Environmental Assessment

Hampton Harbor Bridge Project
Seabrook and Hampton, NH
X-A001(026), 15904
March 2021

U.S. Department of Transportation
Federal Highway Administration

New Hampshire DOT
Department of Transportation

SEABROOK-HAMPTON

Replacement of the Neil R. Underwood Memorial Bridge

ENVIRONMENTAL ASSESSMENT & PROGRAMMATIC SECTION 4(f) EVALUATION

FHWA Project No. X-A001(026)

NHDOT Project No. 15904

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33 USC 1344

by the

U.S. Department of Transportation
Federal Highway Administration
and
New Hampshire Department of Transportation

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Comments may be submitted during the 30-day review period commencing on 24 March, 2021 and concluding on 23 April, 2021.

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1 Introduction

The New Hampshire Department of Transportation (NHDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to replace the Neil R. Underwood Memorial Bridge (Neil R. Underwood Bridge) (NHDOT Bridge No. 235/025), in Hampton, NH. The Neil R. Underwood Bridge carries NH Route 1A over the Hampton River at the inlet to Hampton Harbor and is a vital transportation link between Hampton Beach in the north and Seabrook in the south (see Figure 1, Figure 2, and Figure 3). The Neil R. Underwood Bridge has been on NHDOT's Red List of deficient bridges since 1999 due to the poor condition of the superstructure and is considered New Hampshire's No. 1 priority Red-Listed bridge. In the analysis that follows, the bridge itself is referred to as the Neil R. Underwood Bridge, however, the overall project is referred to as the Hampton Harbor Bridge Project. Approach work on NH Route 1A will extend south from the bridge into Seabrook, NH.

NHDOT and FHWA have prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as amended (42 USC 4332(2)(c)); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508); FHWA guidance regarding Environmental Impact and Related Procedures (23 CFR 771.119); the National Historic Preservation Act of 1966, as amended; and Section 4(f) of the U.S. Department of Transportation Act (23 CFR 774). This EA evaluates two build alternatives, Replacement with Fixed Bridge and Replacement with Bascule Bridge, and a No-Build Alternative, as required by CEQ. The Replacement with Fixed Bridge has been identified by NHDOT and FHWA as the Preferred Alternative. The analysis provided in this EA assesses the potential direct, indirect and cumulative impacts of each of the alternatives and identifies recommended mitigation measures to address adverse impacts.

1.1 Background

Constructed in 1949, the Neil R. Underwood Bridge crosses the Hampton Harbor Inlet, connecting the Towns of Seabrook and Hampton along NH Route 1A. Hampton and Seabrook Harbors lie west of the bridge and are formed by the confluence of the Blackwater River, which flows from the south, and the Hampton River, which flows from the northwest (see Figure 4). The Atlantic Ocean and a breakwater lie to the east of the bridge. To the north and south are residential, recreational, and tourism-based development, including the Hampton Beach State Park, which is located northeast of the bridge and the Hampton State Pier which is located northwest of the bridge. The Hampton-Seabrook Dunes Wildlife Management Area (Dunes WMA) is located southwest of the bridge, the Hampton portion being managed by the NH Fish and Game Department (NHFG) and the Seabrook portion managed by the NH Department of Natural and Cultural Resources (DNCR). Sun Valley Beach lies immediately southeast of the bridge bordering the inlet. The Sun Valley residential neighborhood extends south from the beach between Eisenhower Street in the west and the Atlantic Ocean in the east.

The Neil R. Underwood Bridge is approximately 1,199-feet long by approximately 33-feet wide (53 feet wide at the barrier gates), including a 24-foot-wide roadway, a one-foot shoulder on either side, and a four-and-a-half-foot-wide sidewalk on the east side. The bridge carries up to 18,000 vehicles per day during summer peak times. This segment of NH Route 1A is the on-road route for the East Coast Greenway in NH, and as such, the roadway handles vehicular, bicycle and pedestrian traffic.

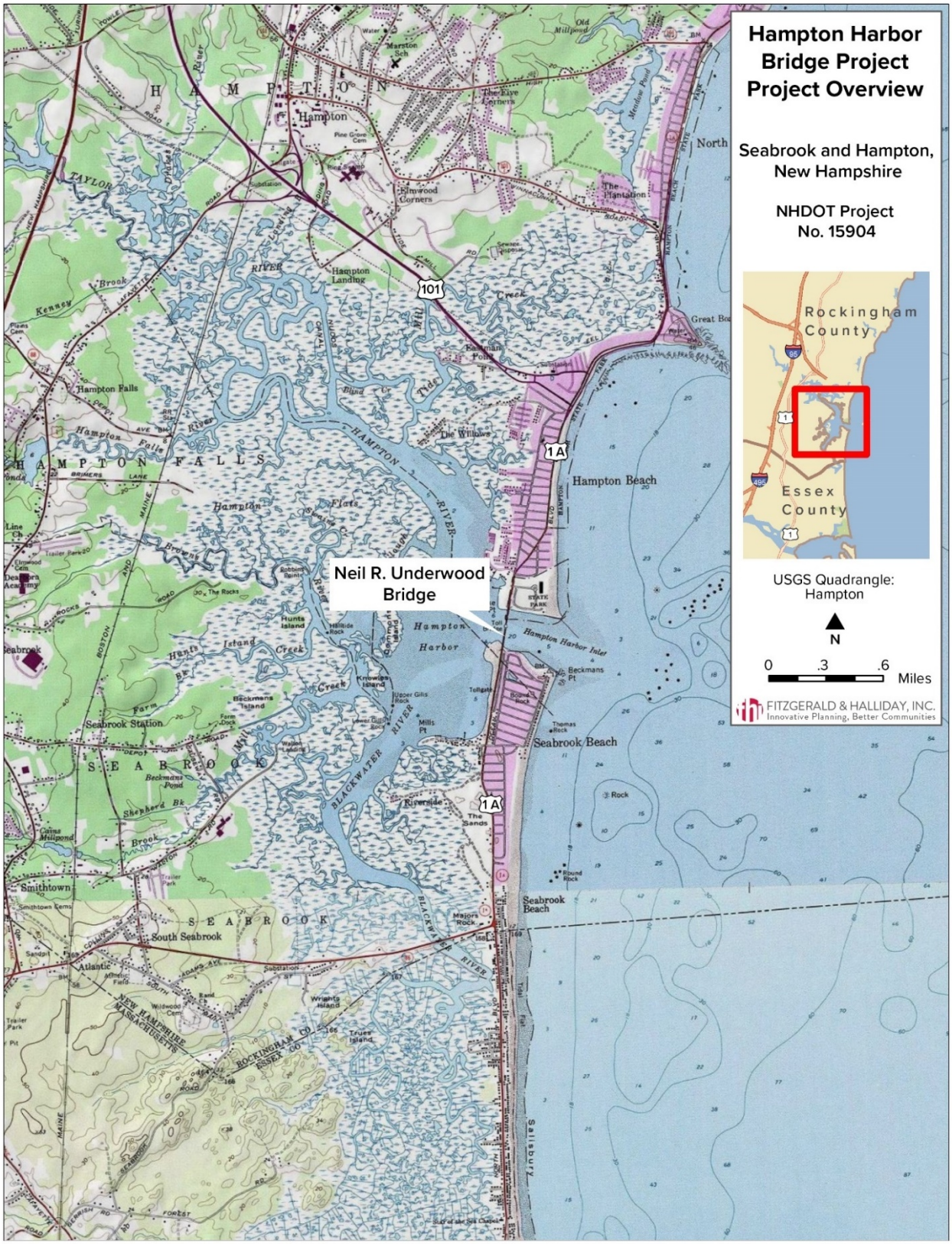
Figure 1 – Aerial View of Neil R. Underwood Bridge Looking West

Source: HDR, Inc.

Figure 2 - Aerial View of Neil R. Underwood Bridge Looking Northeast

Source: HDR, Inc.

Figure 3– Project Location



Source: FHI

Figure 4 – Project Site

Source: FHI

The existing bridge consists of thirteen spans – six approach spans to the south, six approach spans to the north, and a movable bascule span in the center at the navigational channel. The twelve approach spans are each 94 feet in length and are comprised of two steel girders supporting floor beams and stringers with a composite concrete deck. The approach substructure consists of reinforced concrete piers and abutments; five of the approach piers are founded on spread footings, while the remaining seven piers and the abutments are supported on timber piles. The center span is a single-leaf steel bascule with an open steel grid deck. It is approximately 65 feet long and rotates to 79 degrees when fully opened, providing unlimited vertical clearance within the navigational channel. In the lowered position, there is 20 feet of vertical underclearance, although it is posted at 18 feet. The opening of the bascule is controlled from the operator's house on the west side of the bridge atop the bascule pier. Between April 1 and October 31, the bridge is opened on signal from three hours before high tide to three hours after high tide during daylight hours. Outside these hours, and from November through March, the bridge is opened on signal if at least three hours of notice is provided. The operator's house, counterweight, and mechanical systems are located north of the bascule span.

The Neil R. Underwood Bridge spans a US Army Corps of Engineers (USACE)-maintained navigational channel. The Entrance Channel is 150 feet wide east of the bridge but narrows to 40 feet as it passes below the movable bascule span. The approximate depth of the channel at Mean Lower Low Water (MLLW) is eight feet; it is periodically dredged by the USACE to maintain this depth as part of the Hampton Harbor Federal Navigation Project. The navigable Hampton Channel is approximately 100 to 150 feet wide and runs nearly parallel to the bridge approximately 70 to 90 feet to the west. The Seabrook Channel meets the Hampton Channel immediately west of the bascule span and extends south and west at 200 to 250 feet wide. The Hampton and Seabrook Channels were last dredged in 2019.

The Neil R. Underwood Bridge is one of two remaining bascule bridges in the State of New Hampshire, the other being the NH Route 1B Bridge over Little Harbor (Bridge No. 066/071) between New Castle and Rye. The Neil R. Underwood Bridge replaced an earlier bridge at the crossing, the "Mile-Long Bridge", the alignment of which was located west of the existing structure in what is now the Dunes WMA. The Neil R. Underwood Bridge was determined eligible for the National Register of Historic Places (NRHP) as a rare example of a bascule bridge in the State of New Hampshire. The bridge embodies the distinctive characteristics of its type and method of construction including an underdeck counterweight, a control house, and a single-leaf fixed-trunnion deck. The NH 1B Bridge over Little Harbor was also determined eligible for the National Register. A separate EA is being prepared addressing its replacement.

1.2 Project History

As noted above, the Neil R. Underwood Bridge has been on NHDOT's Red List of deficient bridges since 1999 due to the poor condition of the superstructure. In 2018, NHDOT initiated a project to evaluate options for the bridge's rehabilitation or replacement. An early step was the preparation of a Rehabilitation Study in the fall of 2018. The study assessed the existing condition of the bridge by reviewing previous inspection reports and performing visual inspections. It then analyzed the bridge components to evaluate a number of factors, including adequate serviceability for multi-modal transportation, impacts to the structure as a potential historic resource, impacts to natural resources in the area, and the feasibility of the design, constructability, and service life of the rehabilitated structure. The Rehabilitation Study initially recommended rehabilitating the bridge's substructure while widening it and replacing the bridge's superstructure and bascule systems. However, in order to address concerns

raised through the Section 106 consultation process, a second rehabilitation alternative was identified in the spring of 2019. This alternative rehabilitated the existing bridge, while constructing a second bascule bridge to the west (the Twin Bridge Alternative).

An Alignment and Profile Study was also undertaken to assess various horizontal and vertical geometries for two potential replacement alternatives, one with a fixed bridge and one with a movable bridge. This included a review of vessel usage to determine vertical clearances necessary for the replacement alternatives. For the movable bridge, the analysis sought to define a bascule alternative that minimized bridge lifts, while for the fixed bridge, the alternative sought to provide for the continued use of the navigable channel by the current users. The study also reviewed environmental, cultural and socioeconomic resources, right-of-way (ROW) and infrastructure impacts of potential horizontal alignments east and west of the existing bridge, as well as an option that maintained the existing alignment. Finally, the study evaluated the constructability, traffic management concepts, and impact on traffic flow for each alignment and profile option. Based on public comments, the Alignment and Profile Study ultimately recommended a westerly alignment for the two replacement alternatives, the Twin Bridge Alternative, and any required temporary bridge in order to minimize ROW impacts to private property. The study also recommended vertical underclearances of 34 feet at Mean High Water (MHW) if the bridge was to be replaced with a movable bridge and 48 feet at MHW if the bridge was to be replaced with a fixed bridge. This accommodates four feet of Sea Level Rise (SLR).

A Type, Size and Location Study (TS&L) was completed in March 2020 which evaluated each of the four alternatives under consideration: Rehabilitation (with Widened Bridge), Replacement with a Fixed Bridge, Replacement with a Movable Bridge, and Twin Bridge (with Rehabilitated Bridge). Key considerations in the identification of the Preferred Alternative were the extent to which the alternative improved navigability, minimized impacts to natural resources, and improved mobility and safety for the traveling public. Construction duration and life cycle costs were also taken into consideration. The TS&L ultimately recommended the Replacement with Fixed Bridge as the Preferred Alternative because it would eliminate vehicular delays along NH Route 1A due to bridge openings, it would provide sufficient vertical underclearance to accommodate all known Hampton Harbor vessels, it would provide a wider channel and fewer obstructions for small vessels, it wouldn't impact the Hampton and Seabrook Channels to the west, and it would have the lowest initial construction and life-cycle cost.

1.3 Public Involvement and Agency Coordination

At the outset of the project, NHDOT established a Project Advisory Committee (PAC) comprised of NH State Representatives and a State Senator, Town officials from Seabrook and Hampton, a representative from the DNCR Division of Parks and Recreation (DPR), a representative from the Hampton Historical Society, project abutters, and other stakeholders. The role of the PAC has been to disseminate information to the public and to provide input in the overall planning process throughout the life of the project. The public has also been informed through three public informational meetings held in September 2018, January 2019, and January 2021. The September 2018 and January 2019 meetings were held in person and were broadcast by a local cable television channel. The January 2021 meeting was held virtually via the Zoom meeting platform. Abutters were notified by mail of their opportunity to participate in each of the meetings. Stakeholder meetings were also held with abutters and members of the maritime community. Input received from the PAC, from stakeholder meetings, and through the Public

Informational Meetings drove decisions made by the Design Team in the development of alternatives and informed the assessment of potential impacts.

NHDOT and FHWA have also coordinated with federal and state agencies throughout the planning process. NHDOT initially notified federal and state agencies of the project and their intent to prepare an EA through coordination letters sent in the summer of 2018. These agencies included USACE, the National Oceanic and Atmospheric Administration (NOAA), the US Fish and Wildlife Services (USFWS), the US Coast Guard (USCG), and NHFG. In addition, coordination letters were sent to the Hampton and Seabrook Harbormasters, a DataCheck was submitted to the NH Natural Heritage Bureau (NHNHB), and a Request for Project Review form (RPR) was submitted to the New Hampshire Division of Historical Resources (NHDHR). An additional letter was sent to USFWS in January 2019 and an updated DataCheck was submitted to NHNHB in December 2020 to reconfirm State-listed plant species potentially occurring on the Project Site. Coordination letters were also submitted to the NH Office of Energy and Planning, Conservation Land Stewardship Program regarding Land Conservation Investment Program properties, and to the NH Land and Community Heritage Investment Program (LCHIP) regarding LCHIP properties. The agency responses are included in Appendix A and summarized in Table 1 below.

Table 1 – Initial Coordination Letters and Forms

Letter/form date	Response date	Agency
June 18, 2018	July 2, 2018	NHNHB
June 27, 2018	June 27, 2018	USFWS (IPaC)
June 28, 2018	July 11, 2018	NHDHR
July 9, 2018	No response	Hampton Harbormaster
July 9, 2018	No response	Seabrook Harbormaster
July 10, 2018	July 20, 2018 (by phone)	NHFG
July 10, 2018 (2 letters)	July 13, 2018 (by email)	NOAA
July 10, 2018 (2 letters)	July 11, 2018 (by email)	USACE
July 24, 2018	No response	USFWS
August 15, 2018	August 16, 2018 (by email)	USCG
January 22, 2019	February 15, 2019 (by email)	USFWS
December 11, 2020	December 24, 2020	NHNHB (updated DataCheck)

Letter/form date	Response date	Agency
January 21, 2021	January 21, 2021	NH Office of Energy and Planning Conservation Land Stewardship Program
January 21, 2021	February 15, 2021	NH Land and Community Heritage Investment Program
March 9, 2021	March 9, 2021	USFWS (IPaC)

Source: FHI

In addition to written correspondence, NHDOT met with various state and federal agencies throughout project development. NHDOT presented the Hampton Harbor Bridge Project at the monthly Natural Resources Agency Meeting at NHDOT in August 2018, January 2019, December 2019, and December 2020. A site walk was also conducted with representatives from federal and state natural resources agencies in September 2018, and individual meetings and teleconferences were held with USACE, NOAA, USFWS, and NHFG over the course of the project. In accordance with Section 106 of the NHPA, FHWA and NHDOT consulted with NHDHR and Consulting Parties at the monthly Cultural Resources Coordination Meeting at NHDOT in July 2018, February 2019, March 2020 and October 2020. In addition, a site walk was undertaken with NHDHR and Consulting Parties in January 2019 to review the Area of Potential Effects (APE) and identify potential historic properties. Finally, teleconferences were held with the DNCR to discuss potential impacts to Section 6(f) resources. A summary of project coordination meetings is provided in Table 2 below.

Table 2– Coordination Meetings

Date	Meeting/Site Walk
July 12, 2018	Cultural Resources Coordination Meeting
July 12, 2018	Public Advisory Committee Meeting
August 15, 2018	Natural Resources Agency Meeting
August 24, 2018	Site Walk with Natural Resource Agency Representatives
September 26, 2018	Public Information Meeting
November 13, 2018	Public Advisory Committee Meeting
December 4, 2018	Public Advisory Committee Meeting
December 12, 2018	Sun Valley Abutter Meeting
January 16, 2019	Natural Resources Agency Meeting
January 24, 2019	Site Walk with NHDHR and Consulting Parties
January 30, 2019	Public Information Meeting
February 6, 2019	New Hampshire Dredge Management Task Force Meeting
February 14, 2019	Cultural Resources Coordination Meeting

Date	Meeting/Site Walk
March 21, 2019	Meeting with USFWS and NHFG
August 29, 2019	Public Advisory Committee Meeting
December 18, 2019	Natural Resources Agency Meeting
December 18, 2019	Meeting with USFWS and NHFG
March 12, 2020	Cultural Resources Coordination Meeting
April 1, 2020	Public Advisory Committee Meeting
October 14, 2020	Cultural Resources Coordination Meeting
December 16, 2020	Natural Resources Agency Meeting
January 6, 2021	Public Advisory Committee Meeting
January 14, 2021	Public Information Meeting

Source: FHI

A Public Hearing will be held during the public review period to receive comments on this EA.

1.4 Section 106 Compliance

Section 106 of the NHPA requires that federal agencies consider the effects of their actions on historic properties. Historic properties are defined as buildings, structures, sites, objects and districts that are listed on, or eligible for listing on, the National Register of Historic Places (NRHP). The Advisory Council on Historic Preservation (ACHP) regulations implementing Section 106 define a process for identifying and evaluating effects to historic properties. This process includes: (1) determining the APE; (2) identifying cultural resources within the APE that are either listed on, or eligible for listing on, the NRHP; (3) applying the criteria of adverse effect to affected resources; and (4) considering ways to avoid, minimize or mitigate the adverse effects. The State Historic Preservation Officer, Consulting Parties, and the public each have a role in the Section 106 consultation process.

For the Hampton Harbor Bridge Project, the Section 106 process is being coordinated with the NEPA process, as recommended by the CEQ Regulations and the Advisory Council on Historic Preservation's Handbook on Coordinating NEPA and Section 106. The NEPA and Section 106 reviews began early in the project planning and the processes have informed each other throughout. Public Information Meetings and Cultural Resources Coordination Meetings, as noted in Section 1.3 above, were held at key milestones in project development. Public meeting notices referenced Section 106 and materials were made available at the meetings detailing the process for becoming a consulting party. This EA provides a summary of the Section 106 process, including the definition of the APE, the identification of historic properties, the application of the criteria of adverse effect, and the identification of mitigation measures. The final mitigation measures will be documented within a Memorandum of Agreement (MOA) for the Project.

In 1994, in an MOA for the replacement of Col. Alexander Scammell Memorial Bridge, FHWA and NHDOT committed to working towards the long-term maintenance and preservation of the remaining bascule bridges in the state, the Neil R. Underwood Bridge and the NH Route 1B Bridge over Little Harbor. This provision was to address the loss of the Scammell Bridge, one of three bascule bridges in the state at that

time. However, NHDOT has determined that the Neil R. Underwood Bridge is structurally deficient and can no longer be maintained. FHWA consulted with ACHP and ACHP provided guidance on how to proceed with the consultation process. FHWA, working with NHDHR and Consulting Parties, determined that a new MOA should developed. The MOA developed for the Neil R. Underwood Bridge replacement will reference the 1994 Scammell Bridge MOA and clarify the connection between the two consultation processes.

Since the Neil R. Underwood Bridge and the NH Route 1B Bridge over Little Harbor are tied together through the 1994 Scammell MOA, and since the replacement of these bridges could result in the loss of the bascule bridge type in the State of NH, the identification of mitigation measures for both projects was undertaken together through meetings and correspondence between NHDOT, NHDHR and Consulting Parties. A separate MOA that will also reference the 1994 Scammell Bridge MOA and clarify the connection between the two consultation processes will be prepared for the NH Route 1B Bridge over Little Harbor project.

1.5 Environmental Issues Considered

This EA has been prepared to evaluate the impacts the proposed replacement of the Neil R. Underwood Bridge (the Proposed Action) would have on a range of natural and man-made resources and considerations. Resources and considerations addressed in detail in this EA include:

- Natural Resources, including Water Resources and Water Quality; Wetlands; Floodplains and Floodways; Coastal Zone Consistency; Wildlife and Aquatic Habitat; and Threatened and Endangered Species
- Socioeconomic Resources, including Land Use; Environmental Justice; and Economic Resources
- Transportation, including Marine and Vehicular Traffic and Transportation; and Bicycle and Pedestrian Circulation
- Cultural Resources, including Historic Resources and Archaeological Resources
- Visual Resources
- Section 4(f) Resources
- Section 6(f) Resources
- Hazardous Materials Sites/Contamination
- Climate Change and Resilience
- Utilities
- Air Quality
- Noise

A number of other resources and considerations were evaluated at the outset of the planning process, but were eliminated from detailed documentation within the EA because no impacts were evident. These include:

- Energy Needs
- Land Acquisition
- Farmlands
- New Hampshire Designated Rivers
- National Wild and Scenic Rivers
- Forestlands

2 Purpose and Need

2.1 Project Purpose

The purpose of the project is to provide a safe, reliable, and structurally sound crossing over the Hampton Harbor Inlet, while also improving mobility for the traveling public. This includes drivers, bicyclists and pedestrians, as well as maritime users.

2.2 Project Need

The project is necessary because the existing bridge is structurally deficient and functionally obsolete, and is on NHDOT's "Red-List", which identifies deficient bridge structures that are a priority for the state to address. Since its construction in 1949, the bridge has been repaired or rehabilitated numerous times, including in 1963, 1978, 1984, 1990, 2002, and 2011. In addition, emergency repairs to the bascule span were undertaken in 2017 when the bridge became stuck in the raised position due to deterioration in the gears of the structure's mechanical system and interim repairs were made in 2018 to provide a more permanent repair until this project is constructed.

Despite the efforts to repair and maintain the bridge, several recent inspections have indicated the bridge's superstructure is in poor condition and the substructure is just in satisfactory condition. The bridge's superstructure exhibits extensive paint failure and surface rust, and pack rust is evident between the girder plates in numerous areas on the bridge. The floor beams and bracing also exhibit corrosion, the deck joints show damage, and the bridge's bearings display severe corrosion. One of the piers is slightly out of alignment and has substantial spalling and cracking at its cap, while a second pier has substantial scour pockets below the waterline. Finally, there's corrosion on the stairway supports.

Inspections of the bridge's mechanical system conducted in 2018 found that it is in overall poor condition with a few components in severe condition. The main operating machinery, much of it original to the structure, is in fair to poor condition. There are no machinery brakes and the bridge has no redundant means of operations. The emergency drive system is in severe condition and inoperable due to physical deterioration of the motor, brakes and bearings. Severe section loss is evident in the machinery support and bearing fasteners, and the live load bearings are in poor condition. Moreover, the instrumentation machinery and limit switches are generally outdated and in poor condition due to damaged linkages, physical deterioration, and poor maintenance. This deteriorated machinery led to the 2017 malfunction.

The electrical system is also outdated and doesn't meet current standards. The motor control center and control system are in poor condition due to deterioration, periodic tripping of motor overloads, and a lack of working clearances to meet National Electrical Code requirements. The control desk is also in poor condition due to several inoperable components.

In addition to structural and mechanical deficiencies, the current roadway width doesn't adequately accommodate the combined use by vehicles, bicyclists and pedestrians. Existing travel lane and shoulder widths at the bridge are inconsistent with roadway approaches. Moreover, the shoulders are narrow and there is no sidewalk on the west side of the bridge; the sidewalk on the east side is narrow, at just 4'-7". Due to the width of the shoulders, some bicyclists use the sidewalk, which creates conflicts with pedestrians. In addition, the shoulder is not wide enough to provide safe haven for disabled vehicles. Video recorded in 2018 for the project's traffic analysis revealed pedestrians and bicyclists crossing the

roadway to get to and from the eastern sidewalk. The roadway and bridge do not safely accommodate such crossings. Finally, the narrow shoulders do not allow for the passage of emergency vehicles over the bridge during periods of high traffic which is another safety concern.

