects

21-1 INTRODUCTION

The federal Council on Environmental Quality's (CEQ) regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA), set forth in 40 C.F.R. §§ 1500 et seq., requires federal agencies to also consider the potential for indirect and cumulative effects from a proposed project. In addition, SEQRA regulations identify that the contents of an environmental impact statement (EIS) include an evaluation of both cumulative impacts and the growth-inducing aspects of a proposed action [6 NYCRR § 617.9 (b)(5)(iii) (a) and (d)]. As discussed in Chapter 1, "Purpose and Need," the project is a replacement bridge for the existing Tappan Zee crossing. As discussed below, the project would not increase highway capacity or alter regional access and would not result in indirect impacts generated by induced or secondary growth. In consideration of the range of technical analyses presented in this EIS, the project also has little or no potential to result in localized or regional cumulative effects.

21-2 INDIRECT EFFECTS

Potential indirect effects are generally defined as those induced or "caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR §§ 1500-1508). Comprehensive guidance literature on assessing indirect impacts is found in the National Cooperative Highway Research Program (NCHRP)-initiated Project 25-10, the results of which were published as Report 403, "Guidance for Estimating the Indirect Effects of Proposed Transportation Projects," and Report 466, "Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects." These reports identify and provide examples for the types of transportation projects more likely to result in induced or indirect growth. Unlike the proposed bridge replacement, such projects need to greatly influence changes in regional access and mobility so as to induce changes in development and land use patterns. Such secondary effects could result in indirect impacts to the social and human environment as well to natural resources affected by new development patterns.

As identified in Report 466, Course Module 1, Figure 1-3, these types of projects include construction of a new highway, highway extensions, bridges to currently undeveloped areas, new highway bypasses around congested downtowns, new or expanded airports and harbors, new rail transit, new interstate highways, or new interchanges in undeveloped or rural locations. Course Module 7 summarizes such projects as falling into three overall categories: (1) projects planned to serve specific land development, (2) projects likely to stimulate complementary development, and (3) projects likely to influence interregional locational decisions. Since the proposed bridge replacement is not expected to alter regional mobility or capacity, and is in an area with well-established land use patterns, it is not expected to result in new induced or indirect effects. The Replacement Bridge Alternative would replace an existing Hudson River

crossing in a similar alignment with similar landing points and would not include any new access points. As such, this project would not result in induced or indirect effects typical of transportation projects listed above. Additionally, as described further in Chapter 5, "Community Character," the project would be consistent with local and regional comprehensive planning documents by maintaining this important transportation infrastructure, which is vital to the economy of the region. While many of these comprehensive plans call for improvements to certain parklands or trails and for the implementation of expanded transit opportunities, this project would not preclude these initiatives in the future.

21-3 CUMULATIVE EFFECTS

21-3-1 OPERATIONAL EFFECTS

Potential cumulative effects may result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions (40 C.F.R. § 1508.7). The direct effects of an individual action may be negligible, but may contribute to a measurable environmental impact when considered cumulatively with indirect effects and with other past and/or future projects. Report 466, Course Module 1 provides an overview of the relationship of indirect and cumulative impact, identifies the types of large-scale linkages that can lead to noticeable cumulative impacts, and provides examples major transportation improvements combined with: other transportation projects (i.e., a new highway in combination with a new/expanded airport resulting in new locations for commercial and industrial development); new major development projects (i.e., a new interchange and a new shopping mall that could change local and regional traffic patterns); and regional shifts in development patterns (i.e., a new highway in combination with new suburban development creating increased traffic volumes and congestion). Since the proposed replacement bridge has been determined to have no direct or indirect effect on regional traffic capacity or vehicle miles traveled (VMT), it would have no cumulative effect in combination with other projects. Potential adverse effects, as detailed throughout the EIS, and the potential for cumulative effects are summarized in **Table 21-1**.

21-3-2 CONSTRUCTION EFFECTS

Chapter 18, "Construction Impacts," identifies several potential adverse impacts that would result from direct construction activities associated with the proposed replacement bridge and the demolition of the existing Tappan Zee Bridge. As identified in that chapter, the terrestrial construction-related impacts are specific to localized effects at staging sites and along the existing highway. Since no other major construction projects (public or private) were identified within these areas, there is no cumulative effect. The greatest potential for cumulative impacts would result from proposed in-water construction activities associated with dredging, bottom stabilization, demolition, and pile-driving activities.

