

Tappan Zee Bridge NEPA Analysis

Summary

Although the New York State Department of Transportation (NYSDOT) has not yet published guidance on addressing climate change impacts as part of the NEPA process, the organization has been considering the potential impacts of sea level rise on proposed projects during the NEPA process for several years. NYSDOT is concerned about the impacts of climate change, especially sea level rise and riverine flooding, on transportation infrastructure. Sea level rise may flood assets that historically have not flooded or have only experienced infrequent flooding in the past. For example, NYSDOT evaluated potential climate change impacts on the Tappan Zee Bridge reconstruction project.

The Tappan Zee Bridge is a major transportation link and a large financial investment that is designed to have a long useful life. In 2013, NYSDOT performed analyses for the environmental impact statement (EIS) to determine the potential for adverse or beneficial impacts in many categories, including climate change. Specifically, NYSDOT considered the potential for flooding during the 1% annual probability flooding levels on top of end-of century sea level rise. Under this scenario, neither the bridge nor the touchdowns are projected to be exposed to flooding. NYSDOT also looked at the potential for sea level rise to decrease the vertical clearance under the bridge, thus impacting the navigable waterway.

NYSDOT Guidance

NYSDOT does not have publicly available guidance at this time on addressing the impacts of climate change in environmental reviews.

Considering Climate Change Impacts within the NEPA Process

Project Scope

Since 1955, the existing Tappan Zee Bridge has been a main thoroughfare for residents and commuters between Rockland and Westchester counties. A new crossing is intended to address limitations and shortcomings of the existing bridge, including structural, operational, safety, security, and mobility needs.

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Concurrent environmental review and procurement processes for the project began in 2011. Figure 1 shows the location of the existing and replacement bridge.

The new bridge is designed to last 100 years without major structural maintenance and will cost \$3.9 billion. Figure 2 shows an artist's rendering of the new bridge. It is being constructed immediately adjacent to the existing bridge and is built for mass transit, with improvements that allow bus rapid transit, light rail or commuter rail. The bridge will also accommodate non-motorized traffic by including a bike and pedestrian path. Construction began in 2013 and the full bridge is expected to open in 2018. Figures 3 and 4 show the new bridge under construction.

Approach

The analysis of effects of climate change on the project focused on potential flooding and failure to meet the US Coast Guard air draft limitation requirement (the distance from the bottom of the bridge to mean high water) due to changes in sea level. If the air draft is lessened due to sea level rise, then tall ships may not be able to use the waterway. The steps followed for the analysis include:

- **Review existing studies and information on projected sea level rise.** NYSDOT used sea level

rise estimates from the New York State Sea Level Rise Task Force for the lower Hudson Valley. At the time of the study, 2100 was the furthest out-year projection for sea level rise that was approved by the Task Force. For this segment of the Hudson River, sea levels are projected to increase by about 1.0 to 2.0 feet by the end of the century, with possible increases of up to 4.5

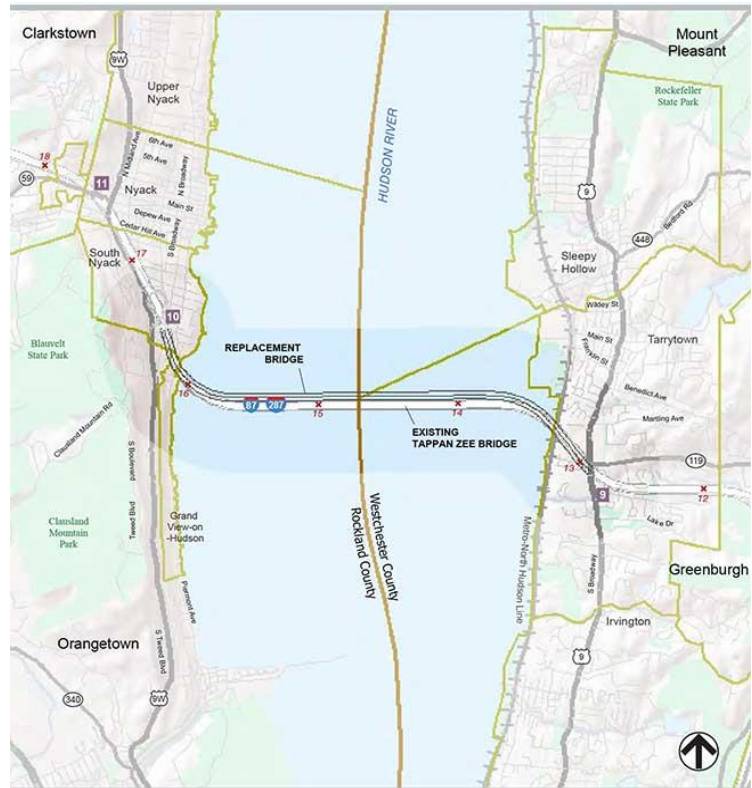


Figure 1. Map of the Project Location. Credit: New York State Thruway Authority.



Figure 2. Rendering of Replacement Tappan Zee Bridge. Photo Credit: New York State Thruway Authority.