3 Alternatives

3.1 No-Build Alternative

Under the No-Build Alternative, the Neil R. Underwood Bridge would not be replaced. Ongoing maintenance would occur, but deterioration, due to harsh marine conditions, would continue. Mechanical failures, such as occurred in 2017, would likely become more frequent, and the cost to maintain the bridge would increase. Over time, the bridge would be down posted for vehicular loads and could eventually be closed, restricting access for residents, visitors, business owners and emergency vehicles. As such, this alternative does not meet the project's Purpose and Need.

3.2 Replacement with Fixed Bridge – Preferred Alternative

The Replacement with Fixed Bridge Alternative would construct a new structural steel fixed bridge approximately 75 feet west of the existing bascule bridge (see Figure 5 and Figure 6). The existing bridge would then be demolished. The total length of the new bridge would be approximately 1,300 feet and the approaches would be curved slightly to allow the new bridge alignment to tie into NH Route 1A north and south of the bridge. At its peak, the deck of the new fixed bridge would be approximately 30 feet higher than that of the existing bascule bridge. The bridge would have two 11-foot travel lanes, with eight-foot shoulders and six-foot sidewalks on each side, resulting in a 50-foot inside width.

The bridge would be comprised of seven spans supported on six piers and two abutments (see Figure 7). The end spans would measure approximately 162 feet in length, while the five central spans would each measure approximately 195 feet in length. Scenic overlooks would be installed at Piers 2 and 5 on both sides of the bridge. The increased clearance between the piers would allow for the widening of the federal navigational channel under the bridge from the current 40 feet to 150 feet. This would match the full width of the existing Entrance Channel approaching the bridge.

The vertical underclearance on the new bridge would be 48 feet, which includes the 44 feet of required vertical clearance to accommodate the USACE Special Purpose (dredge) Vessel (S/P/V) *Currituck*, plus four feet for SLR, the approximate Intermediate-High range estimated by the New Hampshire Coastal Risk and Hazard Commission. This would accommodate all regular and known users of Hampton Harbor. Note that the *Currituck* currently isn't able to access Hampton Harbor because of the width of the channel under the bridge.

Figure 5– Fixed Bridge Alignment

Source: FHI

Figure 6– Visualization of Fixed Bridge Alternative

Source: HDR, Inc.

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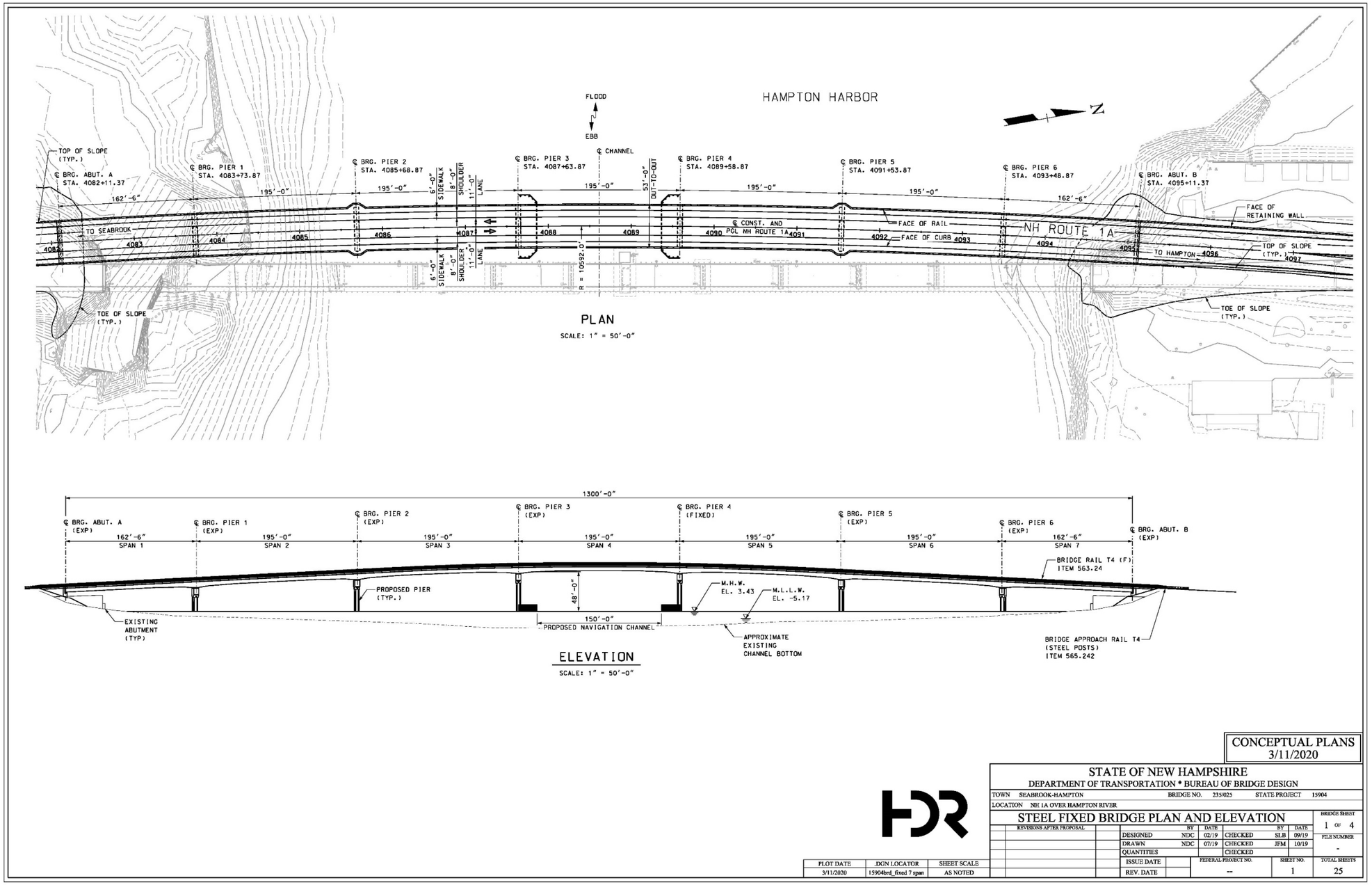
Figure 7– Plan and Section of Fixed Bridge Alternative



Source: HDR, Inc.

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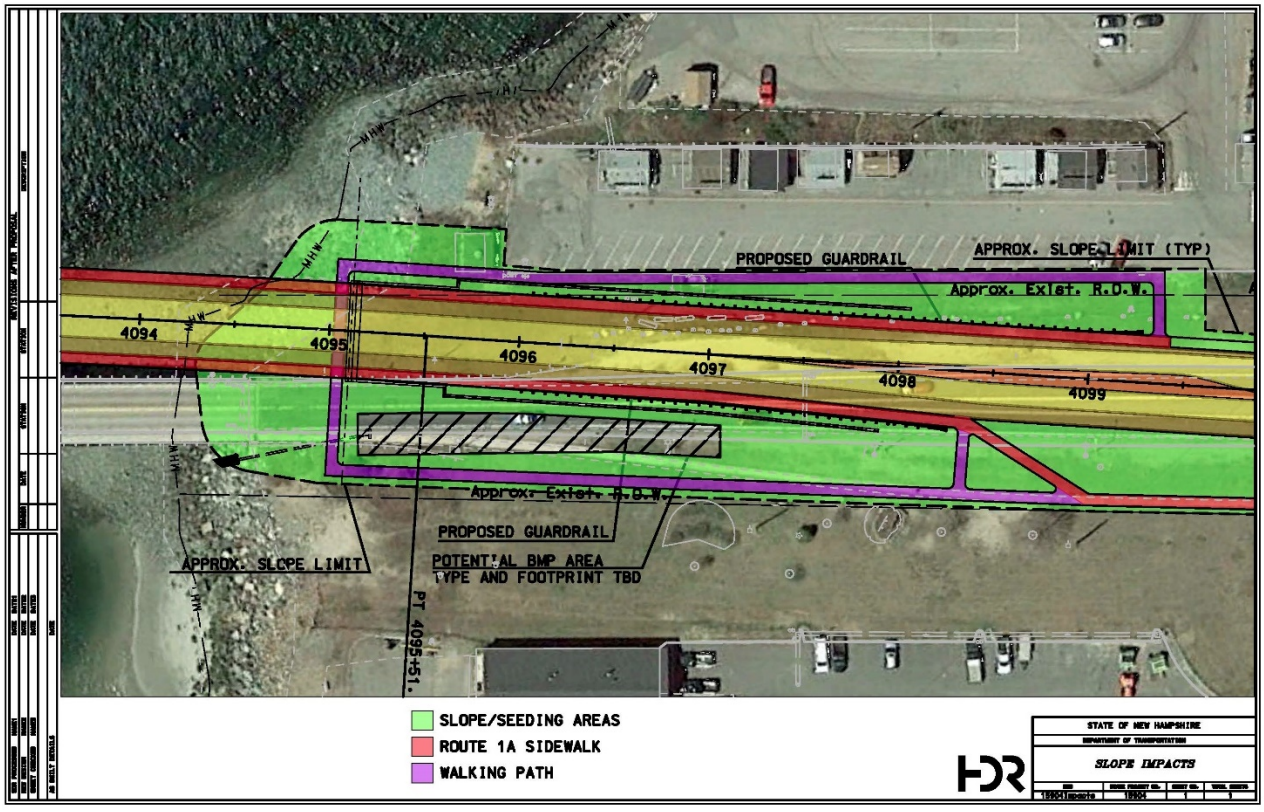
The bridge piers would be supported on drilled shafts which would be cast into a reinforced concrete pile cap. Steel casings for the shafts would be driven into place and would either remain in place or be vibrated out once construction is complete. Cofferdams would be installed at each of the pier locations prior to the installation of the drilled shafts and pier caps to ensure that no suspended sediment from the construction reaches the water column. All water and drill waste material would be extracted from the casing during drilling and pumped onto a barge for removal of suspended particulates and proper disposal.

Each of the two abutments would have U-shaped reinforced concrete wingwalls supported on steel bearing piles. The piles would likely be vibrated to resistance and then driven the rest of the way. At the southern abutment, rip rap would be placed above the USACE jurisdictional high tide line, to provide armoring for the abutment. At the northern abutment, rip rap would extend from the face of the abutment and wingwalls to just below the MHW elevation, within jurisdictional waters. A 250-foot retaining wall would be installed northwest of the bridge to minimize impacts to parking at the State Pier. A similar retaining wall would be constructed on the northeast side of the bridge to minimize impacts to the State Park and to allow for the siting of a stormwater treatment swale. A path for pedestrians and bicyclists would be constructed under the bridge between the north abutment and the water to connect both sides of the roadway (see Figure 8). The path would be located above the HOTL.

Figure 8 - Pedestrian Path on North Side of the Bridge



Source: HDR, Inc.

A new drainage collection and conveyance system would change the open scupper drainage approach on the existing bridge to eliminate direct discharge into the harbor. Drainage discharges would be routed through new treatment swales within the existing ROW at the northern and southern approaches before

flowing into the harbor. Stormwater flow on the southern approach would be diverted to a proposed treatment swale southeast of the bridge between NH Route 1A and Eisenhower Avenue. Flow from the northern approach roadway would be channeled to new catch basins with sumps north of the bridge. Stormwater would be diverted to the proposed treatment swale located northeast of the bridge (see Figure 8).

During construction, temporary access would be required for the new bridge construction. As part of this, work trestles would be constructed adjacent to, and west of, the proposed bridge alignment from both the north and south shores, but not across the navigation channel. Vehicular access to the trestles would be provided through the Hampton State Pier Property. To ensure safety of the users of the State Pier, several businesses would have to be relocated during a portion of the construction period and approximately 18 parking spaces would be temporarily unavailable. During the demolition of the existing bridge, temporary trestles would be built adjacent to, and east of, the existing bridge from both the north and south shores. The proposed bridge and existing bridge trestles would likely not be in place at the same time. It is assumed the trestles would be approximately 30-feet wide, with a leg extending perpendicular to each proposed pier in order to place the cofferdams and to be able to reach all drilled shafts at each pier; a similar configuration would be used for demolition of the existing bridge. An abandoned water pumphouse located northwest of the bridge would require removal in order to provide construction access. During construction of the new bridge, the existing bridge would be functional and open to vehicular traffic; the navigation channel would also be maintained.

Water and sewer lines are buried below the harbor bed and would need to be relocated by the utility providers prior to beginning construction. One gas line is directly under the location of the new Fixed Bridge, however it has been abandoned. The line would either be partially or fully removed or relocated. Two water lines and one sewer line would also be relocated to the west, out of the way of the temporary trestles. The utility lines could be placed atop the bed, at least temporarily. The Fixed Bridge could be designed to allow for the water, sewer, and gas lines to be attached to the bridge by others in the future.

Construction of the new bridge and demolition of the existing bridge would occur over approximately 36 months, anticipated to begin in 2024. In-water work for the relocation of utilities, placement of the sheet piles, dredging for the widened channel, and installation and removal of the trestles would occur between November 15th and March 15th to minimize impacts to listed aquatic species and habitat.

3.3 Replacement with Bascule Bridge

The Replacement with Bascule Bridge Alternative would construct a new concrete and steel bridge with a movable span over the navigational channel (see Figure 9). The existing bridge would be demolished. The new bascule bridge would be constructed approximately 75 feet west of the existing alignment at the midpoint of the bridge on the same alignment as the Fixed Bridge Alternative (see Figure 5). The total length of the bridge would be approximately 1,300 feet and the approaches would be curved slightly to allow the new bridge alignment to tie into NH Route 1A north and south of the bridge. At its peak, the deck of the new fixed bridge would be approximately 15 feet higher than that of the existing bascule bridge. Similarly, the top of the operator's house would be approximately 11 feet higher than that of the current bridge. Like the Fixed Bridge, the Bascule Bridge would have two 11-foot travel lanes, with eight-foot shoulders and six-foot sidewalks on each side. As with the Fixed Bridge Alternative, scenic overlooks

would be provided at Piers 2 and 5 to allow pedestrians to enjoy the views of the Hampton and Seabrook Harbors and the Atlantic Ocean.

Figure 9– Visualization of the Bascule Bridge Alternative

Source: HDR, Inc.

The new bascule bridge would be comprised of seven spans supported on six piers and two abutments (see Figure 10). The bascule pier would be located south of the navigational channel to minimize impacts to the Seabrook and Hampton Channels. Three-span continuous approach units would be proposed on each side of the bascule span, approximately 543 feet long on the south side and approximately 602 feet long on the north side. The bascule span would be approximately 116 feet long and would be located over the navigational channel. The spacing of the piers would allow for the widening of the navigational channel from 40 feet to 80 feet. The bascule span would be steadied during opening through the use of a counterweight. The bridge would be opened with an electrical motor. A second motor would be installed for emergencies. The vertical clearance in the closed position would be 34 feet at MHW. This would provide 30 feet of vertical clearance which would accommodate the majority of the cruise and fishing vessels that go under the bridge regularly, and four feet of additional clearance for potential future SLR. It is anticipated that this increase in height over the current condition would reduce bridge lifts by at least 55 percent. Similar to the existing bridge, the new bascule bridge would provide for unlimited vertical clearance within the navigational channel when the bridge is in the open position.

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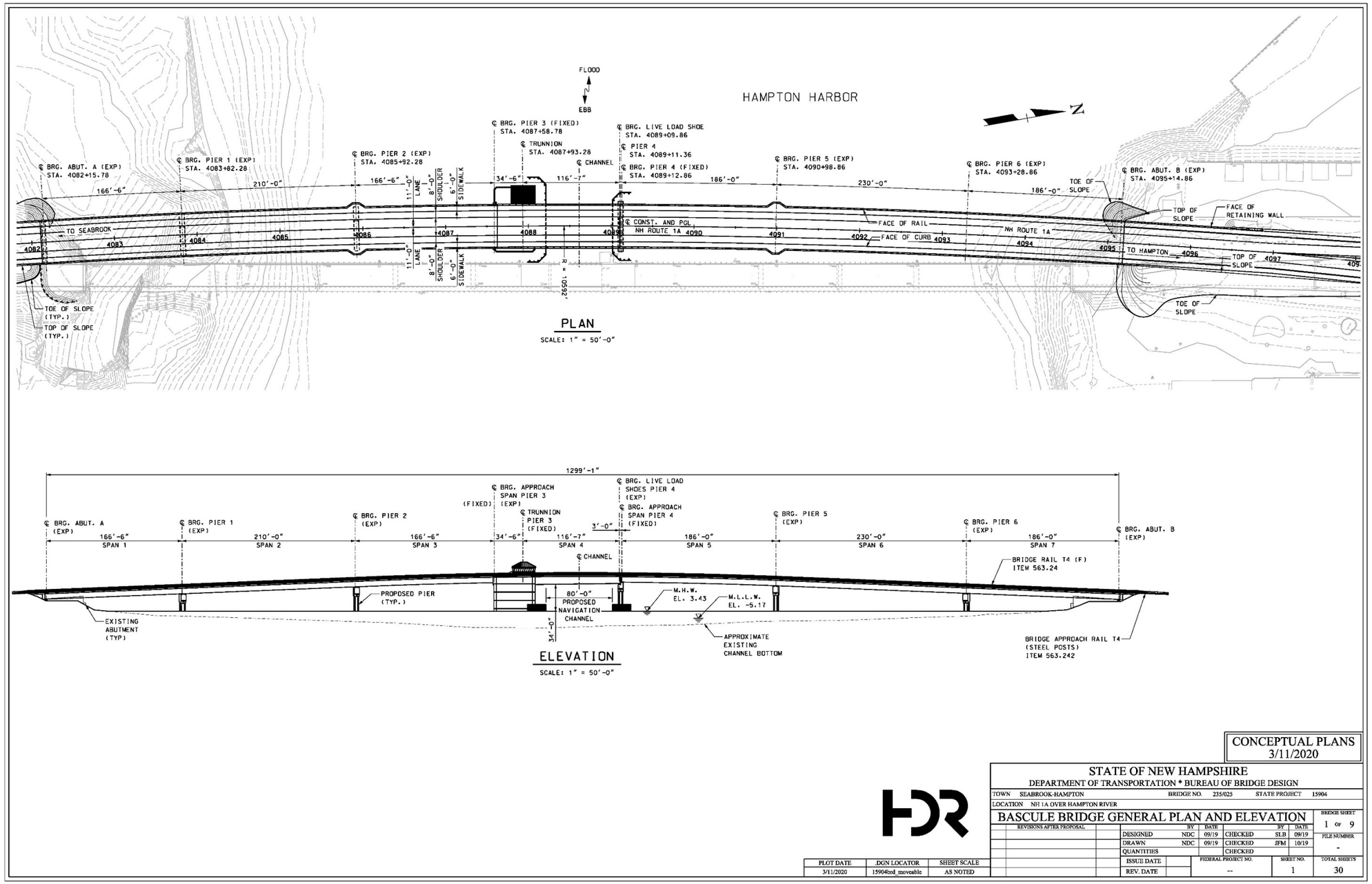
Figure 10– Plan and Section of Bascule Bridge Alternative



Source: HDR, Inc.

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The abutments would be similar to the Fixed Bridge Alternative, with U-shaped reinforced concrete wingwalls supported on steel bearing piles. The piles would likely be vibrated to resistance and then driven the rest of the way. At the southern abutment, rip rap would be placed above the USACE jurisdictional high tide line, to provide armoring for the abutment. At the northern abutment, rip rap would extend from the face of the abutment and wingwalls to just below the MHW elevation, within jurisdictional waters. A retaining wall approximately 130 feet in length would be installed to minimize impacts to the parking at the Hampton State Pier. A similar retaining wall would be constructed on the northeast side of the bridge to minimize impacts to Hampton Beach State Park. A path for pedestrians and bicyclists would be constructed under the bridge between the north abutment and the water to provide a connection between the two recreational uses (see Figure 8). The path would be located above the HOTL.

The proposed bascule pier would be a fully enclosed reinforced concrete pier. It would include housing for the machinery platform and counterweight. All of the electrical distribution and controls would be located in an electrical room in the pier. Workspace and restrooms for the bridge operators would also be located within the bascule pier. The operator's house, located directly above the electrical room, would provide sufficient room for the bridge's control systems.

As with the Fixed Bridge, a new drainage collection and conveyance system would change the open scupper drainage approach to eliminate direct discharge into the harbor. Drainage discharges would be routed through new treatment swales within the ROW at the northern and southern approaches before flowing into the harbor. Stormwater flow on the southern approach would be diverted to a proposed treatment swale southeast of the bridge between NH Route 1A and Eisenhower Avenue. Flow from the northern approach roadway would be channeled to new catch basins with sumps north of the bridge. Stormwater would be diverted to the proposed treatment swale located northeast of the bridge.

Like the Fixed Bridge, the Bascule Bridge would utilize temporary work trestles during construction. The trestles would be installed adjacent to, and west of, the proposed bridge alignment from both the north and south shores, but not across the navigation channel. Vehicular access to the trestles would be provided through the Hampton State Pier property. To ensure safety of the users of the State Pier, several businesses would have to be relocated during a portion of the construction period and approximately 18 parking spaces would be temporarily unavailable. During the demolition of the existing bridge, temporary trestles would be built adjacent to, and east of, the existing bridge from both the north and south shores. The temporary trestles would be supported on steel pipe piles. The proposed bridge and existing bridge trestles would likely not be in place at the same time. It is assumed the trestles would be approximately 30-feet wide, with a leg extending perpendicular to each proposed pier in order to place the cofferdams and to be able to reach all six drilled shafts at each pier; a similar configuration would be used for demolition of the existing bridge. An abandoned water pumphouse located northwest of the bridge would require removal to provide construction access. During construction of the new bridge, the existing bridge would be functional and open to vehicular traffic; the navigation channel would also be maintained.

The water and sewer lines buried below the harbor bed would need to be relocated by the utility providers prior to beginning construction. The abandoned gas line could require partial or full removal or relocation. As with the Fixed Bridge Alternative, the sewer and water lines could be relocated to the west and would be placed atop the bed, at least temporarily. Because the new Bascule Bridge would be movable it would

not accommodate having utility lines run on it. Instead, the lines would need to be located on or below the harbor bed as determined by the utility owner.

Construction of the new bridge and demolition of the existing bridge would occur over approximately 42 months, anticipated to begin in 2024. In-water work for the relocation of utilities, placement of the sheet piles, dredging for the widened channel, and installation and removal of the trestles would occur between November 15th and March 15th to minimize impacts to listed aquatic species and habitat.

3.4 Alternatives Considered but Dismissed from Detailed Analysis

As discussed in Section 1.2, Project History, two additional alternatives were considered during the planning process, but then eliminated from detailed analysis; the Rehabilitation (with Widened Bridge) and Twin Bridge (with Rehabilitated Bridge) Alternatives. In addition, an eastern alignment was considered for each of the two replacement alternatives. A description of these alternatives and the rationale for not carrying them forward is provided below.

3.4.1 *Replacement on Eastern Alignment*

As indicated in Section 1.2, an Alignment and Profile Study was completed early in the planning process prior to fully defining each of the alternatives. This early study evaluated the potential issues with and benefits of both eastern and western alignments. An eastern alignment would have resulted in greater impacts to the residential properties southeast of the bridge, potentially requiring one or more full property acquisitions. Through coordination with stakeholders and the PAC, it was determined that this was not a viable option due to substantial public opposition. As such, the two replacement alternatives were advanced on a western alignment.

3.4.2 *Rehabilitation (with Widened Bridge)*

The Rehabilitation Alternative would maintain the overall form of the existing bridge, widening it to the east, and would replace the superstructure to provide necessary structural capacity and roadway width. Widening the bridge to the east rather than to the west would allow for the preservation of the operator's house, a character-defining feature of the historic bridge. A temporary bridge with a movable span would be required west of the existing bridge to maintain vehicular and maritime circulation during construction. This alternative would require in-water work due to the widening of all piers and abutments. The piers not founded on piles would remain scour critical and would need to be analyzed to determine if they could carry the additional loads. Vehicular delays due to the bridge opening would continue, and there would be no improvement to the vertical underclearance or horizontal clearance of the navigational channel. As such, this alternative was dismissed from detailed analysis.

3.4.3 *Twin Bridge (with Rehabilitated Bridge)*

The Twin Bridge (with Rehabilitated Bridge) Alternative was developed to minimize impacts to the existing historic bridge. This alternative would rehabilitate the existing bascule bridge while also constructing a new (twin) bascule bridge immediately to the west of the existing bridge. Northbound traffic would remain on the rehabilitated existing bridge and southbound traffic would be moved to the new twin bridge. The new bridge would be similar in width and include a bascule span configuration similar to the existing bridge. The navigational channel would remain unchanged from its current condition. The two independent bascule spans requiring simultaneous lifts would pose increased challenges for vessels

passing under the bridges. Moreover, vehicular delays due to bridge lifts would persist. This alternative would have the greatest physical footprint, and therefore the greatest impact on the sensitive habitat in the dunes to the west of the bridge. It would also have the highest initial construction cost, the highest life cycle cost, and the longest construction duration of all of the alternatives. As such, it was dismissed from detailed analysis.

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4 Affected Environment and Environmental Consequences

4.1 Land Use and Public Policy

4.1.1 *Methodology*

The analysis that follows outlines existing land uses in the Study Area and applicable state, regional and local development plans. It then assesses impacts to land uses as result of the alternatives, as well as the consistency of the alternatives with these planning documents. For the purposes of this analysis, the Study Area boundary encompasses lands within approximately one mile of the existing bridge.

4.1.2 *Existing Conditions*

Setting

The area surrounding the bridge is primarily comprised of seasonal business, residential, and recreational uses to the north, and residential and recreational uses to the south (see Figure 4). Hampton Beach and Seabrook Beach are located to the east, north and south of the bridge. To the west lies Hampton and Seabrook Harbors, with open space and recreational uses, marine-related uses (moorings, marina, and commercial fishing) and natural areas. The bridge crosses the Hampton Harbor Inlet.