Table 21-1
Summary of Potential Cumulative Effects

Resources	Potential Adverse Effects[1]	Potential Cumulative Effects
Transportation	No Adverse Impacts	No Cumulative Effects
Community Character	No Adverse Impacts	No Cumulative Effects
Land Acquisition, Displacement, and Relocation	Full acquisition of 6 residential properties and 1 vacant property in Village of South Nyack (Rockland County) Partial acquisition on 3 residential properties and 1 green space area in Village of South Nyack (Rockland County) Permanent aerial easement on small section of 1 residential property in Village of Tarrytown (Westchester County)	No Cumulative Effects No known additional public or private actions are proposed that would add to proposed property acquisition
Parklands and Recreational Resources	No Adverse Impacts	No Cumulative Effects
Socioeconomics	No Adverse Impacts	No Cumulative Effects
Visual and Aesthetic Resources	Obstruction of existing scenic Hudson River views from residences on Bight Lane	No Cumulative Effects No other known projects are planned that would alter the existing viewscape in the study area
Historic and Cultural Resources	Removal of S/NR-eligible Tappan Zee Bridge Acquisition of two contributing properties in the South Nyack Historic District Potential disturbance of submerged archaeological resources, pending further investigation	No Cumulative Effects No known additional public or private actions are proposed that would affect historic and cultural resources in the study area
Air Quality	No Adverse Impacts	No Cumulative Effects
Noise	The project would result in NAC exceedances at several properties.[2] Mitigation measures (such as noise barriers) would be implemented to the extent feasible and practicable to minimize any adverse impacts.	No Cumulative Effects
Energy and Climate Change	No Adverse Impacts	No [Adverse] Cumulative Effects The project would improve mobility and reduce congestion, thereby reducing GHG emissions and helping work toward regional, state, and federal air quality improvement initiatives
Topography, Geology, Soils	No Adverse Impacts	No Cumulative Effects
Water Resources	No Adverse Impacts	No Cumulative Effects
Ecology	Loss of 13 acres of oyster beds	No Cumulative Effects No other known projects are planned that would result in loss of oyster habitat in the study area
Hazardous Materials	No Adverse Impacts	No Cumulative Effects
Environmental Justice	No Adverse Impacts	No Cumulative Effects
Coastal Zone Management	No Adverse Impacts	No Cumulative Effects

Notes: [1]Technical analyses and potential adverse effects are presented in greater detail in each of the EIS chapters.
[2]Some properties may have multiple dwellings and therefore multiple receptors.

21-3-2-1 AQUATIC ECOLOGY

As discussed in Chapter 18, "Construction Impacts," these activities can be expected to result in direct effects from the suspension and deposition of bottom sediments, loss of aquatic vegetation and habitat areas, and hydroacoustic impacts on fish populations. That chapter indicates that these impacts are limited to the specific area of disturbance or a short distance beyond the area of disturbance.

The Champlain-Hudson Power Express (CHPE) project would lay cable at an estimated depth of 6 to 15 feet below the river bottom and the project would extend from Lake Champlain south under the Hudson River and into New York Harbor. Project sponsors indicate that the project may be active in the area of the Tappan Zee in 2014 or 2015, and therefore, construction activities for the CHPE project would potentially be undertaken at the same time as the bridge's construction. The construction technique for the laying of cable is a "jet-plow" operation that would temporarily plow a trench for the cable that would then immediately be filled in in a continuous process that the CHPE project sponsor estimates would lay cable at a rate of approximately one mile per day, creating a disturbance of about 15 feet across and the required depth below the sediment surface at river bottom. Like the analyses for the Tappan Zee, the temporary disturbance and suspension of bottom sediments has been modeled showing that the suspension and deposition of sediments is limited to a short distance from the disturbance. In summary, the CHPE could be expected to be active in the immediate area of the Tappan Zee construction area for less than one week and would be active in a narrow band immediately west of the navigation channel which, as described in Chapter 18 "Construction Impacts," is outside the area of armoring. Therefore, other than coordination of activities (which has already been initiated) to ensure no direct disruption to either project, the cumulative effect of the projects would be minimal. Other regional projects up- or down-stream of the Tappan Zee Hudson River crossing would have no cumulative effect on activities at the project site. At the same time, with no noticeable changes beyond a limited area around the construction site, the project would not create any foreseeable changes at other project locations.

It is noted in Chapter 18, "Construction Impacts," that habitat losses resulting from bridge construction are expected to be localized and would not extend beyond the defined areas of impact. Therefore, any temporary or permanent changes to aquatic habitats would not affect the larger habitat value of the Hudson River and no cumulative habitat fragmentation would be expected. Similarly, the analysis of potential impacts on benthic and fish populations affected by the pile driving would potentially affect a small proportion of any given species and would not cumulatively affect overall populations. It is noted that the CPHE project has been delineated to avoid important habitat locations and such conditions have been established in the New York State Department of State's Conditional Concurrence with the CPHE Coastal Zone Consistency Certification.

21-3-2-2 DREDGING

As set forth in Chapter 18, "Construction Impacts," the vast majority of the dredging activity for the Replacement Bridge Alternative occurs in Stage 1 of the first construction year, when up to 1.12 million cubic yards of materials may be removed. In the second year, this is reduced to 0.43 million cubic yards and by the third stage of dredging in

year four, the estimated amount of dredged material is 0.19 million cubic yards. There is little or no other dredging proposed for the Hudson River navigation channel in the vicinity of the Tappan Zee Bridge so this would not be expected to result in any cumulative impacts in combination with the project.

Localized and periodic dredging of ship channels and berths may occur occasionally for maritime activities within the general area of the Tappan Zee These activities tend to be smaller and localized (the last analysis of dredging permits involving testing for HARS disposal was for 0.1 million cubic yards at US Gypsum in 2000 and 0.06 million cubic yards for American Sugar in a 1998 application).

In terms of potential cumulative effects in the use of HARS disposal, the permitting of disposal is controlled by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) and subject to the Site Management and Monitoring Plan (SMMP). Materials that are tested and found to be suitable for disposal are considered to have a beneficial effect in creating new cover over prior disposal sites of more contaminated materials. The 2009 SMMP and information available from the USACE New York District website (http://www.nan.usace.army.mil), indicates that the as of 2008 the HARS had mostly completed remediation of the first three priority cells and that cells 4 through 9 would continue to accept new cover for many decades. The total material dredged as part of the Tappan Zee project (up to an estimated 1.74 million cubic yards), should it be deemed eligible for HARS disposal, would be a small proportion of the overall fill necessary to remediate the site and would only be disposed within the HARS based on the characteristics of the dredged material following extensive testing. Therefore, there would be no cumulative adverse effects from the disposal of the project-generated dredge material.