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feet in the event of rapid ice melt in the Greenland and west Antarctic ice sheets. Based on this information, NYSDOT assumed that sea level and floodplains would rise by up to 2.0 feet by the end of the century, with a smaller chance of increases up to 4.5 feet. The probability of sea levels increasing is characterized in the EIS as “extremely likely.”

- **Develop combined sea level rise and storm surge projections.**

Because of the uncertainty in changes in storm frequency due to climate change, the project team simply added the projected sea level rise increments to current-day 1% annual probability flood levels to develop future storm surge scenarios. The elevation of the current 1% annual probability flood levels is 6.6 feet, so the combined end-of-century sea level rise and 1% annual probability flood levels is 8.6 to 11.1 feet.

- **Determine future flooding risk.** The lowest point along the new bridge is the Rockland approach, which is 30 feet above the combined sea level rise and storm surge levels. NYSDOT determined that this is sufficient clearance for the bridge to be considered not at risk to future flooding.

- **Determine change in air draft.** The air draft requirement for the new bridge design was set at 139 feet in coordination with the

US Coast Guard as part of the permit application, and in response, the new bridge was designed with an air draft of 139 feet. The projected end-of-century sea level rise range of 2.0 to 4.5 feet will reduce the vertical clearance, lowering the air draft. The EIS does not discuss the potential repercussions of the projected decrease in air draft in their EIS.



Figure 1. Tappan Zee Bridge steel girder assembly. Photo Credit: New York State Thruway Authority

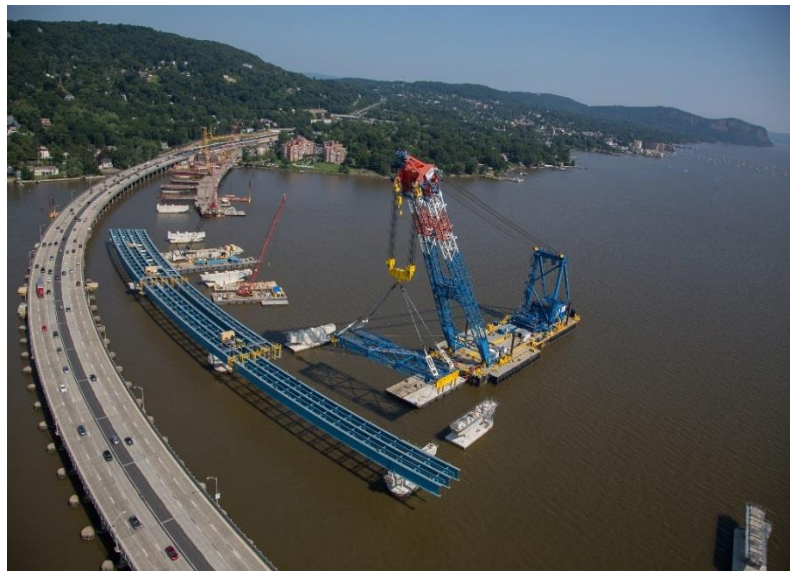


Figure 4. Tappan Zee Bridge assembly. Photo Credit: New York State Thruway Authority.

Findings

The analysis found that the bridge and its approaches are not expected to flood during future 1% annual probability coastal flood levels.

- **Risks posed by future flooding.** While NYSDOT found that the bridge and its approaches would not be expected to flood during future 1% annual probability flood levels, they did not investigate the potential for future flooding under less probable flooding scenarios (e.g., the 0.2% annual probability flood levels).
- **Risks posed to marine traffic on the navigable waterway.** The current bridge design is for an air draft of 139 feet at mean high water, which is the same as the existing bridge and is consistent with the US Coast Guard permit. The air draft would likely be reduced in the future due to sea level rise. The impacts of this reduction on marine traffic are not analyzed in the EIS.
- **Other risks.** The analysis does not address future changes in other climate parameters, such as temperature, storm frequency, and precipitation. These changes may have some effect on bridge maintenance, but the existing projections are much less certain and are therefore not considered in this EIS.

Actions to Address Risk

The EIS did not recommend action to address sea level rise since the Tappan Zee Bridge is not vulnerable to current or future flooding.

References and Links to Further Resources

New York State Department of Environmental Conservation (DEC). Climate Change Guidance Documents: <http://www.dec.ny.gov/regulations/56552.html>

New York State Sea Level Rise Task Force. Report to the Legislature. December 2010. http://www.dec.ny.gov/docs/administration_pdf/slrtffinalrep.pdf

Tappan Zee Hudson River Crossing Project Website: <http://www.newnybridge.com/index.shtml>

Tappan Zee Hudson River Crossing Project Environmental Impact Statement Chapter of Energy and Climate Change: <http://www.newnybridge.com/documents/feis/vol1/13-energy-and-climate-change.pdf>

Tappan Zee Hudson River Crossing Project Environmental Impact Statement Executive Summary: <http://www.newnybridge.com/documents/feis/vol1/00-executive-summary.pdf>