Land uses immediately to the north of the inlet on the west of the bridge are commercial and recreational in nature. The State Pier facility is owned by the Pease Development Authority, Division of Ports and Harbors (Port Authority). It includes an abandoned saltwater pumphouse, a paved parking lot and access road, several businesses housed in a series of small one-story buildings, and a boat launch on the Hampton Harbor waterfront. The businesses are marine focused, including fishing charters, boat rentals and seafood sales. The businesses own the buildings and lease their space from the Port Authority.

To the east of the bridge on the north side of the channel lies Hampton Beach State Park. The park is owned by the State of New Hampshire and is managed by DNCR. This park provides year-round recreation, with Atlantic Ocean-front facilities situated along miles of sandy beach. Recreational uses in the park include swimming, fishing, picnicking, and RV camping in a designated and managed campground. Further north, along Ashworth Avenue and Ocean Boulevards, there are a combination of seasonal commercial and residential uses.

The Dunes WMA (also referred to as the Hampton Harbor Wildlife Management Area and the Old Barge Facility) lies to the southwest of proposed bridge site. It is comprised of vegetated dune and open sand beach, used by residents and visitors for seasonal recreational fishing and sunbathing. The Dunes WMA, which lies within both the Towns of Hampton and Seabrook, is owned by NHFG in the Town of Hampton and by DNCR in the Town of Seabrook. The area was transferred from NHDOT to the NHFG and DNCR in 1988 with the provision that should the land be needed for highway purposes; it would revert to NHDOT. Harborside Park is located south of the Dunes WMA. Further south, land uses are primarily commercial on the west side of NH Route 1A, including the Yankee Fishermen's Co-Op, and along River Street close to NH Route 1A. As River Street extends west, commercial land uses give way to residential uses. Sun Valley Beach, owned by the Town of Hampton, lies east of the bridge on the south side of the Hampton Harbor Inlet. South of the beach to the east of the bridge, the Sun Valley neighborhood is solidly residential.

Consistency with Regional, State and Local Plans

The Study Area falls within four successively larger planning regions, namely the Hampton Beach Area Commission, the Towns of Hampton and Seabrook; the Rockingham Planning Commission region; and the State of New Hampshire. The plans formulated at each level (local, regional, and state) articulate the vision, goals, and objectives for future land use and/or the transportation system. Key relevant findings of policy and planning reports developed for these regions are summarized below.

Hampton Beach Area Commission

The Town of Hampton and the State of New Hampshire published the Hampton Beach Area Master Plan in 2001 to create a common vision for the area and identify specific actions to incrementally improve the beach and its environment. The plan was adopted by the Hampton Planning Board in November 2001. The Hampton Beach Area Commission was established in 2003 to assist the Town of Hampton and the State of New Hampshire in the long-range planning for the Hampton Beach area and implementation of the Hampton Beach Area Master Plan (RSA 216-J).

The Plan's purpose is "to coordinate public and private sector initiatives that will enhance the environmental, recreational and economic value of this area, and support extended seasonal activity and year-round residents." The Plan calls for a future Hampton Beach that includes improved beach and recreational areas, an attractive harbor and waterfront that increases public access, a protected environment and enhanced open spaces, and improved infrastructure that allows all users to travel and park without delays.

Strategies and recommendations in the Hampton Beach Area Plan related to the Hampton Harbor Bridge Project include:

- A new emphasis on pedestrian and bicycle use through extensive sidewalk, streetscape, and bikeway improvements.
- Improved gateways that welcome visitors to Hampton Beach.
- Linking the State Park and the State Pier with a walking and bicycle path.
- Reconstructing the Route 1A Bridge over Hampton River to allow greater clearance for boats and reduce vehicular congestion by reducing the number of bridge openings.

The Hampton Beach Master Plan Transportation Update was completed in 2018 with a focus on improving multi-modal mobility and transportation safety from the north side of the Neil R. Underwood Bridge to the intersection of Route 1A and High Street to the north along Route 1A. The plan update notes that intersection alternatives near the Neil R. Underwood Bridge and the State Park would be considered after the new bridge design and placement is determined.

Town of Hampton

The Town of Hampton's Master Plan was adopted in 1985, with amendments to specific chapters through 2017. The Master Plan is currently being updated and the first phase of the update is the Vision and Coastal Management portions of the plan. As part of that process, the public input process and plan development is ongoing. The draft Vision Statement for the Master Plan Update as published on September 14, 2020 is as follows:

> The Town of Hampton will leverage its existing community strengths to foster economic development in a village-like town center that is closely connected to the beach communities

of the town, both areas populated by thriving small businesses, and forming an overall sense of place despite the different characters of the town center and beach areas. The Town will further strengthen its coastal neighborhoods by making existing housing and infrastructure more resilient to flooding and climate change while facilitating movement of some people to areas of lower risk within Hampton, preserving the Town's economy and making it possible for families to remain in Hampton over the long term (Town of Hampton, 2020).

Town of Seabrook

The Master Plan for the Town of Seabrook was adopted in December 2011. The Coastal Hazards and Adaptation chapter was adopted in 2016. The goals and objectives of this Plan include preserving and protecting the natural and beach/estuarine environment in balance with recreational, economic, business and employment opportunities; and offering multiple modes of transportation facilities and services that provide connections to neighborhoods, businesses, and services as well as regional destinations.

Specific objectives or actions in the Plan related to the Hampton Harbor Bridge Project include:

- Provide a level of public infrastructure and services that enables economic development in a cost-effective manner.
- Continue to invest in public infrastructure such as roads, bridges…to ensure that the town's infrastructure can support current and future business activity.
- Work cooperatively with the NHDOT to assure that any state bridges that are rebuilt or reconstructed provide adequate space for pedestrians and bicycle travel.
- Participate in the coordination of state and local transportation planning that addresses both local and regional needs.

Rockingham Planning Commission

The Rockingham Planning Commission (RPC) was established in 1981 and consists of 27 member communities located in southeastern New Hampshire, including the Towns of Seabrook and Hampton. The RPC serves in an advisory role to local governments to promote coordinated planning, orderly growth, efficient land use, transportation access and environmental protection. The RPC is not affiliated with the Rockingham County government.

The RPC's Regional Master Plan, as updated through March 2015, establishes a regional vision and goals. It is intended to serve as a guidance document for the municipalities when preparing their local master plans. Relative to the Hampton Harbor Bridge Project, the RPC's Regional Master Plan includes the following regional transportation goals:

- *Goal 1 – Mobility:* The region's multi-modal transportation system offers safe, secure and efficient access to employment, housing, commerce, services, entertainment, and recreation.
- *Goal 5 – System Preservation:* Maintenance, preservation, and modernization needs of the existing multi-modal transportation system are prioritized ahead of adding new highway capacity.

Relative to the Hampton Harbor Bridge Project, the RPC Regional Master Plan includes the following transportation recommendation:

- "*Recommendation*: Increase the funding available for operation, maintenance and modernization of transportation infrastructure and utilize public/private partnerships to facilitate project implementation where appropriate."

The RPC also has a Regional Long-Range Transportation Plan. The 2019 Update serves as the short and long-range transportation planning document for the RPC, which is the designated Metropolitan Planning Organization (MPO) for the area. The plan sets out the region's adopted goals and strategies, as well as specific project proposals to improve the transportation system through 2045. Relative to the Hampton Harbor Bridge Project, the Regional Long-Range Transportation Plan includes the following MPO goals:

- *Goal 2* – Transportation Choices: The region's transportation system offers equitable and reliable multi-modal transportation choices to better connect people to jobs and services.
- *Goal 3* – System Preservation & Modernization: The region's transportation system is maintained in good condition and the preservation and modernization needs of existing components are prioritized ahead of adding new highway capacity.
- *Goal 7* – Resiliency: The region's transportation system is adaptive and resilient to climate change and natural and other hazards.

The Regional Long-Range Transportation Plan includes the Hampton Harbor Bridge Project (Seabrook-Hampton 15904), as well as two long-range projects:

- Seabrook (6409006): Ocean Boulevard bicycle shoulders and curbed sidewalk linking Seabrook Beach community with Hampton Beach.
- Seabrook-Hampton (6001018): Route 1A Evacuation ITS Improvements: Deployment of Route 1A contra-flow signage, VMS, surveillance, and communications upgrades.

State of New Hampshire

The NHDOT *Long Range Transportation Plan 2010-2030*, adopted in 2010, includes a strategic approach that links plans and investments to support a set of goals and transportation system performance targets. The overall transportation vision for New Hampshire places a priority on safety; more equitable mobility options; the preservation of existing infrastructure over the creation of new infrastructure; and connecting New Hampshire to its neighbors and global markets. The Plan includes the following goal and objectives relative to the Hampton Harbor Bridge Project:

Goal 6 - System Preservation & Maintenance: Provide appropriate investment in existing and future infrastructure, facilities and equipment to maintain and preserve the physical condition and operability of the transportation system.

Objectives:

- Meet and maintain system condition targets for the State transportation system.
- Increase user satisfaction with the condition of the transportation system.
- Preserve the functional integrity of transportation corridors for future needs.

The NHDOT proposes a Ten Year Transportation Improvement Plan for improvements to the State's transportation system every two years. Its purpose is to develop and implement a plan that allows the State to participate in federally supported transportation improvement projects and outlines projects and programs funded with State transportation dollars. The Plan for 2021-2030 was approved in July 2020. The Ten Year Plan includes the reconstruction of the bridge over Hampton River (15904), or the Hampton Harbor Bridge Project, and improvements to Ocean Boulevard (Hampton 40797).

4.1.3 *Impacts of No-Build Alternative*

The No-Build Alternative would not directly impact land uses in the Study Area. However, the No-Build Alternative would not support the transportation infrastructure, operations, and safety goals of the state, regional, and local planning agencies, as outlined in the above planning documents. It would continue existing conditions, with ongoing bridge deterioration and limited pedestrian and bicycle facilities. Emergency repairs would likely increase over time and bridge openings could become more difficult. Ultimately, the No-Build Alternative could require the closure of the bridge which would have substantial impacts on vehicular circulation and access, which in turn would adversely affect access to existing land uses in the Towns of Hampton and Seabrook and would not be consistent with the goals, objectives and policies set forth in the state, regional, and local planning documents, as noted above.

4.1.4 *Impacts of Fixed Bridge Alternative*

Overall, the Fixed Bridge Alternative would not alter land uses in the area surrounding the Project Site. However, due to the Fixed Bridge Alternative's more westerly alignment, the ROW land use would extend further westward into the State Pier and Dunes WMA. While the bridge would move to the west, the overall use and access to the State Pier and Dunes WMA would remain. A transfer of land ownership would be required between State agencies (Division of Ports and Harbors to NHDOT) at the State Pier for a small portion of the property along the eastern edge of the State Pier between the parking lot and the existing bridge. A formal ownership transfer would not be required at the Dunes WMA for the southern approach of the bridge's alignment, as the land would automatically revert to NHDOT jurisdiction based on the original transfer requirements.

The fixed bridge would eliminate vehicular delays due to bridge openings and would provide increased vertical underclearance that would accommodate all regular users of the channel. It would also provide six-foot sidewalks on both sides of the bridge and eight-foot shoulders that would accommodate bicyclists and better accommodate emergency vehicles. Therefore, the Fixed Bridge Alternative would be consistent with the goals, objectives and policies set forth in the state, regional, and local planning documents, as noted above.

4.1.5 *Impacts of Bascule Bridge Alternative*

Overall, the Bascule Bridge Alternative would not impact land uses in the area surrounding the Project Site. However, due to the Bascule Bridge Alternative's more westerly alignment, the ROW land use would extend further westward into the State Pier and Dunes WMA. While the bridge would move to the west, the overall use and access to both properties would remain. As described in the Fixed Bridge Alternative, a small portion of land at the State Pier property would be transferred from the Division of Ports and Harbors to NHDOT under the Bascule Bridge Alternative and would also not require formal transfer of the Dunes WMA.

The increased vertical clearance would reduce the number of bridge lifts required by approximately 55 percent, thereby reducing vehicular delays along NH Route 1A and would provide an increased vertical underclearance when the bridge is in a fixed position. It would also provide six-foot sidewalks on both sides of the bridge and eight-foot shoulders that would accommodate bicyclists. Therefore, the Bascule Bridge Alternative would be consistent with the goals, objectives and policies set forth in the state, regional, and local planning documents, as noted above.

4.1.6 *Mitigation*

Since there would be no impacts to land uses in the area surrounding the Project Site, and since the overall use and access to the State Pier and Dunes WMA would remain under both alternatives, no mitigation is proposed.

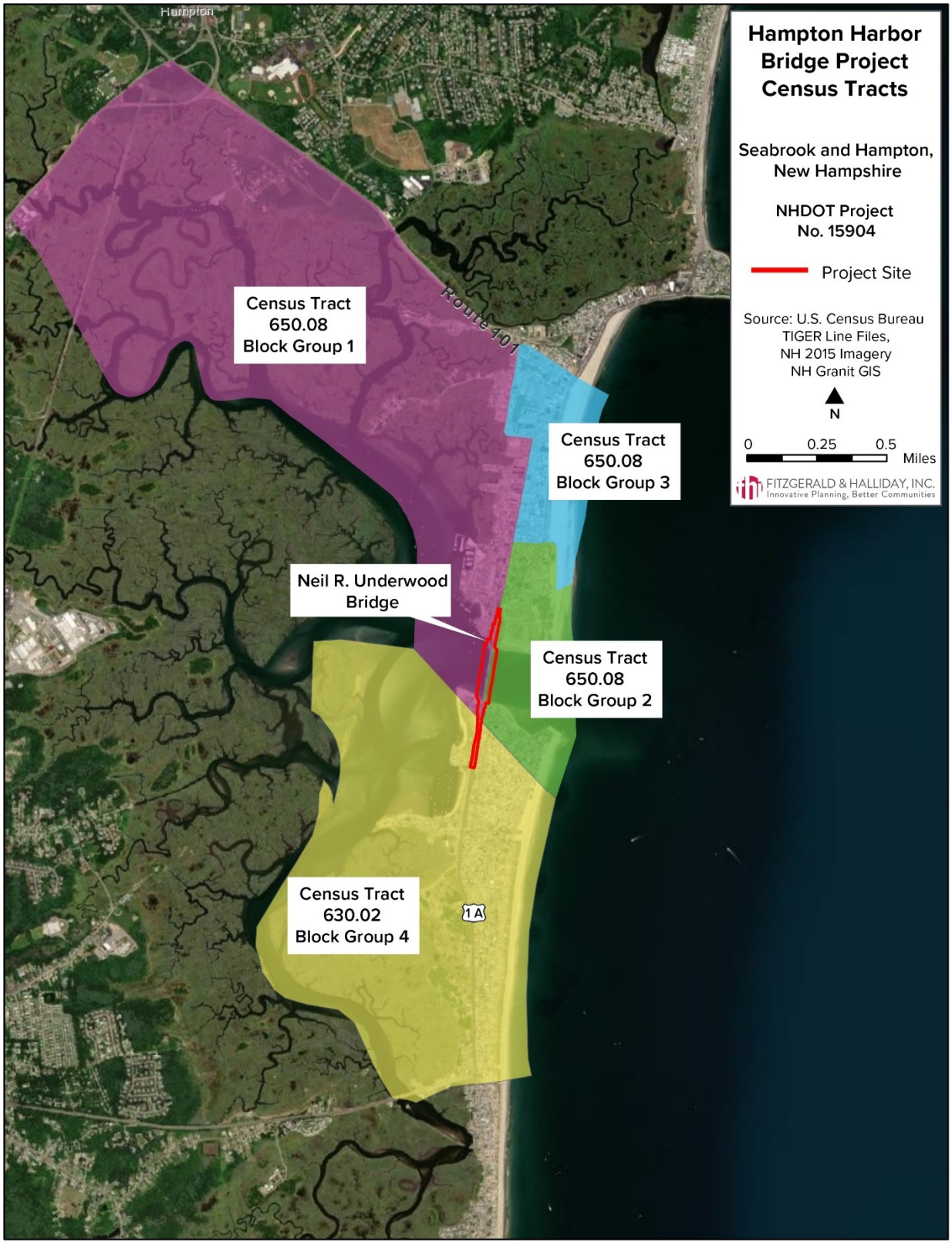
4.2 Economic Conditions

4.2.1 *Methodology*

The following discussion of regional and Study Area socioeconomic conditions includes population and demographic characteristics, major employers, employment levels, income, and property values. Comparative information on housing and local socioeconomic conditions was obtained from the American Community Survey 2019 (ACS), and the New Hampshire Employment Security – Economic and Labor Market Information Bureau, as well as regional and local information from the RPC, the Town of Seabrook, and the Town of Hampton.

In the analysis that follows, the Study Area encompasses four Census block groups (Census Tract 630.02, Block Group 4 and Census Tract 650.08, Block Groups 1, 2, and 3) (see Figure 11). These Census Tract block groups include the Neil R. Underwood Bridge and the areas to the north and south, including a portion of both the Town of Seabrook and the Town of Hampton.

Figure 11 – Census Tracts and Block Groups



Source: FHI

4.2.2 *Existing Conditions*

ACS Demographics and Housing data estimates that there are 2,861 people in the Study Area, with 901 in the Seabrook block group and 1,960 in the Hampton block groups. The overall population of the Town of Seabrook is estimated at 8,830 and the Town of Hampton at 15,467. The median household income in the Seabrook block group is $106,184 and in the Hampton block groups is $54,460, as compared with $110,456 in Rockingham County. The rate of individuals below the poverty level is 5.9% in the Seabrook block group and 8.5% in the Hampton block groups.

ACS data indicates that housing within the Study Area is primarily owner-occupied in the Seabrook block group (96.8%). In the Hampton block groups, there are more rental units, with owner-occupied homes comprising 55% of the housing. As a summer tourist destination, it can be assumed that a portion of the homes in the Study Area are second/vacation homes which are occupied by homeowners during the summer months. In Rockingham County overall, 71% of occupied housing units are owner-occupied and 29% are renter-occupied. Per ACS data, the median property value of owner-occupied units in the Seabrook block group is $534,000. Median rent data is not available for this Census block group. In the Hampton block groups, the median property value is $358,200 and the median rent is $1,091.

The ACS uses the 2017 North American Industry Classification System (NAICS) to report on employment by industry sector. In the Study Area, five sectors represent the majority (65%) of employment: arts, entertainment, and recreation, and accommodation and food services (17.4%); manufacturing (14.9%); educational services, and health care and social assistance (12.7%); professional, scientific, and management, and administrative, and waste management services (12.2%); and retail trade (7.7%).

The New Hampshire Employment Security, Economic and Labor Market Information Bureau identifies major employers within the towns of Seabrook and Hampton. Employers with over 250 employees include: NextEra Energy Services (operator of Seabrook Station Nuclear Power Plant), Market Basket, US Foods, Foss Performance Materials, and Hampton Beach Casino. Other large employers (over 100 employees) include large retail stores like Walmart and Home Depot, several hotels and restaurants, and manufacturers, along with the public school districts. The harbor has an active business sector with businesses such as charter and rental companies, fishing and boat tour operators, tackle and bait shops, seafood restaurants, the Hampton River Marina, and the Hampton State Pier. Commercial fishing is also an important industry in the region, and the Yankee Fisherman's Co-op with approximately 60 members and an active fishing fleet lies southwest of the bridge.

4.2.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, deterioration of the bridge would continue. Emergency repairs would likely increase over time, bridge openings could become more difficult, and pedestrian and bicycle circulation would remain limited which could impact the transportation of goods and customers that support local businesses directly served by the bridge. Ultimately, the No-Build Alternative could result in the closure of the bridge. Therefore, the No Build Alternative would have an eventual adverse impact on local socio-economic conditions within the Study Area.

4.2.4 *Impacts of Fixed Bridge Alternative*

The Fixed Bridge Alternative would maintain vehicular circulation across the Hampton Harbor, and improve pedestrian and bicycle circulation with the addition of sidewalks and widened shoulders on both

sides of the bridge, thereby improving access to area businesses. It would not permanently displace any businesses, displace housing units or jobs, require private land acquisitions, or affect median incomes or demographics.

The Fixed Bridge Alternative would provide continued navigation of the Hampton Harbor Channel, with an increased navigational channel width (from 40 to 150 feet) and a vertical underclearance of 48 feet to accommodate users of the channel. This includes an allowance for potential sea-level rise. It is not anticipated that the replacement of the movable bridge with a fixed span would directly affect access for commercial vessels that travel through Hampton Harbor. Based on studies done as part of the project's Navigational Impact Report, and coordination with the USACE and USCG, the alternative would clear all known users of the channel and USACE dredging equipment. While the increased channel width and increased navigational clearance without a lift would improve conditions for maritime business interests that come into and out of the harbor, the replacement of the bridge with a fixed bridge would be unlikely to increase the number of maritime businesses or the size of vessels they use, as the waterfront is well developed and the size of vessels are limited by the draft of the navigational channels.

Over the anticipated 36-month construction duration, there is the potential for short-term construction-related impacts to maritime businesses due to the presence of construction equipment within the Hampton Harbor Inlet and the increased boat traffic, however, the navigational channels would remain open during construction with only limited interruptions. Throughout construction, the connection across the Hampton Harbor Inlet would be maintained with at least two lanes of traffic on either the existing bridge or the newly constructed bridge and therefore would not affect access to most area businesses or employment. The exception to this is at the Hampton State Pier property where several businesses would have to be relocated during a portion of the construction period to ensure safety and approximately 18 parking spaces would be temporarily unavailable. However, the commercial spaces and parking would be restored when access was no longer needed. While there is the potential for short-term construction-related impacts to businesses in the vicinity of the bridge due to increased truck traffic and construction activities, these impacts would be minimized with time-of-day restrictions and the implementation of a Construction Management Plan.

4.2.5 *Impacts of Bascule Bridge Alternative*

Like the Fixed Bridge Alternative, the Bascule Bridge Alternative would maintain vehicular circulation across the Hampton Harbor, and improve pedestrian and bicycle circulation with the addition of sidewalks and widened shoulders on both sides of the bridge, thereby improving access to area businesses. It would not permanently displace any businesses, displace housing units or jobs, require private land acquisitions, or affect median incomes or demographics.

The Bascule Bridge Alternative would provide continued navigation of the Hampton Harbor channel, with an increased navigational channel width (from 40 to 80 feet). The proposed bascule pier would be located south of the navigational channel, minimizing impacts to the channel. This alternative would provide unlimited vertical clearance with the bridge raised and an underclearance of 34 feet when the bridge is down, which includes an allowance for potential sea-level rise. The increased vertical clearance would reduce the number of bridge lifts required by 55% which would reduce delays for vehicles, pedestrians, and marine users. While the increased channel width and increased navigational clearance without a lift would improve conditions for maritime business interests that come into and out of the harbor, the replacement of the bridge with a new bascule bridge would be unlikely to increase the number of

maritime businesses or the size of vessels they use, as the waterfront is well developed and the size of vessels are limited by the draft of the navigational channels.

During the anticipated 42-month construction duration, there is the potential for short-term construction-related impacts to maritime businesses due to the presence of construction equipment within the Hampton Harbor Inlet and the increased boat traffic, however, the navigational channels would remain open during construction with only limited interruptions. Throughout construction, the connection across the Hampton Harbor would be maintained with at least two lanes of traffic on either the existing bridge or the newly constructed bridge and therefore would not affect access to most area businesses or employment. The exception to this is at the Hampton State Pier property where several businesses would have to be relocated during a portion of the construction period to ensure safety and 18 parking spaces would be temporarily unavailable. However, the commercial spaces and parking would be restored when the space is no longer needed. While there is the potential for short-term construction-related impacts to businesses in the vicinity of the bridge due to increased truck traffic and construction activities, these impacts would be minimized with time-of-day restrictions and the implementation of a Construction Management Plan.

4.2.6 *Mitigation*

The Fixed Bridge and Bascule Bridge Alternatives would minimize impacts to adjacent businesses through time-of-day restrictions and the implementation of a Construction Management Plan. Businesses on the State Pier that require relocation would be relocated to another spot on the State Pier property, where feasible.

4.3 Environmental Justice

4.3.1 *Methodology*

Environmental Justice is defined by the U.S. Environmental Protection Agency (EPA) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, age or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects on the health or environment of minority and low-income populations to the greatest extent practicable. A disproportionately high and adverse effect on minority and low-income populations is defined as an adverse effect that:

- is predominately borne by a minority population and/or a low-income population, or
- will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

Title VI of the Civil Rights Act of 1964 prohibits discrimination by recipients of federal financial assistance on the basis of race, color, and national origin, including matters related to language access for those persons with limited English proficiency (LEP). Executive Order 13166 requires Federal agencies examine the services they provide, identify any need for services to those with LEP, and develop and implement a system to provide those services so LEP persons can have meaningful access to them. FHWA Order 6640.23A establishes policies and procedures for FHWA to use in complying with Executive Order 12898,

while the CEQ provides guidance on NEPA and Environmental Justice analysis in their publication *Environmental Justice: Guidance Under the National Environmental Policy Act*. These regulations and associated guidance provide the foundation for the Environmental Justice (EJ) analysis detailed below.

NHDOT prepared an environmental justice analysis for the project using the EPA EJScreen ACS Summary Report (see Appendix B). This assessment summarized minority and low-income populations as documented within the 2014-2018 Census Bureau ACS. The analysis identifies an EJ group where the proportion (percentage) of the minority or low-income population in an area is "meaningfully greater" than the percentage in the broader, surrounding area. For the purposes of this analysis, the Study Area was defined as the area within one mile of the Project Site. The surrounding area was defined as the area within three miles of the Project Site.

4.3.2 *Existing Conditions*

According to ACS data (see Table 3), the minority population is 5.79% in the Study Area and 4.16% in the surrounding area. The percentage of low-income residents is 15.8% in the Study Area and 14.05% in the surrounding area. The LEP population within the Study Area (0.0 %) is less than that in the surrounding area (0.06%). Based upon the reported data, the Study Area meets the environmental justice criteria as minority and low-income populations because its percentages exceed that of the surrounding area.

Table 3 - Comparison of ACS 2014-2018 Environmental Justice Data

	Study Area (within one mile of Project Site)	Surrounding Area (within three miles of Project Site)
Percent minority**	5.79%	4.16%
Percent low-income*	15.80%	14.05%
Percent LEP***	0.00%	0.06%

Source: ACS 2014-2018
***Low-income population is defined as household income of less than $25,000**
****Minority includes white/Hispanic population.**
*****Percent LEP includes population that speaks English less than well**

4.3.3 *Impacts of No-Build Alternative*

The No-Build Alternative would continue existing conditions, with ongoing bridge deterioration. Emergency repairs would likely increase over time and bridge openings could become more difficult. Ultimately, the No-Build Alternative could require the closure of the bridge, creating adverse impacts to surface transportation by eliminating an important north-south connection between the Towns of Seabrook and Hampton along the seacoast. Given the only north/south detour route around the Neil R. Underwood Bridge is a route that is approximately 11.75 miles long, the loss of the connection across the Neil R. Underwood Bridge has the potential to create a disproportionately high and adverse impact on the identified minority and low-income populations.

4.3.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

Potential project impacts include those related to short-term construction and long-term multi-modal circulation. There is the potential for minor short-term construction-period impacts due to noise and increased truck traffic, however, these impacts would be mitigated through best management practices (BMPs). There would be long-term beneficial impacts to vehicular circulation due to the reduction or elimination of delays due to bridge lifts. There would also be long-term beneficial impacts to bicycle and pedestrian circulation as a result of both alternatives.

As summarized above and detailed in each resource topic analysis, there would be no significant adverse short- or long-term impacts resulting from the project. In addition, extensive outreach has been undertaken to residents of the Town of Seabrook and the Town of Hampton as a part of the project. The short-term construction impacts would have a limited duration and BMPs and other measures would be employed to minimize impacts. These impacts would not be disproportionately high and adverse. Both alternatives would improve multi-modal circulation, which would benefit the community as a whole and beneficial impacts would be experienced by all adjacent residents and visitors who access the bridge. Overall, impacts from either alternative would not cause disproportionately high and adverse effects on minority or low-income populations in accordance with the provisions of EO 12898 and FHWA Order 6640.23.

4.3.5 *Mitigation*

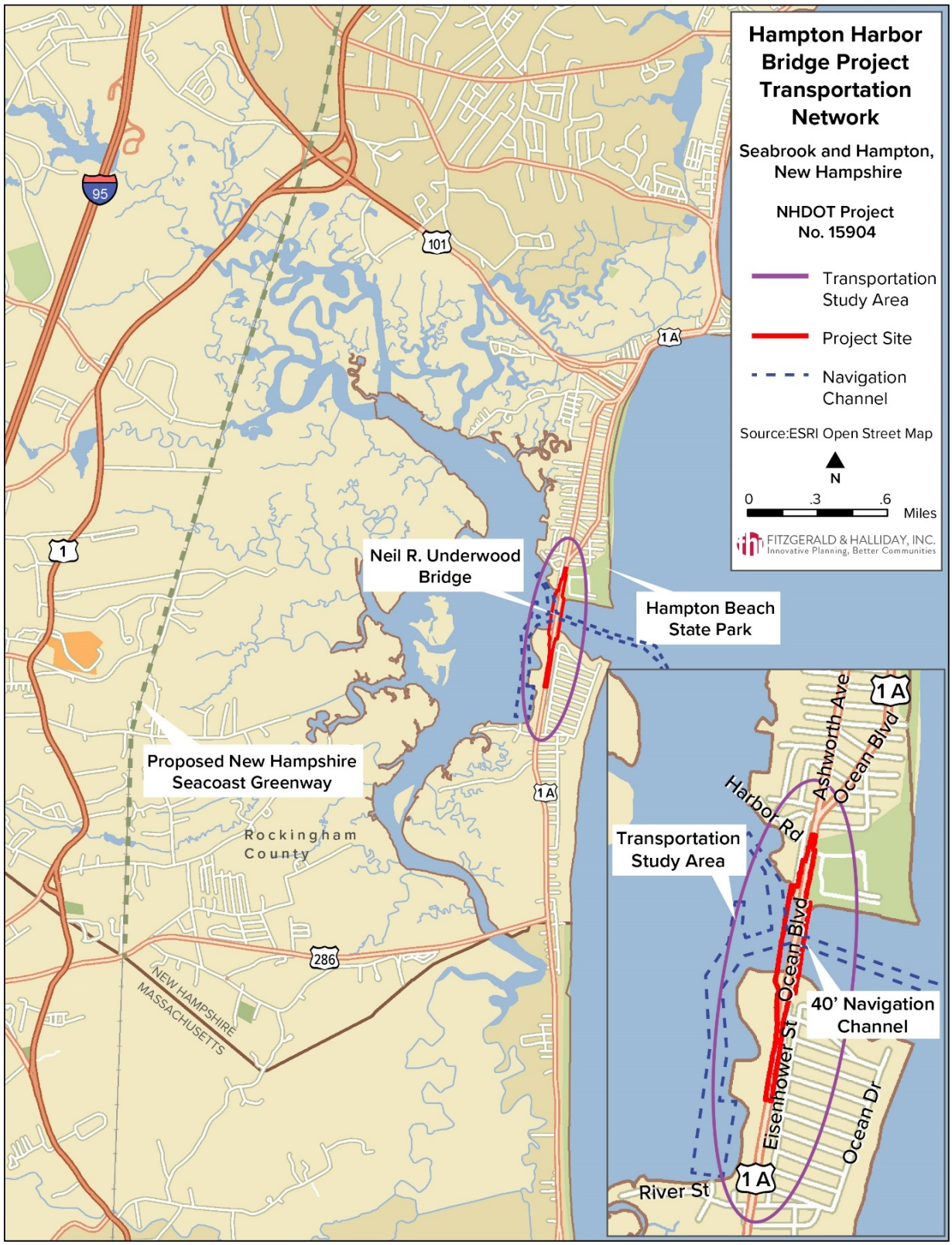
The Fixed and Bascule Bridge Alternatives would not cause a disproportionately high and adverse impact on any minority or low-income populations as defined by EO 12898, and therefore no mitigation is required. In accordance with NHDOT's *NEPA Public Involvement Manual* (2021), outreach to local stakeholders, including underserved populations, will continue as the project advances.

4.4 Marine and Vehicular Traffic and Transportation

4.4.2 *Methodology*

To assess transportation-related impacts attributed to the replacement of the Neil R. Underwood Bridge, a Study Area was defined which includes the existing roadway network and associated bicycle and pedestrian infrastructure, and the navigable waterways that could potentially be affected by the project. With respect to roadways, the Study Area extends from the NH Route 1A/River Street intersection in Seabrook on the south, to the NH Route 1A/Harbor Road intersection in Hampton in the north as shown in Figure 12. The figure also depicts the two major east-west routes that link Interstate-95 (I-95) and US Route 1 on the west to NH Route 1A (also known as Ocean Boulevard) along the Seacoast. Those routes include NH Route 286 on the south through Seabrook near the Massachusetts/New Hampshire State Line, and NH Route 101 on the north through Hampton. Regarding marine vessel navigation, the navigational Study Area includes the Hampton Harbor Inlet channel (Entrance Channel) as well as the Seabrook and Hampton Channels to the west.

Figure 12 – Transportation Network



Source: FHI

For affected roadways, Annual Average Daily Traffic (AADT) volumes, speed limits, level of service (LOS) data, turning movements, bicycle and pedestrian volumes, and other pertinent traffic information was obtained as part of a multi-modal traffic analysis that was completed by HDR, Inc. in 2018 to characterize existing conditions in the Study Area. Data on fire and police stations and emergency response routes to and from the Study Area and surrounding locations were also obtained. Historical Automated Traffic Report (ATR) data and the 2001 *Hampton Beach Transportation Master Plan* and RPC growth projections were consulted to determine future growth rates for 2023 design year traffic projections. A growth rate of 1% annually was identified in RPC planning documents, but for this analysis, a higher growth rate of 1.5% was used as the background growth factor. The Synchro 9.0 traffic software model was used to model future design year traffic. The analysis assumed free flow conditions to and from the bridge on both the Hampton and Seabrook approaches to the bridge. Overall, the weekday and weekend PM peak hours represented the highest traffic demand and thus were used to document worst-case scenarios within the Study Area.

Regarding marine vessel traffic, bridge tender lift logs for a two-year period from September 2016 to June 2018 were consulted as the primary source of vessel user data. Additionally, marine vessel traffic information was obtained from three sources: 1) current mooring registrations for Hampton Harbor and Seabrook Harbor via the New Hampshire Division of Ports and Harbors website; 2) US Coast Guard (USCG) National Vessel Documentation database queries via the NOAA website, and 3) from licensed charter and party boat data from the NHFG website. Calls were also made to the Hampton Harbormaster, the USACE New England Division, the USCG Station in New Castle and the Hampton River Marina.

4.4.3 *Existing Conditions*

Roadway Characteristics

NH Route 1A (Ocean Boulevard) is an important link along New Hampshire's coastline connecting the Towns of Seabrook and Hampton. The roadway begins in Seabrook at the New Hampshire-Massachusetts State Line and extends north approximately 18.4 miles through the towns of Hampton, North Hampton, and Rye to its eventual intersection with US Route 1 in Portsmouth. The Neil R. Underwood Bridge is located at mile marker 1.6 near the Seabrook/Hampton Town Line. The roadway is classified as a New Hampshire Tier 2, Urban Minor Arterial Road within the project limits.

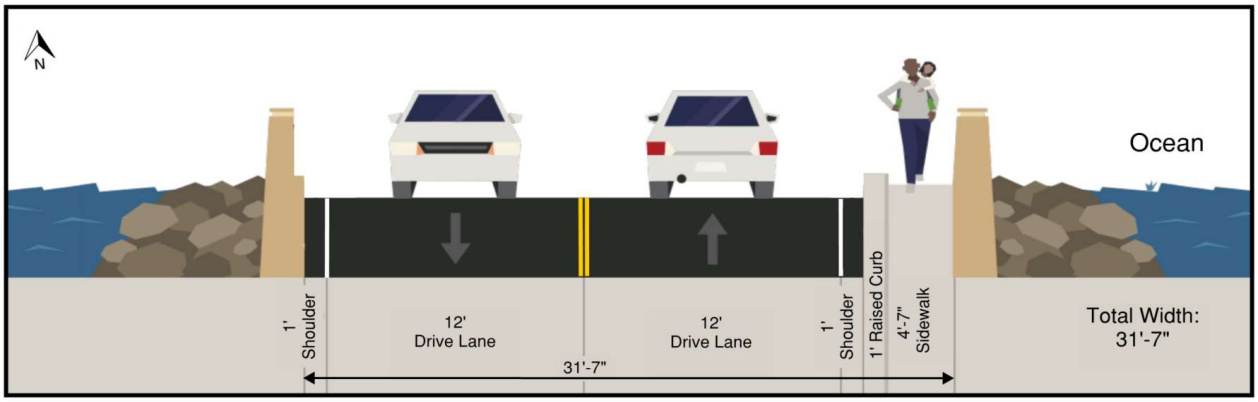
Along the Seabrook side, the approach roadway to the bridge is 0.8 miles long and includes one lane in each direction from Harborside Park, located on the west side of NH Route 1A, north up to and over the 1,193-foot-long bridge, and two lanes in each direction south of Harborside Park. North of the bridge, NH Route 1A continues as one through-lane in each direction, however, the roadway cross section also includes a southbound left-turn lane that provides access to Hampton Beach State Park located to the east. NH Route 1A continues north beyond the Study Area limits (Harbor Road intersection), passing through the more densely populated Hampton Beach Village District as an urban arterial. NHDOT District 6 is responsible for the maintenance and operation of NH Route 1A within the Study Area. Posted speed limits within the Study Area range from 30 to 35 miles per hour (mph). Westerly access to and from NH Route 1A is from NH Route 286 in the south through Seabrook near the Massachusetts/New Hampshire State Line, and NH Route 101 in the north through Hampton. These routes both connect to US Route 1 and Interstate 95 (I-95) to the west and offer the only north/south detour route around the Neil R. Underwood Bridge, a detour route that is approximately 11.75 miles long.

The existing roadway cross section within the Study Area is variable. As such, it has been broken into three separate segments described below for ease of understanding.

1. From River Street to 500 feet south of the Neil R. Underwood Bridge: This southern-most segment includes a posted speed limit of 35 mph and four 11-foot travel lanes (two northbound [NB] and two southbound [SB]). This roadway segment has uncurbed shoulders varying from 8 feet to 12 feet in width and there are no sidewalks or guardrails. A constructed sand berm is located between New Hampshire Route 1A and Eisenhower Street to the east. Uncontrolled parking occurs on wide gravel shoulders and paved parking exists adjacent to the Yankee Fisherman's Co-op.

2. From 500 feet south of the Neil R. Underwood Bridge to the Hampton Beach State Park driveway entrance 600 feet north of the bridge in Hampton: The posted speed limit along this segment including the Neil R. Underwood Bridge is 30 mph. The approach roadways along this segment north and south of the bridge consist of two 11-foot travel lanes (one northbound [NB] and one southbound [SB]). The lane widths broaden to 12-feet on the bridge. Curbed shoulders vary in width from one-foot (on the bridge) to five-feet along the bridge approach roadways. There is a 4-foot 7-inch-wide raised sidewalk along the eastern side of the Neil R. Underwood Bridge that is separated from the travel way by a one-foot-wide raised curb. The total width of the roadway cross section on the bridge is 31-feet seven-inches. Figure 13 depicts the existing roadway cross section on the Neil R. Underwood Bridge. South of the bridge in Seabrook, there is a five-foot-wide sidewalk on the east that is connected via boardwalks or paths to Eisenhower Street. The sidewalk ends 500 feet from the bridge where the shoulder widens to eight feet. North of the bridge up to the entrance driveway to Hampton Beach State Park is a five-foot-wide sidewalk on the east that is separated from the traveled-way by a grassy area.

Figure 13– Existing Roadway Cross Section



Source: HDR, Inc.

3. From the Hampton Beach State Park entrance north to the intersection of Harbor Road in Hampton: The posted speed limit along this northern-most segment is 30 mph. There are two 11-foot travel lanes (one NB and one SB) and there is also one 11-foot SB left-hand turn lane for access into Hampton Beach State Park. Curbed shoulders varying in width from one-foot to five-feet along this segment and there is a five-foot to seven-foot-wide sidewalk on the east, separated

from the road by a grassy area with a variable width from five feet to approximately 30 feet. This roadway segment is accessed by only one driveway, and two intersections: Epping Avenue and Harbor Road.

Overall, the Study Area is utilized by vehicles, pedestrians, and bicyclists, as well as transit vehicles.

The Hampton Police Department is located at 100 Brown Avenue and the Hampton Fire/Rescue Station is located next door at 140 Winnacunnet Road. All police, fire and ambulance services for the Study Area are provided from these departments, which are located approximately one mile north of the Neil R. Underwood Bridge. The Seabrook Fire Department is located at 87 Centennial Road and the Seabrook Police Department is nearby at 7 Liberty Lane. Both departments are located inland and closer to the Town center, US Route 1, and I-95, and are approximately 4.5 miles from the Neil R. Underwood Bridge.

Existing Traffic Data

Traffic data for the Study Area was collected by HDR, Inc. on Wednesday July 11, 2018 and Sunday July 15, 2018 to capture weekday and weekend conditions. In addition to direct field observation/counts, a 24-hour ATR was placed on NH Route 1A at the Seabrook/Hampton Town Line. Weekday volumes were collected and analyzed during the AM peak period (6:00 AM to 10:00 AM) and PM peak period (3:00 PM to 7:00 PM). On the weekend, traffic volumes were collected and analyzed for the following time periods: 6:15 AM to 10:00 AM, 10:00 AM to 2:00 PM, and 2:00 PM to 5:00 PM. This data is presented in Table 4 below.

Table 4 - Existing Traffic Volumes along the Neil R. Underwood Bridge – July 2018

Direction along NH Route 1A	Weekday AM Peak (6AM to 10AM)	Weekday PM Peak (3PM to 7PM)	Weekend Morning (6:15AM to 10AM)	Weekend Mid-Day (10AM to 2PM)	Weekend Afternoon (2PM to 5PM)
Seabrook to Hampton	351	626	429	523	484
Hampton to Seabrook	346	556	389	594	733

Source: HDR, Inc. July 11, 2018 and July 15, 2018

The average daily traffic (ADT) for the period from July 11, 2018 to July 15, 2018 was 15,800 vehicles per day (vpd). The AADT for the Neil R. Underwood Bridge segment in 2017 was 9,466 vpd per NHDOT traffic data. It is notable that the AADT for NH Route 1A increases to over 18,000 vpd during peak times during the summer and during special events.

The existing bascule bridge lift cycle takes approximately six minutes and typically occurs twice a day during the weekday AM and PM periods during the boating season. To assess existing 2018 queuing and traffic delay, a more conservative bridge lift cycle duration of 6.6 minutes was used for the traffic analysis. Table 5 presents traffic analysis results attributed to the existing bridge lift cycle and evaluates the fixed bridge condition versus the lift condition. Table 5 also reports Level of Service (LOS) for the identified roadway segments under both the existing fixed condition and the lift condition. LOS is used to analyze

roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measure like vehicle speed, density, and congestion. LOS ranges from LOS A (free flow traffic condition) to LOS F (forced traffic flow conditions characterized by stop and go waves of traffic and poor travel times).

Table 5 - Existing 2018 Bridge Lift Cycle Traffic Analysis Results

Intersection Link/Name	Movement	2018 Existing Condition								
			Fixed Condition with 1 Lane Each Direction				Lift Condition with 1 Lane Each Direction			
		Volume (hourly)	95th Queue Length (Veh)	Delay (Sec)	v/c ratio	LOS	95th Queue Length (Veh)	Delay (Sec)	v/c ratio	LOS
Ocean Blvd (Seabrook)	NBT	626	0	0	0.4	A	>100	26.1	0.43	C
Ocean Blvd (Hampton)	SBT	556	0	0	0.49	A	>100	24.2	0.53	C
Ocean Blvd and State Park Road	NBT	595	0	0	0.66	A	0	0	0.66	A
	NBR	19	0	0	0.66	A	0	0	0.66	A
	SBL	14	<2	11.2	0.03	B	<2	11.2	0.03	B
	SBT	473	0	0	0.39	A	0	0	0.39	A
	WBL	25	<2	21.7	0.16	C	<2	21.7	0.16	C
	WBR	18	<2	21.7	0.16	C	<2	21.7	0.16	C

Source: HDR, Inc. 2018 Synchro and HCM Analysis

Regarding bascule lift operations, the weekday PM had longer traffic queues in the northbound direction and the weekend PM had the longer queues in the southbound direction. The 2018 queue length was over 100 cars northbound and southbound. LOS within the Study Area ranged from A to C under both the fixed bridge and lift bridge conditions.

Navigation Channel Characteristics

NOAA Chart 13278, 28th Edition (last corrected on May 14, 2019) recorded the following depths of the Hampton Harbor Inlet at the Neil R. Underwood Bridge in NAVD88 datum:

- Mean Higher High-Water (MHHW): 16.9 feet
- Mean High Water (MHW): 16.5 feet
- Mean Low Water (MLW): 8.2 feet
- Mean Lower Low-Water (MLLW): 7.9 feet

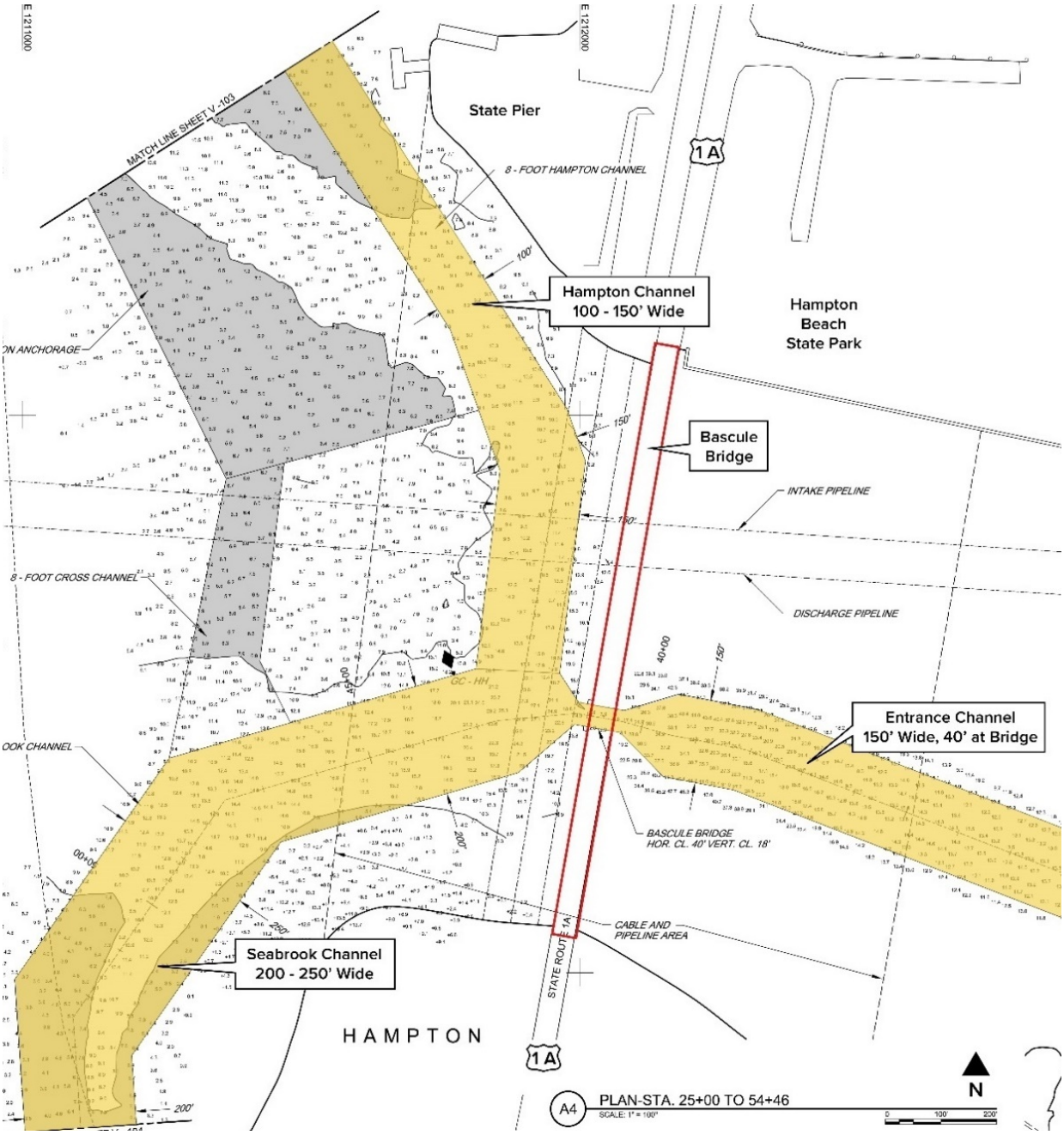
The channel was last dredged in fall/winter 2019. Since dredging was conducted so recently, it is assumed current channel depths are slightly greater than what's listed above, as the navigational design depth is eight feet.

The bridge has a vertical clearance at MHW of 20-feet (posted as 18-feet for mariners) when the bridge is lowered allowing vehicles to pass. There is no restriction on vertical clearance when the bridge is raised (in the open position) allowing vessels to pass. The horizontal clearance between the fenders is approximately 51-feet, but the posted clearance for mariners is 40-feet. The overall width of the Hampton Harbor Inlet at the bridge is 1,025 feet.

The bridge is the only structure along the navigable portion of the Hampton River. Tides are semi-diurnal at the bridge with flow in an east to west direction along the Entrance Channel. Flood tide velocity is 1.5 to 2.2 knots (1.73 statute miles per hour [smph] to 2.53 smph) and Ebb tide velocity is 2.0 knots to 3.2 knots (2.30 smph to 3.68 smph).

The Entrance Channel is 150 feet wide and extends approximately 2,000 feet eastward from the Neil R. Underwood Bridge to the Atlantic Ocean (see Figure 14). The channel tapers down to a width of 40-feet where it is crossed by the bridge. The Entrance Channel is a federal navigation channel that is maintained by the USACE.

Figure 14– Federal Navigational Channels



Source: USACE and FHI

Hampton and Seabrook Harbors lie immediately west of the bridge and are formed by the union of the Blackwater River which flows from the south, and the Hampton River which flows from the northwest. The Entrance Channel splits into two navigation channels approximately 75 feet west of the Neil R. Underwood Bridge. The Blackwater River navigation channel, also known as the Seabrook Channel, varies in width from 200 to 250 feet and extends in a southerly direction to the Yankee Fisherman Co-op in Seabrook. The Hampton River channel, also known as the Hampton Channel, is 150-feet wide and narrows to 100-feet wide near the Hampton State Pier. Maintenance dredging of these two channels within the harbor cannot be accomplished with the USACE owned *Currituck* because the existing Neil R. Underwood

Bridge does not provide enough navigation clearance for the vessel. Therefore, dredging of these two harbor channels is accomplished by independent dredge operators under contract to the USACE. The most recent maintenance dredging operation of the Seabrook and Hampton Channels was conducted by USACE in 2019.

Marine Traffic

In terms of existing maritime traffic conditions, vessels of significant size are restricted to travel within the dredged entrance channel and two harborside channels; and require lifting of the bascule span to transit the bridge. Data on maritime traffic at the bridge was obtained by reviewing the lift logs for the bascule from September 2016 to June of 2018. The total number of bridge lifts, inclusive of test lifts, over that time-period was 1,722. Subtracting test lifts, the total number of lifts for vessel passage was 1,607, and the total number of vessels that passed through the bridge was 2,188. The vessels that transit the bridge are primarily motorized charter vessels for day cruises and fishing outings. An infrequent number of sailboats (30) enter and leave the harbor during the boating season, as the harbor is not considered a typical port-of-call for sailboats due to its shallow waters. At the time of the vessel survey, a total of 217 boats were moored in the Hampton River mooring field and an additional 56 boats were moored in the Blackwater River mooring field.

Special vessels using the harbor include channel maintenance dredging vessels, and emergency operations vessels for the Hampton Fire Department and the USCG New Castle Station. The USACE dredge vessel *Currituck* is restricted by the horizontal clearance at the current bridge and therefore cannot pass west of the bridge and into the harbor. The USACE has requested that a new bridge accommodate the *Currituck* to reduce the costs and coordination required when a private company is hired to complete the dredging.

Many operators of vessels with low vertical clearance requirements choose to transit the bridge outside of the dredged navigation channel limits, as the 40-foot posted horizontal width of the navigation channel is narrower than the width of the existing bridge approach spans. The width between the approach span piers is approximately 90 feet. Mariners reported that they often remove rigging from their vessels to allow them to transit the bridge under these approach spans, thus eliminating the need to lift the bascule span. The strong cross-current also makes transit under the existing bridge challenging.

4.4.4 *Impacts of No-Build Alternative*

Vehicular Traffic Impacts

Under the No-Build Alternative, the bridge would not be replaced, and the structurally and mechanically deficient and functionally obsolete conditions of the existing bridge would persist. Even with costly maintenance and repairs, the bridge would remain on NHDOT's "Red List" and continue to deteriorate over time which would eventually require NHDOT to place vehicle restrictions on the bridge. Ultimately, the bridge could have to be closed, eliminating a critical north south connection along New Hampshire's seacoast between Seabrook and Hampton. Bridge closure would leave travelers with no option but to use the approximately 11.75-mile detour route around the bridge (NH Route 286 on the south in Seabrook to US Route 1 or I-95 on the west, to NH Route 101 on the north in Hampton). Bridge closure would therefore hinder operations of the transportation network and diminish overall public safety.

In addition to the continued structural and mechanical deficiencies, the existing roadway profile would perpetuate the poor accommodation of combined use of the bridge by vehicles, bicyclists and

pedestrians. Existing travel lanes and shoulder widths on the bridge would continue to be inconsistent with roadway approaches. The narrow width of the roadway shoulder on the bridge provides little space for disabled vehicles to seek refuge, thereby creating traffic congestion issues in the event of a vehicle breakdown. Similarly, the narrow shoulders on the bridge impede emergency vehicle response, as vehicles have limited room to pull over to allow emergency vehicles to pass.

Navigation Impacts

Navigational clearances at the bridge would remain unchanged so long as the bascule span remains operational. The vertical clearance at the bridge when the bridge is in the closed position would decrease over time as sea levels rise. The USACE dredge vessel *Currituck* would still be unable to transit the bridge to access Hampton Harbor on the west. Thus, maintenance dredging of the Seabrook and Hampton channels would continue to be contracted out by the USACE to private dredge operators.

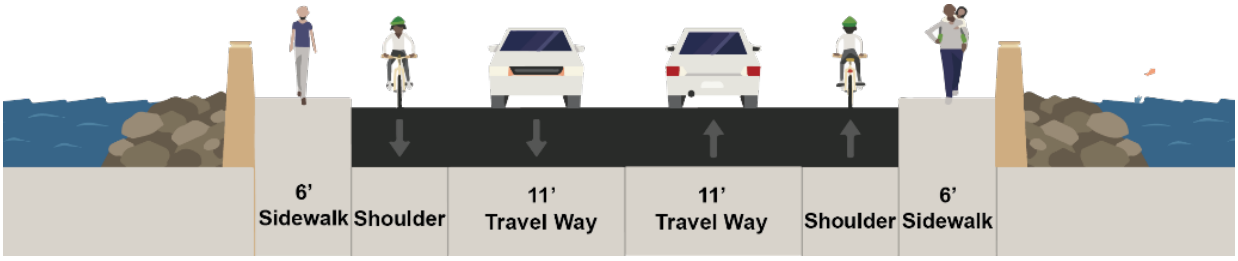
Bridge closure, however, would also affect marine traffic within Hampton Harbor as the bridge would likely be left permanently in the down, or closed, position. As such, vertical clearance would be restricted to 18 feet initially, and that clearance would gradually decrease over time with the onset of SLR. This would further restrict the type of vessels capable of navigating into the harbor.

4.4.5 *Impacts of Fixed Bridge Alternative*

Vehicular Traffic Impacts

Replacement with a fixed bridge would result in consistency between the roadway cross section on the bridge and the approach roadways. With the Fixed Bridge Alternative, there would no longer be any traffic delays or queueing associated with bridge openings as presently occurs with the existing bascule span. Traffic flow would be improved with the widening of roadway shoulders from their one-foot width in the existing condition to eight-feet under this alternative as shown Figure 15 which depicts the proposed roadway cross-section on the new bridge.

Figure 15 – Proposed Roadway Cross Section



Source: HDR, Inc.

This increased shoulder width would create an adequate refuge area for disabled vehicles and would provide space for vehicles to move out of the way of emergency response vehicles, thereby improving response times. Through Synchro analysis, traffic engineers demonstrated that a two-lane roadway configuration (one lane NB and one lane SB) for a new fixed bridge is appropriate to accommodate traffic in the area of the bridge crossing. As shown in Table 6 below, the future 2023 Build Condition for the Fixed Bridge Alternative which takes into consideration a 1.5% background yields similar traffic results during free flow conditions to the existing bridge when it is in a fixed (down) position allowing vehicular passage.

Table 6 - Existing 2023 Building Condition with 1.5% Growth Rate – Fixed Bridge

Intersection Link/Name	Movement	Fixed Condition with 1 Lane Each Direction				
		Volume (hourly)	95th Queue Length (Veh)	Delay (Sec)	v/c ratio	LOS
Ocean Blvd (Seabrook)	NBT	674	0	0	0.43	A
Ocean Blvd (Hampton)	SBT	599	0	0	0.53	A
Ocean Blvd and State Park Road	NBT	641	0	0	0.71	A
	NBR	20	0	0	0.71	A
	SBL	15	<2	11.7	0.04	B
	SBT	510	0	0	0.42	A
	WBL	27	<2	24	0.19	C
	WBR	19	<2	24	0.19	C

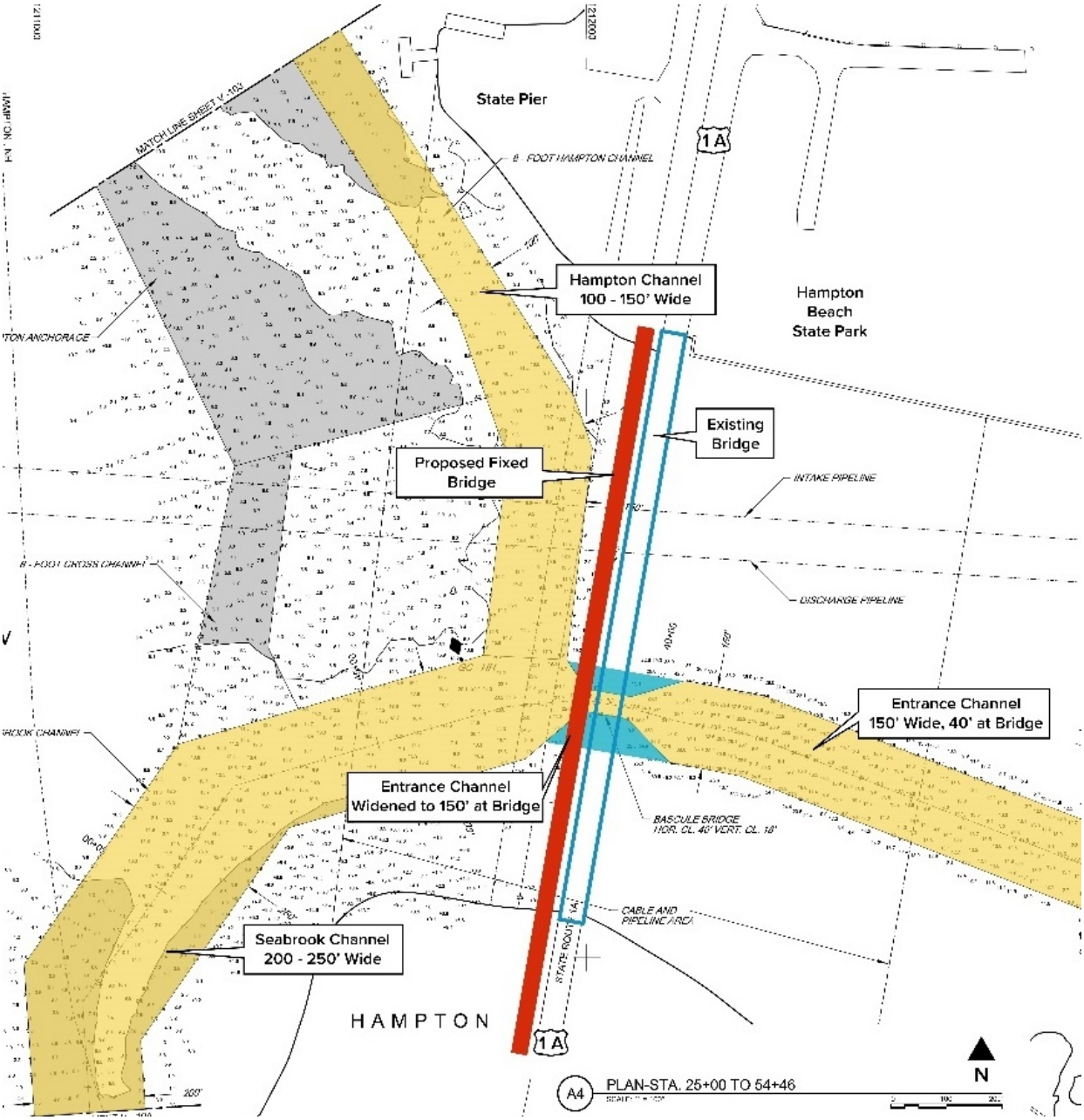
Source: HDR, Inc. 2018 Synchro and HCM Analysis

The Fixed Bridge would be constructed to the west of the existing bridge. The existing bridge would remain open to traffic flow during the construction period and once the new bridge is complete and open, the existing bridge would be demolished and removed. Therefore, there would be no need for a traffic detour. While there is the potential for short-term construction-related impacts to vehicular circulation in the vicinity of the bridge due to increased truck traffic and construction activities, these impacts would be minimized with time-of-day restrictions and the implementation of a Construction Management Plan.

Navigation Impacts

Replacement with a Fixed Bridge would place the new bridge piers outside of the Hampton and Seabrook channels located to the west. With respect to horizontal navigational clearance, a new fixed bridge would provide a 150-foot navigational width through the bridge (inclusive of bridge fenders), which would match the full width of the Entrance Channel to the east (See Figure 16). The existing federal navigation channel tapers down to a 40-foot width at the current bridge crossing, so a new fixed-bridge would provide 110 feet of additional horizontal navigational clearance at the crossing.

Figure 16 – Federal Navigational Channels -- Fixed Bridge



Source: USACE, HDR, Inc. and FHI

The vertical navigational clearance is based on an assessment of vessel usage of the channel, and information obtained from the USACE and USCG. Currently, the existing bascule span provides 20 feet (18-feet posted) of vertical clearance (above MHW) in the closed position, and unlimited vertical clearance when in the open (raised) position. In the latter configuration, the depth of the channel and the existing horizontal clearance currently limit the size of the vessels that can pass under the bridge and access Hampton Harbor. Replacement with a Fixed Bridge would provide a 48-foot vertical clearance at MHW which is almost 30 feet more than that provided by the existing bascule bridge when in the closed position.

Based on studies conducted by HDR, Inc. as part of the navigational impact report, all regular vessel users of the Hampton Harbor Inlet channel would be able to pass under the new fixed bridge, as would the USACE dredging vessel *Currituck.*

In developing conceptual designs for future bridge alternatives, engineers took SLR into consideration. The height of SLR is based on the "Intermediate-High" range of estimated 2100 rise by the New Hampshire Coastal Risk and Hazards Commission (2016 report). The actual rise is reported as 3.9 feet. Design engineers therefore used a SLR of four feet during concept development. This variable is accounted for in the vertical clearances.

The changes to horizontal and vertical navigational clearances constitutes a change to a federal navigation project and would require authorization from the USACE through the Section 408 permitting process and would also require a USCG Bridge Permit.

During project outreach efforts, comments were documented about prospective navigational needs related to future decommissioning of the Seabrook Station Nuclear Power Plant (SSNPP), located approximately 1.5 miles west of the existing bridge. While decommissioning is expected during the lifetime of the proposed new bridge, it is unknown at this time whether the channel would be used to help facilitate the decommissioning, nor is specific data known relative to prospective vessels that may be used. Correspondence received from SSNPP indicates that the largest plant components to remove during decommissioning include the reactor vessel, a steam generator, a main output transformer, and a low-pressure turbine rotor. Assuming these components get floated out on a low-profile barge, the SSNPP spokesman estimates that a total clearance of 25 to 30 feet under the bridge would be required to float the decommissioned components out of the harbor. Given this information, it appears the 48 feet of vertical clearance provided by a new fixed bridge would be adequate to accommodate this decommissioning activity should it occur via barge float-out.

The navigational channels would be maintained throughout the estimated 36-month construction period, with only brief outages which would be unlikely to exceed several hours. These outages would be advised to mariners through USCG Local Notices to Mariners. Fixed navigational lights would be installed on the new fixed bridge to indicate channel perimeters. Additionally, navigational information relative to the new bridge would be included in the US Coast Pilot and during construction, through notices to mariners and other standard boater information methods. The proposed fixed bridge would accommodate all documented existing navigation/vessel users. An increase in vessel traffic and/or new moorings within Hampton Harbor are not anticipated as a result of the Fixed Bridge Alternative. Future navigation would likely be limited by channel depth as opposed to the proposed bridge. This is because many vessels are presently precluded from using the Hampton and Seabrook channels west of the bridge due to the water depth as opposed to the bridge opening. The channel is "officially" only eight feet deep below MLW, so large keels and heavy boats with a deep draft don't venture into Hampton Harbor even though they would fit through the bridge opening.

4.4.6 *Impacts of Bascule Bridge Alternative*

Vehicular Traffic Impacts

The Replacement with Bascule Bridge Alternative would result in consistency of the roadway cross section on the bridge with that of the approach roadways. This alternative would have the same roadway cross section as that proposed for the Fixed Bridge Alternative as depicted above in Figure 15. Traffic flows

would be improved with the widening of roadway shoulders from their one-foot width in the existing condition to eight feet. This would create adequate refuge area for disabled vehicles and would provide space for vehicles to move out of the way of emergency response vehicles, thereby improving response times.

Through Synchro analysis, traffic engineers demonstrated that a two-lane roadway configuration (one lane NB and one lane SB) for a new bascule bridge is appropriate to accommodate traffic in the area of the bridge crossing. As shown in Table 7 below, the future 2023 build condition for the Bascule Bridge Alternative, which takes into consideration a 1.5% background growth, yields similar traffic conditions (i.e., queues, delays, and LOS) to the existing condition during lift operations.

Table 7 - Existing 2023 Building Condition with 1.5% Growth Rate – Bascule Bridge

Intersection Link/Name	Movement	Bascule Condition with 1 Lane Each Direction				
		Volume (hourly)	95th Queue Length (Veh)	Delay (Sec)	v/c ratio	LOS
Ocean Blvd (Seabrook)	Ocean Blvd (Seabrook)	NBT	674	>100	25.3	0.46
Ocean Blvd (Hampton)	SBT	599	>100	23.7	0.57	C
Ocean Blvd and State Park Road	NBT	NBT	641	0	0	0.71
	NBR	NBR	20	0	0	0.71
	SBL	SBL	15	<2	11.7	0.04
	SBT	SBT	510	0	0	0.42
	WBL	WBL	27	<2	24	0.19
	WBR	WBR	19	<2	24	0.19

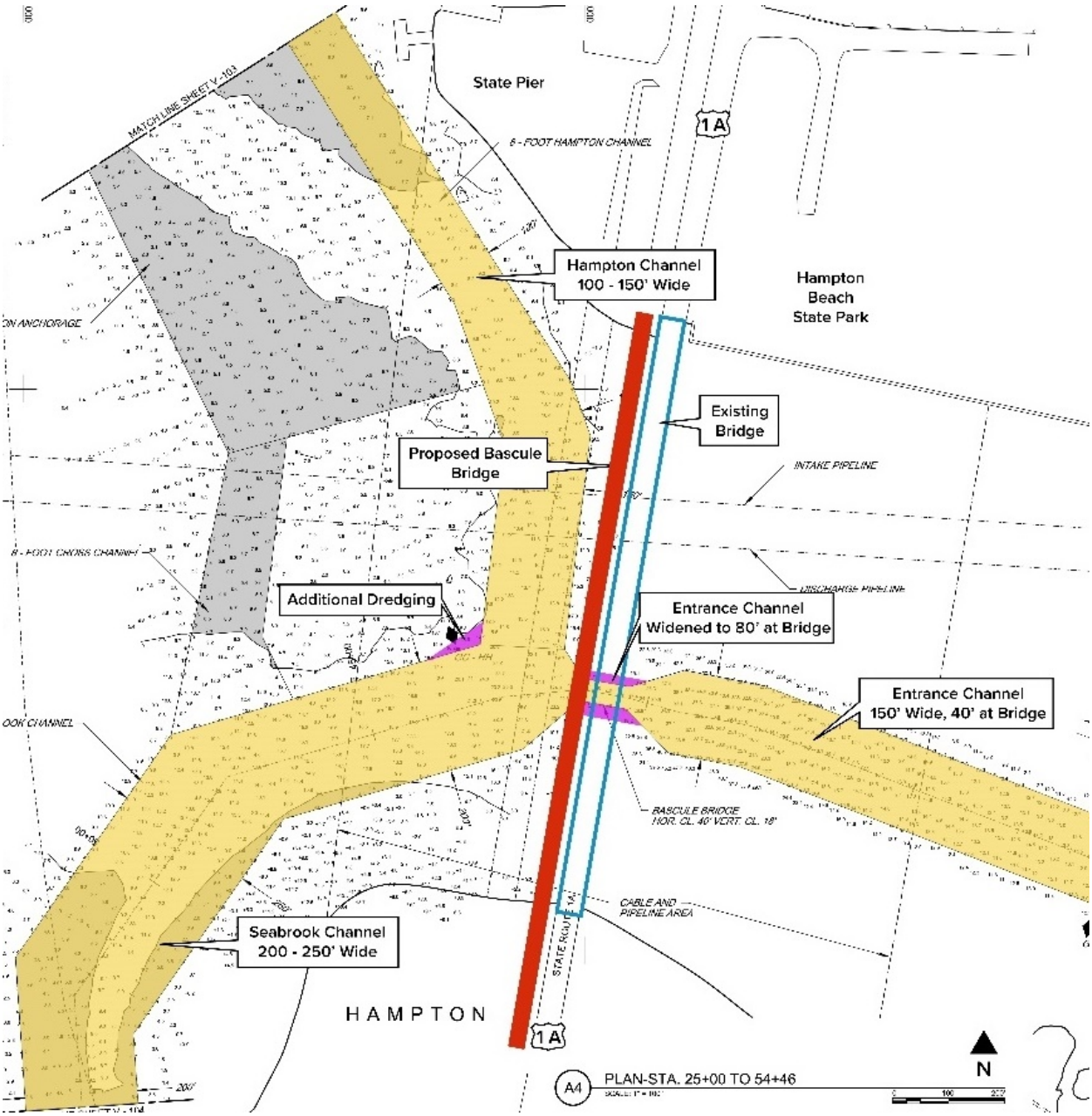
Source: HDR, Inc. 2018 Synchro and HCM Analysis

Construction of a new bascule bridge would be to the west of the existing bridge. The existing bridge would remain open to traffic flow during the estimated 42-month construction period and once the new bridge is complete and open, the existing bridge would be demolished and removed. Therefore, there would be no need for a traffic detour. While there is the potential for short-term construction-related impacts to vehicular circulation in the vicinity of the bridge due to increased truck traffic and construction activities, these impacts would be minimized with time-of-day restrictions and the implementation of a Construction Management Plan.

Navigation Impacts

Replacement with a Bascule Bridge on an alignment immediately west of the existing bridge would place a portion of the new bascule pier within the Seabrook Channel where it transitions from the Entrance Channel west of the existing bridge. To compensate for the loss of navigable width resulting from placement of a portion of the bascule pier in the Seabrook Channel, dredging of the Seabrook Channel opposite the pier placement would be required to maintain the existing navigable width (see Figure 17).

Figure 17– Federal Navigational Channels -- Bascule Bridge



Source: USACE, HDR, Inc. and FHI

Due to the presence of a bedrock ledge in the area to be dredged, blasting would likely be required. The USACE requires a two-foot over-dredge for new channel dredging which means the bedrock ledge would need to be removed to two feet below the existing navigation channel depth. With the new bascule bridge, the horizontal navigational clearance at the crossing would increase from the existing 40-foot clear width to an 80-foot clear width. This horizontal clearance, although an improvement over the existing

condition, would be 70 feet less than the horizontal clearance that would be provided with a new fixed bridge on a similar western alignment.

Regarding vertical navigational clearance, replacement with a new movable bascule bridge would provide unlimited clearance within the Entrance Channel with the bascule raised for vessel passage and a clearance of 34 feet (MHW) which would provide 30 feet of vertical clearance with the bascule closed. This would accommodate the majority of the cruise and fishing vessels that go under the bridge regularly, and four feet of additional clearance for potential future SLR when the bascule is closed. Based on historic bridge lift data, this vertical clearance would reduce the number of bridge lifts by approximately 55% when compared to the existing condition, thereby reducing delays for vehicles, bicyclists, pedestrians, and boaters.

Like the Fixed Bridge Alternative, any impacts or changes to the federal navigation channel and existing navigational clearances would require USACE Section 408 permit approval and a USCG Bridge Permit. The navigational channels would be maintained throughout the estimated 42-month construction period, with only brief outages which would be unlikely to exceed one eight-hour workday. These outages would be noticed to mariners. Fixed navigational lights would be installed on the new movable bridge to indicate channel perimeters. Additionally, navigational information relative to the final bridge would be included in the US Coast Pilot and during construction, through notices to mariners and other standard boater information methods. Based upon the vessel survey conducted by HDR, Inc. for this project, the proposed bascule bridge would accommodate all existing navigation/vessel users including any vessels used during the future decommissioning of the SNPP. No increase in vessel traffic is anticipated with the Bascule Bridge Alternative.

4.4.7 *Mitigation*

Regardless of whether the replacement bridge is a fixed-bridge or bascule bridge, the replacement bridge would be constructed off-alignment to the west of the existing bridge. Therefore, there is no need for a traffic detour as traffic would continue to use the existing crossing until the new replacement bridge is complete and ready for traffic. If a bascule bridge is constructed, traffic queues, delays, and LOS would be similar to existing conditions and therefore, no mitigation is warranted for vehicular traffic.

Construction of a replacement bridge would involve brief outages of the navigational channel, primarily during the removal and construction of bridge spans over the channel and when dredging takes place. Notices to mariners of these construction period delays and/or vessel passage restrictions would be posted by the Town of Hampton and Town of Seabrook Harbormasters, the USCG, and at local marinas or by other means, as appropriate. Short-term construction-period impacts to vehicular circulation would be minimized with time-of-day restrictions and the implementation of a Construction Management Plan.

4.5 Consideration Relating to Pedestrians and Bicyclists

4.5.1 *Methodology*

The Study Area for the assessment of impacts to bicycle and pedestrian circulation is the same as that used to assess transportation impacts and is depicted in Figure 12. It extends from the intersection of NH Route 1A and River Street in Seabrook to the intersection of NH Route 1A and Harbor Road in Hampton. Bicycle and pedestrian conditions and activity in the Study Area were observed in the field during the summer of 2018. Existing infrastructure, such as bicycle lanes and sidewalks, were identified and their

condition noted. Counts were conducted at the bridge on Wednesday July 11, 2018 during the AM peak period (6:00 AM to 10:00 AM) and PM peak period (3:00 PM to 7:00 PM) as well as on the weekend (Sunday, July 15, 2018) for the following time periods: 6:15 AM to 10:00 AM, 10:00 AM to 2:00 PM, and 2:00 PM to 5:00 PM.

4.5.2 *Existing Conditions*

In Seabrook, there are no designated or striped bicycle lanes along NH Route 1A, but the roadway does have uncurbed shoulders varying from eight feet to 12 feet in width up to a point approximately 500 feet south of the existing bridge. From this point north and over the bridge, the shoulders taper down considerably to a one-foot width and remain at this narrow width along both sides of the roadway until the bridge touches down in Hampton. North of the bridge to the northern limits of the Study Area, curbed shoulders vary in width from one foot to five feet.

There are no sidewalks along NH Route 1A in Seabrook until a point 500 feet south of the existing bridge. From this point north to the existing bridge, there is a five-foot-wide sidewalk on the eastern side of the roadway that is connected via boardwalks or paths to Eisenhower Street. The sidewalk tapers down to a four-foot seven-inch width on the bridge. The sidewalk on the bridge is also only on the eastern side of the roadway and is raised and separated from the through-travel-lane by a one-foot raised curb and a one-foot shoulder. North of the bridge on the east side, a five-foot-wide sidewalk is separated from the travel way by a grassy area with a variable width from five feet to approximately 30 feet. The sidewalk extends to the entrance driveway to the Hampton Beach State Park entrance. The existing roadway cross section on the bridge is depicted in Figure 13. North of the Hampton Beach State Park entrance, there is a five-foot to seven-foot-wide sidewalk on the east that is separated from the roadway.

New Hampshire Route 1A in the Study Area is a designated section of the US Bicycle Route 1 State Bicycle Route, the New Hampshire Coastal Scenic Byway, and the on-road route for the East Coast Greenway through New Hampshire. As a result, it has been a focal point for long-term planning of bicycle usage by organizations such as the RPC.

Existing pedestrian and bicycle activity in the Study Area, as observed during a weekday and weekend in July 2018, is presented in Table 8 below.

Table 8 - Existing Hourly Pedestrian and Bicycle Volumes along the Neil R. Underwood Bridge – July 2018

Direction along NH Route 1A	Weekday AM Peak (6AM to 10AM)	Weekday PM Peak (#PM to 7PM)	Weekend Morning (6:15AM to 10AM)	Weekend Mid-Day (10AM to 2PM)	Weekend Afternoon (2PM to 5PM)
Bicyclists Seabrook to Hampton	13	4	17	11	8
Bicyclists Hampton to Seabrook	6	3	9	18	10

Direction along NH Route 1A	Weekday AM Peak (6AM to 10AM)	Weekday PM Peak (#PM to 7PM)	Weekend Morning (6:15AM to 10AM)	Weekend Mid-Day (10AM to 2PM)	Weekend Afternoon (2PM to 5PM)
Pedestrians (both directions combined)	27	24	31	48	32

Source: HDR, Inc. July 11, 2018 and July 15, 2018

Overall, the inconsistent roadway cross section throughout the Study Area, narrow one-foot shoulders on the bridge, and the raised, narrow sidewalk along the eastern side of the bridge only, collectively pose safety hazards for pedestrians and bicyclists. The narrow shoulders on the bridge are substandard for bicycle use, as the minimum recommended shoulder width to accommodate bicyclists is five feet. The narrow shoulders cause bicyclists to use the sidewalk informally, leading to conflicts with pedestrians. A sidewalk along only the eastern side of the roadway also contributes to pedestrians and bicycles crossing the roadway to get to and from the sidewalk.

4.5.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the current safety issues experienced by pedestrians and bicyclists would continue to persist within the Study Area, as the cross section of the roadway is limited by the width of the bridge structure. The No-Build Alternative would not allow the RPC to achieve their long-term bicycle planning goals and objectives for the corridor. Additionally, should the bridge fall into disrepair and need to be closed to traffic, the passage of bicyclists and pedestrians would also be restricted.

4.5.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

The proposed roadway cross section on a replacement bridge would be the same regardless of whether it is fixed or bascule. The cross section would include six-foot sidewalks on both sides of the roadway, which would not only match best practices for sidewalk accessibility but would also reduce the need for pedestrians to cross NH Route 1A to access the sidewalk on the east side of the bridge. The cross section also would include shoulders of sufficient width to safely accommodate bicyclists, thereby minimizing conflicts with through traffic and pedestrians. NHDOT will not be responsible for maintaining the sidewalks.

Because a replacement bridge would be constructed to the west of the existing bridge, a pedestrian and bicycle detour is not required for this project. Pedestrians and bicyclists would continue to use the existing bridge until the new replacement bridge is complete and operational. Therefore, there would be no short-term impacts to pedestrians and bicyclists during construction.

Overall, either replacement bridge alternative would have a beneficial impact on pedestrian and bicycle travel within the Study Area and would be in keeping with the goals and objectives of the RPC in terms of multi-modal planning along the corridor.

4.5.5 *Mitigation*

Construction of a replacement bridge would have a beneficial impact on pedestrian and bicycle circulation and therefore mitigation is not required. However, to further improve safety and connectivity for these travel modes, a shared use path will be constructed in Hampton under the new bridge to allow pedestrians and bicyclists safe access between the State Pier and Hampton Beach State Park without having to cross NH Route 1A.

4.6 Air Quality

4.6.1 *Methodology*

The Clean Air Act ("CAA, 42 USC § 7401 et seq.") required the USEPA to establish the National Ambient Air Quality Standard (NAAQS) for six criteria pollutants considered to be harmful to public health and the environment. These pollutants have both public health-based (primary) and public welfare-based (secondary) air quality standards. The "primary" ambient air quality standards have been established to protect the public health, while the "secondary" standards have been established to protect the public welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. These six pollutants are carbon monoxide ("CO"), particulate matter ("PM") which includes both PM_{10} and $PM_{2.5}$, lead ("Pb"), sulfur dioxide ("SO_2"), ozone ("O_3"), and nitrogen dioxide ("NO_2"). The NAAQS for these pollutants is provided in Table 9 below. As shown, NAAQS for SO_2, PM_{10}, $PM_{2.5}$, CO, O_3, and NO_2 are provided based on short-term averaging times (i.e., 1-hour, 3-hour, 8-hour and 24-hour). NAAQS based on long-term averaging times (i.e., three month and annual) are also provided for Pb, $PM_{2.5}$, SO_2 and NO_2.

Table 9 - National Ambient Air Quality Standards

Pollutant	Primary Standard	Secondary Standard	Form
Carbon Monoxide (CO)			
1-Hour Average	35 ppm	NA	Not to be exceeded more than once per year
8-Hour Average	9 ppm	NA	
Lead (Pb)			
3-Month Rolling Average	0.15 µg/m^3	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)			
Annual Average	53 ppb	53 ppb (2)	98th percentile of 1-hour daily maximum concentrations, averaged over three years
1-hour Average	100 ppb	NA	Annual mean
Ozone (Photochemical Oxidants - O_3)			

Pollutant	Primary Standard	Secondary Standard	Form
8-Hour Average	0.070 ppm	0.070 ppm [3]	Annual fourth-highest daily maximum 8-hour concentration, averaged over three years
Fine Particulate Matter ($PM_{2.5}$)			
24-Hour Average	35 µg/m^3	35 µg/m^3	98th percentile, averaged over three years
Annual Average	12 µg/m^3	15 µg/m^3	Annual mean, averaged over three years
Inhalable Particulates (PM_{10})			
24-Hour Average	150 µg/m^3	150 µg/m^3	Not to be exceeded more than once per year on average over three years
Sulfur Dioxide (SO_2)			
3-Hour Average	NA	0.5 ppm	99th percentile of 1-hour daily maximum concentrations, averaged over three years
1-Hour Average	75 ppb [4]	NA	Not to be exceeded more than once per year

Source: "NAAQS Table." EPA, Environmental Protection Agency, 20 Dec. 2016, www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed 1/28/2021

4.6.2 *Existing Conditions*

According to EPA's *Greenbook*, the Study Area is located within Rockingham County and is in attainment for all six criteria pollutants. According to the EPA's transportation conformity requirements (40 CFR Part 93), certain types of projects are exempt from the requirement to determine conformity. Such projects, listed in 40 CFR § 93.126, may proceed toward implementation in the absence of a conforming transportation plan and Transportation Improvement Program (TIP). The existing 1,199-feet long Neil R. Underwood Bridge includes a two-lanes 26-foot-wide roadway, a one-foot shoulder on either side, and a four-and-a-half-foot-wide sidewalk on the east side. Both alternatives under consideration would replace the existing bridge with an approximately 1,300 feet bridge with two 11-foot-wide travel lanes, with eight-foot shoulders and six-foot sidewalks on each side. The scope of this project would not introduce any new travel lane and therefore satisfies the exempt condition of widening narrow pavements or reconstructing bridges (no additional travel lanes) according to Table 2 of 40 CFR Part 93 (40 CFR § 93.126 - Exempt Projects). As such, air quality impacts for the No Build Alternative, the Fixed Bridge Alternative, and Bascule Bridge Alternative are discussed qualitatively below.

4.6.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the existing Neil R. Underwood Bridge would not be replaced. The air emissions generated by the traffic volume is expected to remain consistent with the background population growth. The vehicle speed and classification are expected to remain unchanged. However, the existing Neil R. Underwood Bridge is expected to close when its operational life span ends in the future. The closure would add 11.75 miles to the vehicle miles travelled for those vehicles. Therefore, traffic related air emissions are expected to eventually increase under the No-Build Alternative.

4.6.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

Under both the Fixed and Bascule Bridge Alternatives, the air emissions generated by the traffic is expected to be unchanged due to the change of the road profiles. However, the traffic volume is expected to remain consistent with the background population growth. The vehicle speed and classification are expected to remain unchanged. The travel distance increase is negligible and not expected to be a significant source of air pollution. Therefore, no air quality impact is expected for either Build Alternative.

4.6.5 *Mitigation*

Emissions from on-site construction equipment and on-road construction-related vehicles, as well as dust generating construction activities, have the potential to affect air quality. To minimize effects that construction of the proposed project would contribute to immediate setting, an emissions reduction program would be implemented for all construction activities, consisting of the following components:

- To minimize fugitive dust emissions from construction activities, mitigation measures such as a robust watering program, stabilization of all work areas, cleaning paved roadways, and scheduling construction to minimize the amount and duration of exposed earth should be implemented throughout the duration of construction.
- Ultra-Low Sulphur Diesel fuel should be used for all diesel engines throughout the construction site.
- EPA's Tier 1 through 4 standards for non-road engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons (HC). All non-road construction equipment with a power rating of 50 hp or greater should meet the Tier 4-final emissions standard.

4.7 Noise

4.7.2 *Methodology*

A noise study was prepared for this project in accordance with FHWA regulations as set forth in 23 CFR 772 and the NHDOT Traffic Noise Policy - *Policy and Procedural Guidelines for the Assessment and Abatement of Highway Traffic Noise for Type I & II Highway Projects* (November 2016). The study, entitled *Noise Analysis Technical Report – Neil R. Underwood Memorial Bridge (Hampton Harbor Bridge) Replacement Project* (HDR, Inc., February 2021) assesses existing noise levels in 2020, as well as modeled (projected) noise conditions for the No-Build Alternative in the design year (2040) and for the Build Alternatives (Bascule and Fixed Bridge Alternatives) in the opening year (2027) and design year (2040). A detailed noise study is required because the Proposed Action is categorized as a Type I project under 23 CFR 772 as it includes replacement of the existing bridge, reconfiguration of the bridge approach

roadways, and substantial alteration of the vertical and horizontal alignment. The Study Area investigated includes a 500-foot boundary extending outward from the edge of pavement of the proposed bridge and associated approach roadway improvements. Note that noise-related impacts to Threatened and Endangered Species and associated mitigation are discussed in Section 4.11.

Modeling of individual receptors for each noise-sensitive property within the Study Area was completed using FHWA's approved Traffic Noise Model (TNM) version 2.5. It is important to note that due to TNM software limitations, the model cannot derive the acoustical difference between vehicles traveling across a steel grate bridge deck (the existing deck condition of the Neil R. Underwood Bridge) and an asphalt bridge deck as proposed under both the Fixed Bridge and Bascule Bridge Alternatives. Since asphalt absorbs more noise and vibration than steel grating, the existing noise levels may be higher than the TNM modeled levels.

The NHDOT considers traffic noise impacts to occur when the predicted (modeled) traffic noise levels either:

1. Approach or exceed the Noise Abatement Criteria (NAC); with "approach" meaning within one A-weighted decibels (dBA) of the NAC thresholds for each Land Use Activity Category, or
2. Substantially increase over existing noise levels; with "substantial increase" meaning a 15 dBA increase over the existing noise level.

4.7.3 *Existing Conditions*

Noise sensitive land uses within the Study Area were categorized according to FHWA land use activity categories defined in 23 CFR 772 and the NHDOT Traffic Noise Policy. These land use activity categories, and their respective NAC, are presented in greater detail in the *Noise Analysis Technical Report*. Existing land use in the Study Area is primarily residential (Land Use Activity Category B) with recreational (Category C) located on both sides of the Hampton Harbor Inlet and hotels with outdoor activity areas (Category E) north of the bridge. Additionally, there are clusters of commercial development and areas of undeveloped lands that are not permitted for development (Category G) within the Study Area. There are no Category D land uses within the Study Area. Category D includes those land uses where interior noise levels are of greatest importance with respect to potential noise abatement measures. Because there are no Category D land uses within the Study Area, interior noise levels were not evaluated for this project per NHDOT policy. Overall, noise-sensitive land use in the Study Area includes 193 receivers, representing 193 receptors. A receiver is a modeled point that represents one or more receptors.

According to the analysis conducted by HDR, Inc., existing (2020) modeled noise levels range from 47 to 64 dBA.

4.7.4 *Impacts of No-Build Alternative*

No-Build (2040) modeled noise levels range from 48 dBA to 66 dBA at the 193 receivers. Based on the analysis conducted by HDR, Inc., there would be no substantial increase in noise (exceeding 15 dBA), nor would the projected levels approach or exceed the NAC for each land use activity category under the No-Build Alternative.

4.7.5 *Impacts of Fixed and Bascule Bridge Alternatives*

Opening Year (2027) modeled noise levels for the Fixed Bridge and Bascule Bridge Alternatives range from 47 dBA to 65 dBA at the 193 receivers. Build (2040) modeled noise levels for the Fixed Bridge and Bascule Bridge Alternatives range from 48 dBA to 66 dBA at the 193 receivers. Based on the analysis conducted by HDR, Inc., ambient sound levels are expected to increase by up to three dBA over existing conditions at many receivers within the Study Area. Several receivers, however, are anticipated to experience a reduction in noise levels due to changes in future traffic patterns and/or changes in vertical and horizontal alignments. There would be no substantial increase in noise (exceeding 15 dBA) resulting from the operation of the proposed project, nor would the projected levels approach or exceed the NAC for each land use category under either of the Build Alternatives. As such, noise abatement is not required for this project.

Under both the Bascule and Fixed Bridge Alternatives, noise from new bridge construction would be experienced by homes located northeast, northwest, and southeast of the Project Site, as well as within recreation and outdoor activity areas within the Study Area. Table 10 provides typical noise emission levels in A-weighted decibels (dBA) at a location 50 feet from various types of construction equipment. These are the types of construction equipment that would likely be used to construct the new bridge. In general, point source noise from construction equipment is reduced by six (6) dBA for each doubling of distance from the construction equipment noise source. For example, a dozer with a noise level of 82 dBA at 50 feet will have a noise level of 76 dBA at 100 feet, 70 dBA at 200 feet, 64 dBA at 400 feet, 58 dBA at 800 feet, and so on. Barriers/structures located between the construction equipment (noise source) and a sensitive noise receptor (e.g., residential dwelling) further reduce the intensity of construction noise.

Table 10 - Noise Emission Levels from Construction Equipment

Equipment	Typical Noise Level (dBA) 50 ft. from Source
Concrete Mixer Truck	79
Concrete Pump Truck	81
Crane	81
Dozers	82
Dump Truck	88
Generator	81
Impact Pile Drivers	101
Pneumatic Tool	85
Pump	81
Roller	80
Vacuum Street Sweeper	82
Front End Loader	79
Drill Rig Truck	79
Pavement Scarafiers	90
Sheers (on Backhoe)	96
Excavator	81

Source: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfme

As stated above, there are 193 noise sensitive receivers located within the 500-foot noise assessment Study Area. Applying the construction noise reduction rule stated above (reduction of 6 dBA with every doubling of distance from a construction noise source), receivers located farthest from the project construction site would experience noise attenuation of at least 18 dBA or greater than the construction equipment noise levels reported in Table 10 (as 400-feet is the equivalent of doubling the distance three times). For comparison, noise sensitive receivers most proximate to the bridge on the south side include homes along the northern extent of Eisenhower Street. This row of homes is roughly 75 feet to 100 feet from the edge of pavement of NH Route 1A but approximately 750 feet from the center of the bridge where it passes over the Hampton Harbor Inlet. The closest receivers on the south side of the bridge would experience a construction noise attenuation of up to 6 dBA over the noise levels reported in Table 10 (as 100 feet is equivalent to only a one-time doubling of distance), but the attenuation would increase as the distance between the noise source and receiver increases. The Hampton Beach State Park Campground, which includes space accommodations for RV/campers, is the most proximate noise

sensitive receptor on the north side of the bridge. The closest area within the campground that accommodates RV/campers is roughly 150 feet from NH Route 1A and yet is approximately 700 feet from the center of the bridge as it passes over the Hampton Harbor Inlet. The closest receivers on the north side of the bridge would experience a construction noise attenuation of between 6 and 12 dBA, but the attenuation would increase as the distance between the noise source and receiver increases. Overall, construction noise experienced at noise sensitive receivers within the Study Area would vary greatly as it is dependent on their proximity to the noise source; the bridge is over 1,300 feet long and the entire Project Site inclusive of the approach roadway work areas spans approximately 3,000 feet. Additionally, any buildings or barriers located between a construction equipment noise source and a receiver would offer even greater level of noise attenuation. Finally, noise levels would vary depending on the phase of construction and the equipment required during that phase.

4.7.6 *Mitigation*

Per 23 CFR 772, noise abatement measures must be evaluated for noise receptor sites predicted to approach or exceed the FHWA NAC, or which are predicted to experience a substantial (15 dBA or more) noise level increase over existing noise levels. Since no traffic-related noise impacts are predicted to occur during the Opening Year (2027) or the Design Year (2040), consideration of noise abatement is not required per NHDOT policy.

The replacement of the Neil R. Underwood Bridge will be fully coordinated with the community. To alleviate construction noise concerns, the Contractor, in coordination with the NHDOT Project Contract Administrator, will develop a plan that will include appropriate measures to manage unavoidable noise caused by its construction operations. Management measures to mitigate potential construction noise impacts may include:

- For portions of the project near residential areas, any work that produces objectionable noise between 10 P.M. and 6 A.M. should be restricted.
- When feasible, the Contractor should establish haul routes that direct their vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.
- Source noise control measures (i.e., emission limits, quieter equipment and/or processes) can be used. Equipment shall not be altered or fall into a state of disrepair such that noise levels that are greater than those produced by the original equipment.
- Path noise control measures (i.e., portable noise barriers, panels, enclosures, and acoustical tents) may be used in connection with concrete trowels, hydraulic break rams, pile drivers, rock drillers, etc.

4.8 Water Resources and Water Quality

4.8.1 *Methodology*

Information regarding the presence, classification, and characterization of surface water resources and water quality within the Study Area was obtained from the online New Hampshire Department of Environmental Services (NHDES) 2018 Surface Water Quality Assessment Viewer, and from consulting the Standards for Classification of Surface Waters of the State (RSA Title 50, Chapter 485-A:8). Stormwater

information was obtained from existing conditions field surveys, preliminary design plans, and from the design engineer (HDR, Inc.).

The NHDES Watershed Management Bureau administers the state's *Surface Water Quality Regulations* (Env-Wq 1700) and any discharges to surface waters are subject to these regulations. In addition, the NHDES Alteration of Terrain (AoT) regulations (Env-Wq 1500) regulate land disturbance and stormwater management associated with development projects. An MOA between the NHDOT and NHDES is in place which outlines the BMPs NHDOT utilizes to minimize and control sedimentation and erosion during construction and manage stormwater during post-construction operation of the facility. Stormwater is regulated by USEPA's *Construction General Permit* under the National Pollution Discharge Elimination System (NPDES) for projects that will disturb more than one acre. The 2017 New Hampshire Small Municipal Separate Storm Sewer System (MS4) General Permit was issued on January 18, 2017. USEPA proposed modifications to the 2017 NH MS4 General Permit on April 23, 2020 and those modifications went into effect on January 6, 2021.

4.8.2 *Existing Conditions*

As shown in Figure 18, Hampton Harbor is a tidal harbor that receives flows from three notable rivers, the Hampton River on the north, the Brown's River on the west, and the Blackwater River on the south. The Hampton River is formed by the confluence of the Taylor and Hampton Falls Rivers and flows for approximately one mile in a generally southerly direction before dispersing into the harbor. Tide Mill Creek, Nudds Canal, and Blind Creek are smaller watercourses that also flow into the Hampton River from the north. Brown's River originates in the Town of Seabrook just east of US Route 1 and flows in an easterly direction along the north side of the SNPP before discharging into Hampton Harbor. Swains Creek and Hunts Island Creek are tributaries of Brown's River. The Blackwater River is approximately 3.1 miles long and generally flows in a northeasterly and then northerly directly from Massachusetts into southeastern New Hampshire and ultimately into the harbor. Mill Creek and Dead Creek are two notable tributaries of the Blackwater River. Hampton Harbor, and the lower reaches of the rivers and tributary streams identified above, are surrounded by the largest salt marsh system in New Hampshire.

Figure 18– Surface Water Resources

Source: USGS and FHI

The watershed that comprises the Study Area contains a wide variety of land uses ranging from undeveloped forested lands, farmlands, and salt marshes to residential and more intensely developed commercial and industrial uses. At the Neil R. Underwood Bridge, land use is primarily residential mixed with undeveloped beaches, sand dunes, the State Pier, and a state park/campground.

The NHDES Watershed Management Bureau conducts monitoring of watersheds within the state in accordance with the NHDES Water Monitoring Strategy (R-WD-16-2). The Study Area lies within the USGS twelve-digit Hydrologic Unit Code (HUC 12) HAMPTON HARBOR 010600031004 watershed. Within this HUC-12 portion of the watershed, there are several identified assessment units (AUIDs) that are monitored by the NHDES. Five of these AUIDs are in the immediate vicinity of the Study Area within the Seabrook and Hampton Harbor system. These five assessment units and their location descriptions are presented in Table 11 - Water Quality Assessment Units in the Vicinity of the Project Site, which also includes a water quality assessment and the primary pollutants identified in each unit. The locations of the units are also shown in Figure 19. The data is sourced from water quality report cards associated with the Surface Water Quality Assessment GIS Viewer. The pollutant sources for these locations are sometimes unknown, such as for Mercury, Polychlorinated Biphenyls (PCBs), and Dioxin (including 2,3,7,8-TCDD). Other sources include those from pesticides or pesticide breakdown products (Dieldrin, Lindane, trans-Nonachlor, DDD). The sources of the fecal coliform bacteria include wet weather discharges of sanitary sewer outfalls (SSOs); combined sanitary and storm sewer outfalls (CSOs); and sanitary sewer collection system failures. Where present, enterococcus bacteria concentrations are due to wet weather discharges of SSOs, CSOs; and sanitary sewer collection system failures.

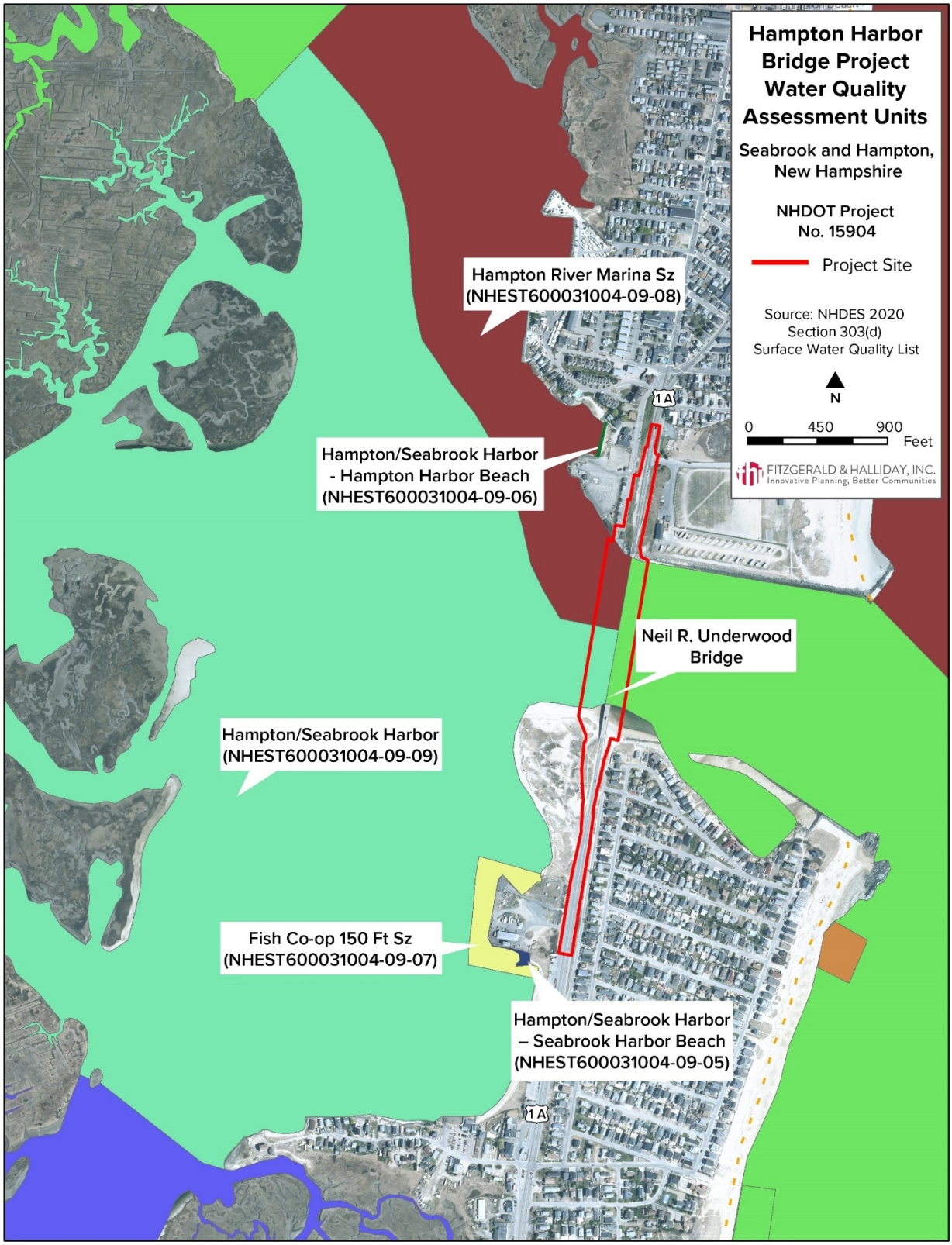
Table 11 - Water Quality Assessment Units in the Vicinity of the Project Site

Assessment Unit Location Name + Description	Designated Use	Water Quality Assessment Outcome	Primary pollutant parameter
Hampton/Seabrook Harbor – Seabrook Harbor Beach (NHEST600031004-09-05) *The waters off the beach south of the Fisherman's Co-op pier*	Aquatic Life	No data	NA
	Fish consumption	Poor, Not supporting, Marginal	Mercury, Polychlorinated biphenyls (PCBs)
	Primary contact recreation	Full support, Marginal	—
	Secondary contact, recreation	Full support, Good	—
	Shellfish consumption	Poor, Not supporting, Marginal	Dioxin, Fecal Coliform, Mercury, PCBs
	Wildlife	No data	NA
Hampton/Seabrook Harbor - Hampton Harbor Beach (NHEST600031004-09-06) *A small reach of beach located on the estuary side of Hampton Beach bound to the east by land and to the west*	Aquatic Life	No data	NA
	Fish consumption	Poor, Not supporting, Marginal	Mercury, PCBs
	Primary contact recreation	Full support, Good	—
	Secondary contact, recreation	Full support, Good	—

Assessment Unit Location Name + Description	Designated Use	Water Quality Assessment Outcome	Primary pollutant parameter
by the Hampton River Marina waters	Shellfish consumption	Poor, Not supporting, Marginal	Dioxin, Fecal Coliform, Mercury, PCBs
	Wildlife	No data	NA
Fish Co-op 150 Ft Sz (NHEST600031004-09-07) *Waters immediately adjacent to the Fisherman's Co-op pier in Seabrook out to 150 ft*	Aquatic Life	No data	NA
	Fish consumption	Poor, Not supporting, Marginal	Mercury, PCBs
	Primary contact recreation	No data	NA
	Secondary contact, recreation	No data	NA
	Shellfish consumption	Poor, Not supporting, Marginal	Dioxin, Fecal Coliform, Mercury, PCBs
	Wildlife	No data	NA
Hampton River Marina Sz (NHEST600031004-09-08) *Waters within the limits of the Hampton River Marina in Hampton*	Aquatic Life	No data	NA
	Fish consumption	Poor, Not supporting, Marginal	Mercury, PCBs
	Primary contact recreation	Poor, Not supporting, Marginal	Enterococcus
	Secondary contact, recreation	Poor, Not supporting, Marginal	Enterococcus
	Shellfish consumption	Poor, Not supporting, Marginal	Dioxin, Fecal Coliform, Mercury, PCBs
	Wildlife	No data	NA
Hampton/Seabrook Harbor (NHEST600031004-09-09) *Harbor waters not otherwise specified west of the Seabrook-Hampton Bridge*	Aquatic Life	Poor, Not supporting, Marginal	Aluminum, DDD, Dieldrin, Lindane, trans-Nonachlor
	Fish consumption	Poor, Not supporting, Marginal	Mercury, PCBs
	Primary contact recreation	Likely bad, insufficient information	Enterococcus
	Secondary contact, recreation	Good, full support	
	Shellfish consumption	Poor, Not supporting, Marginal	Dioxin, Fecal Coliform, Mercury, PCBs
	Wildlife	No data	NA

Source: NHDES 2018 Section 303(d) Surface Water Quality List

Figure 19 - Water Quality Assessment Units



Source: NHDES and FHI

Point and non-point sources of pollution associated with land uses higher up in the watershed have the potential to affect the water quality of Hampton Harbor. There are no public or community drinking water supply wells, reservoirs, or drinking water aquifers in the Study Area. The Project Site lies within two NH MS4 municipalities, Hampton and Seabrook. Based on sediment analyses conducted for the recent (2019) USACE maintenance dredging for the Hampton Harbor Navigation Project, the channel is comprised predominantly of sand and gravel material overlying bedrock. Based on the grain size analysis, the probability of encountering chemical contamination in the dredge spoils was determined to be very low and that dredged material could be used for beach replenishment (USACE 2018).

Regarding stormwater, there is no existing stormwater treatment or pretreatment along NH Route 1A south of the bridge. On the bridge, scuppers are spaced along the bridge approach spans, collecting runoff from the deck surface and discharging directly to the harbor inlet. On the north approach, stormwater runoff is collected along the existing curb and by a closed drainage system, which conveys runoff northerly. Sumps in existing catch basins that are part of the closed drainage system in this area provide limited stormwater quality treatment. From record plan review, the closed drainage system collects runoff along NH Route 1A and the historic alignment of Ocean Boulevard, as well as areas of Ashworth Avenue, Dustin Avenue, Harbor Road, and Dover Avenue. The stormwater is conveyed to an outlet identified on historic plans near the Hampton Marina. On the south approach, runoff appears to collect along the existing curb and sand berm, before being directed off the pavement. Drop inlets and outlets were shown on the record plans, however the outlet pipes or structures were not found during field review.

4.8.3 *Impacts of No-Build Alternative*

The No-Build Alternative would not replace the bridge and existing conditions would continue. The scuppers on the existing bridge would continue to allow direct discharge of untreated stormwater carrying vehicle oils and other contaminants directly into the waterway. Maintenance work would occur in the future if a new bridge is not constructed, and there could be future temporary adverse impacts to water quality due to related repair work, depending on the type and location of the work. Should future closure of the existing bridge to vehicular traffic become necessary, the result would be a slight improvement in water quality at the bridge. This is because contaminants and oils from vehicles would no longer be deposited on the bridge deck and be carried via stormwater to scuppers and into the waters below since no vehicles would be allowed on the bridge.

4.8.4 *Impacts of Fixed Bridge Alternative*

During construction of the Fixed Bridge Alternative, cofferdams would be installed at each of the pier locations prior to the installation of drilled shafts and pier caps to help contain suspended sediment from construction and keep it from reaching the water column outside of the Project Site. All water and drill waste material would be extracted from the casing during drilling and pumped onto a barge for removal of suspended particulates and proper disposal. The bridge piers would be supported on drilled shafts which would be cast into a reinforced concrete pile cap. Steel casings for the shafts would be six feet in diameter and would be driven into place. The casings would either remain in place or be vibrated out. The existing bridge piles would likely be cut off below the channel bottom and the subgrade portion left in place to reduce the potential for excess turbidity which might occur during full removal.

Dredging associated with the widening of the Entrance Channel at the bridge would cause a temporary, localized adverse impact to water quality during the dredging activity due to increased turbidity. Since the substrate material in the location of the proposed construction area is composed almost entirely of medium to fine-grained sands, with less than one percent fines, (based on USACE 2018 sediment test results of samples immediately to the west of the bridge taken prior to recent dredging), potential turbidity associated with the dredging is anticipated to be of minimal extent and of short duration. Most hydraulic conditions would be expected to return to normal upon cessation of the dredging as turbidity settles and tidal exchange flushes the water column.

The operation of barges and work vessels within the Study Area would also likely cause temporary turbidity. Barges would require the use of spuds, which are installed to the bottom to steady the barge and removed each time the barge moves, which causes small amounts of turbidity with each movement.

The drainage system on the Fixed Bridge Alternative would eliminate direct discharge into the harbor. Drainage discharges would be routed through new stormwater treatment swales at the northern and southern approaches before flowing into the harbor. Stormwater flow on the southern approach would be diverted to a proposed treatment swale southeast of the bridge between NH Route 1A and Eisenhower Avenue, but still within the ROW. Flow from the northern approach roadway would be channeled to new catch basins with sumps north of the bridge. Stormwater would then be diverted to the proposed treatment swale located north of the bridge within the ROW. As a result, the Fixed Bridge Alternative would improve water quality by treating stormwater prior to it being discharged into the Hampton Harbor Inlet.

Overall, the Fixed Bridge Alternative would only cause minor short-term temporary impacts to water resources and water quality during the period of active construction. Once constructed, this alternative would result in beneficial long-term effects on water quality due to the new stormwater treatment. The Fixed Bridge Alternative would comply with MS4 and other water quality permitting requirements.

4.8.5 *Impacts of Bascule Bridge Alternative*

The construction methods and temporary drilling and dredging impacts described above in the Fixed Bridge Alternative would also occur under the Bascule Bridge Alternative. In addition, temporary localized adverse impacts to water quality from dredging associated with the Bascule Bridge Alternative from turbidity plumes could occur from operation of the dredge vessel during the widening of the Entrance Channel.

The Bascule Bridge Alternative would require the dredging of a small area west of the bridge outside of the Hampton and Seabrook Channels due to the placement of the bascule pier within the channels. It is anticipated there is a bedrock ledge in this area and therefore blasting would likely be required. Blasting could result in increased turbidity of the water column during the blasting procedures to break up the bedrock.

Stormwater management would be handled as described under the Fixed Bridge Alternative and as a result, the Bascule Bridge Alternative would improve water quality by treating stormwater within the Study Area prior to it being discharged into the Hampton Harbor Inlet.

Overall, the Bascule Bridge Alternative would only cause minor short-term temporary impacts to water resources and water quality during the period of active construction. Once constructed, this alternative

would result in beneficial long-term effects on water quality due to the new stormwater treatment. The Bascule Bridge Alternative would comply with MS4 and other water quality permitting requirements.

4.8.6 *Mitigation*

Incorporation of BMPs and low-impact in-water construction methods would minimize temporary water quality impacts during construction. Cofferdams would be installed at each of the pier locations prior to the installation of drilled shafts and pier caps to help contain suspended sediment from construction, keeping it from reaching the water column outside of the Project Site. Additional measures will be taken to protect the quality of water resources, including separation and removal of sediment-laden water, and the preparation of a detailed Stormwater Pollution Prevention Plan. The project will be designed in accordance with the *2008 New Hampshire Stormwater Manual* and will comply with all federal and State water quality permitting requirements.

4.9 Wetlands

4.9.1 *Methodology*

Wetland Resources

Information regarding the presence, classification, and characterization of wetlands in the Study Area was obtained from a combination of on-line data sources, on-site observations and delineation efforts, and information made available from third-party sources. Wetland resources were also discussed at Natural Resources Agency Meetings in August 2018, January 2019, December 2019, December 2020.Wetland classifications were obtained from the USFWS National Wetland Inventory (NWI) on-line mapping and were verified and modified during the on-site wetland delineation. Field surveys for tidal wetlands also yielded anecdotal observations of water resources. The potential presence and landward limits of tidal vegetated wetland resources were investigated by a New Hampshire Certified Wetland Scientist during site visits conducted on June 20-21, 2018. Wetland delineation was conducted within approximately 300 feet of the Project Site. This constitutes the Study Area for wetland resources.

Wetland delineations were conducted according to both the federal and State of New Hampshire definitions. No inland wetlands were identified in the Study Area. Tidal wetland delineations were conducted based on the extent of tidal wetland vegetation, soils and hydrology in accordance with State of New Hampshire Code of Administrative Rules (CAR) Chapter Env-Wt 400 and in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0)* definitions and requirements. Documented tidal elevations for MLW and MHW lines were obtained from the as-built bridge plans of the current bridge. The USACE *Highway Methodology Supplement* (1999) was used to document the functions and values of wetlands on the site.

According to the State of New Hampshire Env-Wt 602.23, the Highest Observable Tide Line (HOTL) is "…a line defining the farthest landward limit of tidal flow, not including storm events, that can be recognized by indicators such as the presence of a strand line of flotsam and debris, the landward margin of salt-tolerant vegetation, or a physical barrier that blocks inland flow of the tide." On June 20-21, 2018, the project team field determined the HOTL elevation at the bridge site. Section 404 of the Clean Water Act defines the landward limit of USACE jurisdiction as the high tide line (HTL) in tidal waters. The HTL was determined to be average of the highest tide of record over the last five years using tidal data records

from Hampton Harbor, Station ID 8429489 adjusted to the North American Vertical Datum of 1988 (NAVD88).

Protected Shoreland

The NHDES Shoreland Program regulates construction, excavation, or filling activities within 250 feet of waterbodies protected under the Shoreland Water Quality Protection Act (SWQPA) (RSA 483-B). Protected waterbodies include public waters defined under RSA 483-B:4(XVI) including all lakes, ponds, and artificial impoundments of greater than 10 acres (ac) in size, water subject to the ebb and flow of the tide, fourth order or greater streams and rivers, and/or all rivers and river segments protected under the New Hampshire Rivers Management and Protection Program (RSA 483:15). Any disturbance proposed within 250 feet from the reference line of these protected waterbodies requires permitting through the NHDES Shoreland Program.

Surface water resources within the Study Area were identified using NH GRANIT surface water data layers. These surface waters were field verified and delineated within the Study Area. The NHDES Consolidated List of Waterbodies Subject to RSA 483-B was used to identify surface waters within the Study Area that are subject to the SWQPA.

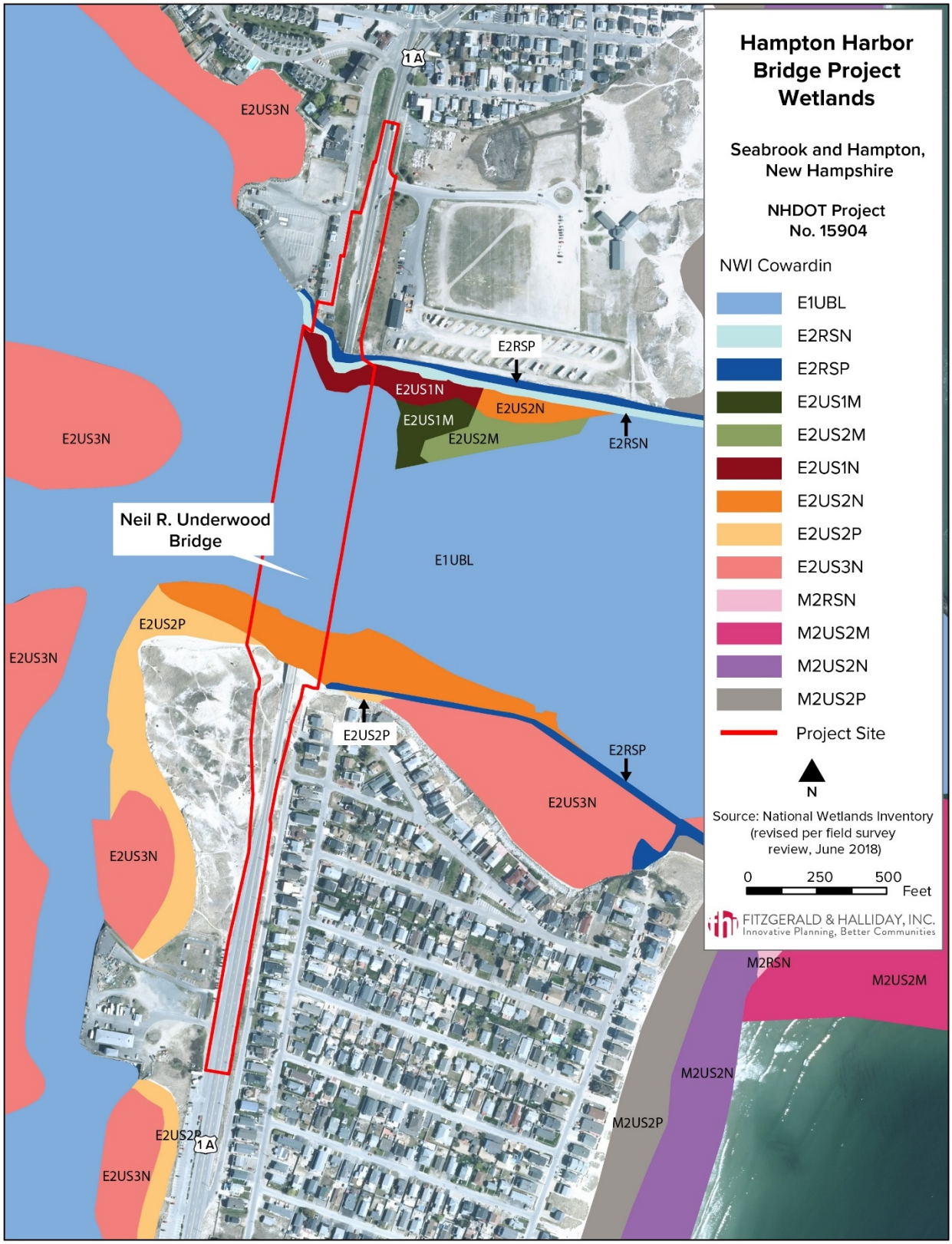
4.9.2 *Existing Conditions*

Wetland types were identified according to the Cowardin et. al. (1979) system of wetland classification. According to the NWI, Estuarine and Marine Wetlands are located east and west of the bridge, on both the north and south sides of the Hampton Harbor Inlet (see Figure 20). No vegetated tidal wetlands or inland wetlands were found within the Project Site during the field investigation. Although large areas of vegetated tidal wetlands do exist in the Hampton River system, they are more than 2,000 feet to the west of the Project Site. Small pockets of tidal vegetated wetlands may occur along the developed shorefront of the inner harbor to the north and south of the bridge, but these are also outside the Project Site.

The primary wetland types in the vicinity of the bridge are estuarine intertidal and subtidal wetlands. The deeper portion of the harbor is classified as Estuarine Subtidal Unconsolidated Bottom (E1UB). Intertidal areas consist of Estuarine Intertidal Unconsolidated Bottom Sand (E2US2) and their regularly (N) and irregularly flooded (P) analogs. Some E2US1 intertidal areas, composed of pebble/gravel, are located near the northern abutment. A field study conducted in the immediate vicinity of the northern and southern abutments in the intertidal zone found all survey samples contained very coarse pebble/gravel, likely due to higher water velocities in these areas (Normandeau Associates, 2020). Smaller areas of E2US2 irregularly exposed (M) sand flats are located to the east of the Project Site. Although existing NWI mapping shows “mud” flats on the south side of the harbor in the Study Area, these areas were found to be sandy rather than muddy, and therefore are classified as ESUS2N on Figure 20.

The lower portions of the abutments, although anthropogenic in nature, would classify as Estuarine Intertidal Rocky Shore Rubble (E2RS2), since they are armored with large stone material. The upper portion of these abutments would classify similarly, except they are irregularly flooded (E2RS2P). These classifications are generally consistent with the New Hampshire Referenced Analysis and Information Transfer System (NH GRANIT) natural and coastal resources GIS data; however, minor adjustments were made to Figure 20 based on field investigations.

Figure 20 - Wetlands



Source: NWI and FHI

Based on information obtained from the NOAA Chart 13278, 28th Ed, Last Correction 5/14/19, and adjusted to NAVD88, tidal elevations for Mean Low Water and Mean High Water are as follows:

Mean Low Water: -4.87 feet NAVD88

Mean High Water: 3.43 feet NAVD88

High Tide Line: 5.49 feet NAVD88

Based on field survey, the HOTL elevation at the bridge site was determined to be 5.82 feet NAVD88.

The natural and coastal resources that dominate the immediate project vicinity are Hampton Harbor and sand dune systems. A blue mussel bed (*Mytilus edulis*), relatively small in size, was field delineated in the vicinity of the northern abutment by a biologist on April 23, 2019. According to the New Hampshire Coastal Resource Mapper, no eelgrass (*Zostera marina*) is located within the project. This was confirmed through correspondence with Frederick Short, a former researcher with the University of New Hampshire's School of Marine Science and Ocean Engineering (personnel communication, September 5, 2018). Large areas of sandflat exist in the Study Area. During field work, substantial erosion of dune and beach areas were noted to the southwest of the bridge and re-shifting of sand flats seems to be a continuous process in this area, especially resulting from storm events.

The tidal buffer, which is the land area 100 feet landward of the HOTL, is a mixture of anthropogenic and natural habitat areas. The upland habitats north of the bridge are dominated by shrub, tree, and vine species, including staghorn sumac (*Rhus typhina*), pin cherry (*Prunus pensylvanica*), Oriental bittersweet (*Celastrus orbiculatus*), and rugosa rose (*Rosa rugosa*). To the south of the bridge, a large area of Beach Grass Grassland (dune habitat), which is a critical community type in New Hampshire, is located immediately to the west of the existing roadway, and a narrow area of dune habitat to the east of the road. This dune habit was identified by NHNHB as containing multiple NH listed plant species (see Section 4.11 below for further discussion of these resources). A small patch of invasive swallowwort (*Cynanchum louiseae)* was also discovered on the southeastern approach slope of the road. Other invasive species documented on the site include Oriental bittersweet, autumn olive (*Elaeagnus umbellata*), Japanese barberry (*Berberis thunbergii*), and bush honeysuckle (*Lonicera* sp.). Invasive species were mapped with a sub-meter GPS unit during the field work.

4.9.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the bridge would not be replaced and therefore no immediate impacts to wetland resources would occur. However, since the existing bridge is on the State's Red List with multiple serious deficiencies, it is likely that maintenance activities would be required in the foreseeable future. Depending on the type of maintenance work, these activities could potentially cause wetland impacts. Potential future maintenance activities could include work to the bridge superstructure and pier or abutment maintenance.

4.9.4 *Impacts of Fixed Bridge Alternative*

Since new drilled shafts, and potentially all the pier caps, would be installed in the channel, the estuarine channel bottom within the footprint of the new drilled shafts and pier caps would be permanently lost. In addition, dredging associated with widening of the existing navigation channel would cause permanent impacts to the channel bottom but would be a shift in habitat type rather than a loss of habitat. Based on

the current design, the installation of the drilled shafts and pier caps for the bridge piers would permanently impact approximately 0.18 ac of subtidal E1UBL channel bottom, some of which is soft bottom and some hardbottom materials. Permanent impact to intertidal (E2US2) wetlands in the vicinity of the abutments due to the installation of the northernmost and southernmost piers would also constitute a portion of this 0.18 ac of impact. As a result of the proposed dredging, E1UBL channel bottom would be permanently impacted, however, this habitat would not be lost since the benthic habitat would still remain but would exist at a slightly lower elevation (i.e., at a greater depth). While the full dredge envelope (shown in blue in Figure 16) encompasses approximately .39 ac, it is anticipated only approximately 0.11 ac of this would be permanently impacted, since much of the proposed dredge envelope currently has depths below the required navigation channel depth. Underwater survey during the final design phase of the project will help to calculate exact quantities of dredge material.

Construction of the Fixed Bridge Alternative would have temporary impacts to wetland resources due to construction access and work containment for in-water work activities. During construction of the new bridge, the existing bridge would be functional and open to vehicular traffic; the navigation channel would also be maintained. As such, temporary work trestles would be constructed adjacent to, and west of, the proposed bridge alignment from both the north and south shores, but not across the navigation channel. Likewise, during the demolition of the existing bridge, temporary trestles would be built adjacent to, and east of, the existing bridge from both the north and south shores. The piles for the trestles would be installed during the in-water work window of November 15th and March 15th. The proposed bridge and existing bridge trestles would likely not be in place at the same time.

Cofferdams would be installed at each of the pier locations prior to the installation of the drilled shafts and pier caps to control potential releases of suspended sediment from the construction reaches the water column. All cofferdams would be installed during the in-water work window, and thereafter, work inside the cofferdams could take place at any time. All water and drill waste material would be extracted from the casing during drilling and pumped onto a barge for removal of suspended particulates and proper disposal.

Other potential temporary impacts to the channel bottom include the relocation of underwater utilities to facilitate construction of the new bridge on a western alignment, and the use of spudded work barges during construction. Since the estimated construction duration is approximately three years, with in-water work dispersed throughout this time, and due to the size and complexity of the construction work, a conservative temporary impact envelope was estimated. For the purposes of this project, the temporary impact envelope includes the area from between the HOTL at both ends of the bridge, and from 100 feet west of the proposed bridge and 80 feet east of the existing bridge – an area of approximately 7.0 ac.

To help offset the proposed permanent impact from the drilled shafts and pier caps, the piers and piles of the existing bridge would be completely removed to a point two-feet below the federal channel depth in the navigation channel, two-feet below the existing harbor bottom in areas of sandy substrate, and even with the channel bottom in areas of hard-bottom substrate outside the navigation channel, restoring approximately 0.06 ac of subtidal and intertidal channel bottom habitat. Therefore, it is anticipated that the project as currently designed would result in a permanent net loss of 0.12 ac of channel bottom habitat. Some areas of existing rip rap around the existing bridge abutments would also be removed, with preliminary estimates ranging up to potentially 0.29 ac of rip rap removal and bottom habitat restoration. No tidal vegetated wetlands or eelgrass beds occur on the site, so these resources would not be impacted.

The location of the wetlands is shown on Figure 20, while Figure 7 shows the plan of the Fixed Bridge Alternative.

Work to be conducted within the tidal buffer would consist primarily of roadway approach improvements. Since the new bridge would be on a western alignment, the resulting impacts from this work include an expansion of earthen side-slopes to the west of the existing bridge approach, installation of a new roadbed and pavement, stormwater improvements, and construction of new abutments. Shifting and widening of the roadway approaches would cause impacts to existing vegetation, including the Beach Grass Grassland (dune habitat), a state critical community type, to the west and east of the approach, south of the bridge. The specific impacts to this community and the listed species found therein are discussed in greater detail in Section 4.11 below. Vegetation in the northwest quadrant of the existing bridge would also be impacted, although no listed plant species were identified in this area. The wider bridge and roadway cross section would require a small increase in pavement area to accommodate the proposed lanes and shoulders, however the increase in pavement has been minimized, and would be only a minor increase in pavement relative to the entire tidal buffer area. In addition, pavement would be removed within the portion of existing roadway approach to be abandoned, helping to offset new pavement areas to some extent. A new stormwater treatment area is proposed in the southeast quadrant of the bridge. A second treatment area is planned northeast of the bridge. Erosion and sedimentation BMPs would be incorporated into the design to avoid and minimize potential impacts during construction. Retaining walls were considered along the south approaches during the identification of alternatives, however, in order to maintain habitat for listed species, earthen banks were considered preferable (see discussion in Section 4.11). Impacts to dune habitat and listed plant species would require compensatory mitigation, as discussed in Section 4.11 below.

The Fixed Bridge Alternative would require grading and very minor tree clearing within the Protected Shoreland. Proposed impacts within the Protected Shoreland of the Hampton River would require a Shoreland Permit in accordance with RSA 483-B. The Shoreland Permit would account for increased pavement areas within the 250-foot Protected Shoreland Buffer, total ground disturbance within the 250-foot Protected Shoreland Buffer, and minor tree clearing activities. During construction activities, temporary impacts within the 250-foot Protected Shoreland Buffer may occur due to temporary construction equipment access and staging or stockpiling of materials within uplands. All areas temporarily impacted during construction would be returned to existing conditions once the project is complete.

4.9.5 *Impacts of Bascule Bridge Alternative*

The types of impacts to wetland resources associated with the Bascule Bridge Alternative are very similar to the Fixed Bridge Alternative, however, the magnitude of in-water impacts is different between the two alternatives. Due to the larger size of the bascule pier for the Bascule Bridge Alternative (see Figure 10), permanent impact to and loss of subtidal E1UBL channel bottom habitat due to the six bridge piers (one bascule pier and five standard piers) would be approximately 0.31 ac – about 0.13 acres more than the Fixed Bridge Alternative. Permanent impact to intertidal (E2US2) wetlands in the vicinity of the abutments due to the installation of the northernmost and southernmost piers would also constitute a portion of this 0.31 ac of impact.

The navigation channel would only be widened to 80 feet under the Bascule Bridge Alternative, however, since the bascule pier is larger and would encroach on the existing Seabrook navigational channel along

its eastern side, the channel would need to be widened on its western side to provide the required width, and an additional area of dredging would be necessary on the western side of the channel, west of the proposed bridge (see Figure 17). The full dredge envelope (shown in pink in Figure 17) would be smaller than the Fixed Bridge Alternative, approximately .15 ac. However, like the Fixed Bridge Alternative, the actual area of impact is anticipated to be less than the full envelope, since a portion of the proposed dredge envelope currently has depths below the required navigation channel depth. The actual dredge area is anticipated to be about the same as the Fixed Bridge Alternative, approximately 0.11 ac. It is anticipated blasting would be required in the area on the west side of the channel due to shallow bedrock. It is estimated about 350 sf of bedrock would need to be removed by blasting. Similar to the Fixed Bridge Alternative, the dredge area would not be considered a loss of habitat, but rather a shift in habitat type due to the deeper depth to the channel bottom. Therefore, once the existing bridge piers were removed, this would offset the permanent loss of habitat by 0.06 ac, for a net loss of 0.25 ac. Some areas of rip rap around the existing bridge abutments would also be removed, with preliminary estimates ranging up to potentially 0.29 ac of rip rap removal and additional bottom habitat restoration.

It is anticipated the area of temporary impact for the Bascule Bridge Alternative would be about the same as the Fixed Bridge Alternative, approximately 7.0 ac. The impacts to the tidal buffer along the roadway approaches to the north and south of this alternative would also be the same as those for the Fixed Bridge Alternative.

Similar to the Fixed Bridge Alternative, the Bascule Alternative would require grading and very minor tree clearing within the Protected Shoreland of the Hampton River, and would require a Shoreland Permit in accordance with RSA 483-B. Temporary impacts within the 250-foot Protected Shoreland Buffer may occur during construction activities due to temporary construction equipment access and staging or stockpiling of materials within uplands. All areas temporarily impacted during construction would be returned to existing conditions once the project is complete.

4.9.6 *Mitigation*

During the final design phase of the project, the NHDOT would undertake coordination with the USACE and NHDES to determine potential mitigation needs for the project. It is currently anticipated all impacts to wetland resources as a result of this project would be fully mitigated through utilization of the New Hampshire Aquatic Resource Mitigation (ARM) Fund In-lieu Fee Program and no additional mitigation would be necessary.

4.10 Wildlife and Aquatic Habitat

4.10.1 *Methodology*

Information regarding the presence, classification, and characterization of biological resources was obtained from a combination of on-site observations and survey efforts, information obtained directly from regulators, and via a literature review. Existing information included NWI GIS mapping, GIS resource mapping from the New Hampshire GRANIT data portal, and the New Hampshire Wildlife Action Plan (NHWAP). Coordination with state and federal regulatory agencies also provided useful information on wildlife and aquatic habitats. Checklists of bird sightings submitted by birders to eBird, an online database maintained by Cornell University and the National Audubon Society, were reviewed for sightings within and adjacent to the Project Site. NOAA National Marine Fisheries Service (NMFS) was consulted regarding

Essential Fish Habitat (EFH) protected under the Magnuson-Stevens Fisheries Conservation and Management Act. The NMFS Essential Fish Habitat Mapper was used to determine the EFH species located within the Study Area. This data search was followed up with a letter directly to the NMFS requesting any other information on EFH within the Study Area. For the purposes of this analysis, the Study Area encompasses the area within approximately 500 feet of the Project Site.

Data on vegetation composition and community types was obtained from field work at the site and from early coordination with NHNHB. Likewise, additional information on wildlife and aquatic species was obtained during field work at the site during site meetings, wetland delineation work, listed species surveys, and benthic survey work.

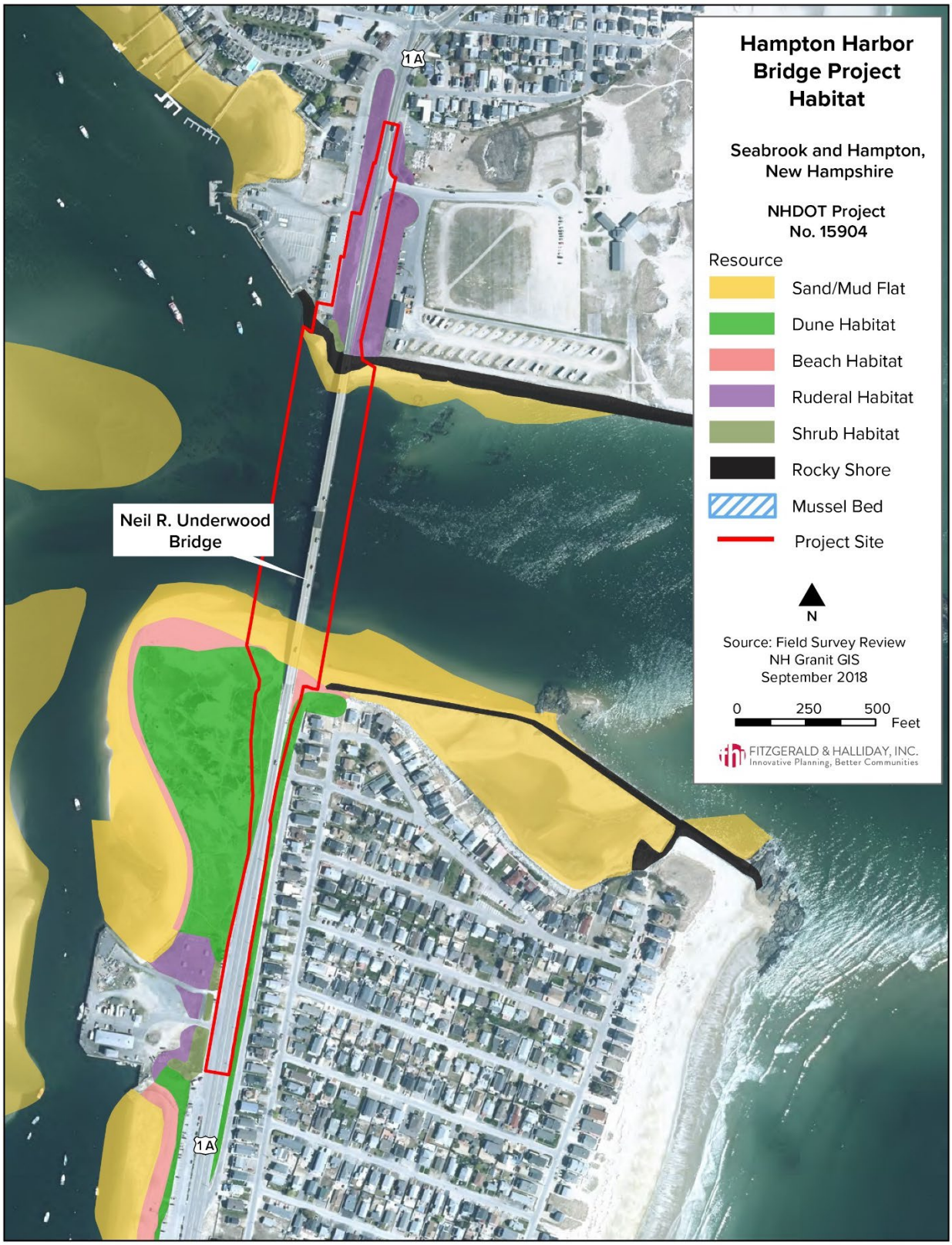
4.10.2 *Existing Conditions*

Vegetation

The project is located in the Gulf of Maine Coastal Plain Lowland Ecoregional Subsection of the state, according to the NHWAP. Much of the open space land on all four quadrants of the bridge is classified as "Highest Ranked Wildlife Habitat" by the NHWAP, and the beach areas classified as "Highest Ranked Habitat in Region". The habitat to the west of the bridge is also mapped as part of a much larger "Prioritized Habitat Block", which encompasses the majority of the tidal wetland system all the way to Interstate 95.

Vegetation on portions of the site is characteristic of disturbed and developed coastal sites, however, more natural community types also exist (see Figure 21). Fill materials and topsoil are found adjacent to the roadway along its northern reaches of the Project Site. Along the southern portions of the roadway, soil materials are dominated by loose sand, not fill material or topsoil. Portions of this sandy material are likely reworked native soils based on the geologic formation in this area, but sandy dredge spoils are also known to have been historically placed in the area to the southwest of the existing bridge abutment to some extent. The dune area to the southwest of the bridge was created at the time of the construction of the existing Neil R. Underwood Bridge and through the deposition of dredge spoil from maintenance dredging of Hampton Harbor. Although the soils in this area have been historically disturbed, their loose sand composition still supports a multitude of dune-specific plant species.

Figure 21 - Habitat



Source: FHI and NH GRANIT

The bridge approach to the north is dominated by ruderal vegetation, or vegetation on waste ground habitat. The northwest quadrant of the bridge is dominated by a small cluster of shrub species, staghorn sumac and pin cherry, near an abandoned salt water pumphouse structure, and maintained turf north of that area. Vegetation in the northeast quadrant is maintained turf near the campground driveway with several ornamental tree plantings. South of this area, near the abutment where sandier soils exist, vegetation is dominated by a mix of native herbaceous species and non-native weed species, however stunted red cedar (*Juniperus virginiana*), Oriental bittersweet, bayberry (*Morella pensylvanica*), and bush honeysuckle (*Lonicera* sp.) were also observed.

Few trees are located within the Study Area. Of the trees identified, black pine (*Pinus nigra*) and blue spruce (*Picea pungens*) were adjacent to houses in the southeast portion of the Study Area as landscaping trees. In the vicinity of the Yankee Fisherman's Co-op driveway, vegetation was dominated by rugosa rose, bayberry, staghorn sumac, and oriental bittersweet.

Vines on the site consist of Oriental bittersweet, black swallowwort, and grape (*Vitis* sp.). Herbaceous plants included the following dominant species in fill areas: goldenrod (*Solidago* sp), little bluestem (*Schizachyrium scoparium*), wild carrot (*Daucus carota*), and common evening primrose (*Oenothera biennis*). Dune areas located to the southwest of the bridge are dominated by beach grass (*Ammophila breviligulata*). Various state-listed plant species are found throughout the dune habitat, as further discussed in Section 4.11 – Threatened and Endangered Species.

A small patch of invasive black swallowwort was also discovered on the southeastern approach slope of the road. Other invasive species documented on the site include Oriental bittersweet, Autumn olive (*Elaeagnus umbellata*), Japanese barberry (*Berberis thunbergii*), bush honeysuckle, winged euonymus (*Euonymus alatus*), multiflora rose (*Rosa multiflora*), and spotted knapweed (*Centaurea stoebe*). No wetland vegetation and habitats are located within the immediate Study Area, but large expanses of tidal wetland are located to the west of the Study Area.

Benthos

The intertidal zone which is the area above water level at low tide and underwater at high tide, is comprised of a diverse community of aquatic organisms. The occurrence, distribution, and abundance of subtidal fauna is a function of substrate type, availability, texture, depth, and hydrology. Mudflats are typically colonized by burrowing amphipods, polychaete worms, and bivalve mollusks with different sympatric species occupying coarser sandy and gravelly substrates. Beneath the bridge, coarser textured pebble/gravel substrate prevails in the subtidal areas, while finer, sandier substrate prevails along quiescent shorelines. Generally, substrate in the Project Site is composed almost entirely of medium to fine-grained sands, with less than one percent fines, based on USACE sediment test results of samples immediately to the west of the bridge taken prior to recent dredging (USACE, 2018). The NHDES GRANIT database has mapped the mud/sand flats further to the west of the bridge within the harbor as habitat for the softshell clam (*Mya arenaria*), however, these areas are well outside the Project Site. A smaller patch of blue mussels is also mapped by the GRANIT database to the south of the northern abutment; this population was delineated in the field by biologists to refine the boundary. Based on NH GRANIT information, all shellfish areas in the immediate vicinity of the bridge are classified as Prohibited – Safety Zone, with the exception of the southwest quadrant, where shellfish harvesting is classified as Conditionally Approved.

During a field survey for benthic resources by Normandeau Associates (2020), three transects were conducted in the intertidal zone under the northern reach of the bridge. The results identified four zones and the dominant species in each, from the highest elevation to the lowest: Black (blue-green algae) Zone, Barnacle (*Balanus* sp.) Zone, Blue Mussel Zone, and the Irish Moss (*Chondrus crispus*) Zone. Rock barnacles have colonized the concrete piers as well as the rip rap stone located just below the littoral fringe almost to the bottom of the intertidal zone. Blue mussels were found beneath the rock barnacles and continuing down to lower elevations.

During the Normandeau Associates study, six samples, near the north and south abutments, were collected and analyzed for softshell clam and other species. No softshell clam, or any other living species, were found in the samples; the lack of species was thought to be a result of the coarse nature of the material. In addition, Normandeau Associates collected three benthic samples as part of the soft-bottom macrofauna survey. These three samples were located in the proposed dredge area to the west (inshore) of the bridge. Macroinvertebrate community composition in these three samples was considered to have good diversity.

Fisheries

Open water habitat around the bridge sustains a finfish community composed of forage species, higher trophic level species, species of conservation concern, and a number of game species sought by recreational anglers. Representative species of both true marine finfish and estuarine dependent species can be found in Hampton Harbor.

Estuarine dependent fish are those species of fish which require estuarine habitats for some, if not all, of their life cycle. Examples expected to occur in Hampton Harbor or adjacent waters include the winter flounder (*Pseudopleuronectes americanus*) and the Atlantic herring (*Clupea harengus*). The habitats within the larger estuary, such as tidal creeks and salt marshes, provide important nursery areas for many marine fish such as Atlantic cod (*Gadus morhua*), Atlantic herring, and pollock (*Pollachius virens*). These nursery areas are sought out by larval and juvenile life stages of the estuarine dependent fish, since they offer some degree of safe cover from predators; but they also supply an abundant indirect food source (through detrital food chains) available to the juvenile fish in a setting of reduced competition at critical trophic levels. Abundant prey species expected to occur in the Study Area include Atlantic silverside (*Menidia menidia*), killifishes (*Fundulus spp*.), and sticklebacks (*Apeltes, Gasterosteus*, and *Pungitius spp*.).

The NOAA NMFS initial assessment indicated that the project borders on, or may include, areas identified as EFH for the life history stages of several species managed by the New England and Mid Atlantic Fishery Management Councils and NMFS. Therefore, an EFH Assessment Worksheet was completed and submitted to NOAA. The EFH Assessment Worksheet identifies the managed species that may occur within the waters surrounding the Project Site. Twenty-four federally managed species were identified as occurring in the Study Area; twenty-one fish, two invertebrates (two species of squid) and one shellfish species.

The following EFH occurs within the Project Site:

- Estuarine
- Subtidal
- Intertidal
- Water Column

- Rocky/hardbottom (includes portions colonized by macroalgae)
- Sand
- Diadromous fish (migratory or spawning habitat)

Avian Species

The benthic and water column invertebrates and finfish sustain a diversity of waterfowl throughout the season in Hampton Harbor and surrounding areas. To date, area birders have reported identifying approximately 187 species of birds from the Hampton Harbor and adjacent areas, based upon over 453 checklists submitted to eBird by birders (http://ebird.org/ebird/hotspots). The information submitted to eBird was used to characterize the water-dependent avian resources of the Study Area. Due to its coastal setting, the site represents foraging habitat for an assortment of waterfowl, gulls, and shorebirds all year. The adjacent tidal wetlands and mud/sand flats provide foraging opportunities for various shorebirds and waders during migration and the breeding season. Open water areas provide foraging habitat for various fish-eating birds such as Osprey (*Pandion haliaetus*), Bald Eagle (*Haliaeetus leucocephalus*), cormorants (*Phalacrocorax* spp.), red-breasted merganser (*Mergus serrator*), and loons (*Gavia* spp.). Terrestrial habitats provide nesting opportunities for songbirds during the breeding season, and wintering habitat for several resident and northern migrant species.

Mammalian Resources

Harbor seals (*Phoca vitulina*) are commonly sighted in Hampton Harbor. Other marine mammals that occur in New England waters such as porpoises and whales are not expected to be encountered within Hampton Harbor with any reliable frequency.

4.10.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the bridge would not be replaced and therefore no immediate impacts to wildlife or aquatic habitat would occur. Since the existing bridge has multiple serious deficiencies, it is likely that maintenance activities would be required in the foreseeable future if a new bridge is not built. Depending on the type of maintenance work, these activities could potentially impact wildlife or aquatic habitat. Potential future maintenance activities could include work to the bridge superstructure and pier or abutment maintenance.

4.10.4 *Impacts of Fixed Bridge Alternative*

Under the Fixed Bridge Alternative, vegetation would be impacted as a result of construction along both bridge approaches. The entire area within the limit of disturbance would be cleared and grubbed, resulting in the removal of all vegetation and root masses. A total of approximately 2.5 ac of terrestrial habitat would be impacted by the project. Of this, approximately 1.3 ac of dune habitat would be impacted along the southern approach. This impact is primarily due to the shift in roadway alignment to the west, but also to some extent the proposed widening of the roadway cross section.

Typically, the NHDOT establishes turf grass along its roadway shoulder, however, this would not be done for portions of this project. Disturbed soils within the southern approach area would be re-graded as part of construction, but no topsoil or grass would be planted so as not to impede reestablishment by native dune vegetation. No landscaping trees or shrubs are proposed at this time. Although the existing trees and shrubs would be permanently removed, this is not anticipated to have an adverse biological impact due to the small number of trees and shrubs that would need to be removed. Impacts to listed plant

species would occur along both the north and south approach ways; this impact is described further in Section 4.11 – Threatened and Endangered Species. Invasive species control would consist of removal and proper disposal of the plant of concern in accordance with the NHDOT's *Best Management Practices for the Control of Invasive and Noxious Plant Species Manual* (2018) and the specific Invasive Species Control and Management Plan to be developed for this project during the permitting phase.

As noted above in Section 4.9 - Wetlands, the channel bottom would be altered. The area of permanently disturbed channel bottom has been estimated to be 0.29 ac, which includes both new structures and new dredging. To offset this permanent impact, the existing bridge piles would be removed below the sediment surface, restoring approximately 0.06 ac of channel bottom to match surrounding bottom conditions. Some areas of existing rip rap around the existing bridge abutments would also be removed, with preliminary estimates ranging up to potentially 0.29 ac of rip rap removal and bottom habitat restoration. Due to the installation of in-water cofferdams, construction staging equipment, and spudded barge activity, a conservative temporary impact envelope was assumed, resulting in an estimate of approximately 7.0 ac of temporary channel bottom impact during construction. This work would occur in both the intertidal and subtidal portions of both soft bottom (sand) and hard bottom (gravel or rock) habitat. It is anticipated these temporarily impacted areas would eventually become available for recolonization of benthic organisms, and thus would return as foraging habitat for benthic-dwelling and benthic-foraging fish species (e.g., flounders, cod, etc.). Direct impacts to fish and filter-feeding organisms (e.g., blue mussels) could occur through turbidity and suspended sediment plumes during dredging activities, however, these are expected to be minimal due to the predominantly sandy and gravelly sediment and lack of fines in the Study Area. This alternative would incorporate BMPs to minimize generation of suspended sediment during in-water work and would therefore not have a substantial adverse impact on fisheries or shellfish resources.

Construction of the entire project is anticipated to take about 36 months, with the in-water portion expected to take place during the first winter work window for the new in-water structures (piers), and in the third winter work window for removal of the existing bridge piers and dredging. Based on coordination with the regulatory agencies, the proposed in-water work window is from November 15th to March 15th. This time-of-year restriction on in-water work would reduce the potential exposure to fisheries resources by conducting work when fisheries are in a life stage which is less susceptible to suspended sediment, or when they are absent from the habitat.

Although the dredging of sediment to widen the existing channel would cause a temporary reduction in quality of benthic habitat and decrease in foraging potential for bottom-foraging fish species, this habitat would not be lost, and would return to normal conditions once benthic materials were recolonized. Depth in the dredge area would increase in some areas from the existing depths of three to seven feet (MLLW), to approximately eight feet (MLLW), but this depth change is within the depth preference of the species for which EFH has been designated at the site and therefore would not adversely affect these species. As discussed in Section 8.9 - Wetlands, the actual dredge area is expected to be less than that shown in Figure 16 since much of the proposed dredge envelope currently has depths below the required navigation channel depth.

An underwater noise analysis was conducted as part of a separate Biological Assessment to address potential adverse impacts to the Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*), which may occur in the Study Area (see Section 4.11 – Threatened and

Endangered Species). The analysis determined some types of construction equipment had the capacity to produce high underwater noise levels – primarily pile driving activities. It was determined sound pressure would be attenuated as it travelled through the water column, and partially by cofferdams, with potential adverse impacts (e.g., undesirable behavioral responses) extending out to 389 feet along the trajectory from the cofferdam (for Atlantic and shortnose sturgeon). Different fish species respond differently to underwater noise levels based on their tolerance of this factor, however, it is expected fish would react accordingly to their specific noise tolerance, and some fish would swim through the noise zone, while others may swim around it. At 800 feet wide, the full channel width should allow fish species that are most sensitive to underwater noise to minimize or avoid their exposure.

The Fixed Bridge Alternative would have permanent impacts to avian habitat. Although intertidal mud/sand flat and beach habitat would be permanently lost due to construction of the new abutment, removal of the existing bridge abutment would mostly offset this and provide new foraging habitat. Therefore, no long-term adverse impacts are anticipated to avian species. The small amount of vegetation altered by the project would not negatively impact breeding or foraging of avian species in terrestrial areas. However, construction activities could have an adverse impact on some species, such as shorebirds that utilize adjacent beaches for foraging. Due to the large scale and complexity of the project, work may be conducted at any time of the year in terrestrial areas.

This alternative would not have adverse impacts on mammalian species. No important large-mammal habitat or wildlife corridors would be impacted by the project. The limited amount of potential small-mammal habitat altered by the project would not have an adverse impact on individuals or populations of mammalian species. The NHDOT would require the contractor to manage trash and keep a clean site so as not to attract unwanted scavenger or predator species which could predate ground nesting birds and small mammals.

4.10.5 *Impacts of Bascule Bridge Alternative*

The types of impacts to wildlife and aquatic habitat resources associated with the Bascule Bridge Alternative are very similar to the Fixed Bridge Alternative. Terrestrial and vegetation impacts would be the same as described for the Fixed Bridge Alternative since the approaches would be of the same design. Therefore, a total of approximately 2.5 ac of terrestrial habitat, including 1.3 acres of dune habitat, would be impacted by this alternative.

As discussed in Section 4.9 - Wetlands, in-water impacts would be greater for the Bascule Bridge Alternative. Due to the larger size of the bascule pier, the permanent loss of channel bottom habitat would be approximately 0.31 ac – about 0.13 ac more than the Fixed Bridge Alternative. The area required to be dredged would be similar to the Fixed Bridge Alternative, approximately 0.11 ac.

The area of dredging required on the western side of the federal channel would require blasting of approximately 350 sf of bedrock. Although limited to a small area, this blasting would cause additional underwater noise and potential impacts to aquatic life. Once the existing bridge piers are removed, this would offset the permanent loss of aquatic habitat by 0.06 ac, for a net loss of 0.25 ac. Some areas of existing rip rap around the existing bridge abutments would also be removed, with preliminary estimates ranging up to potentially 0.29 ac of rip rap removal and additional bottom habitat restoration. It is anticipated temporary impacts would be roughly equivalent to the Fixed Bridge Alternative, approximately 7.0 ac.

4.10.6 *Mitigation*

Construction induced turbidity would be substantially reduced by installing the piers within an outer sheet pile containment system, thereby minimizing the potential for wastewater and sediment to reach the water column. Wastewater would be pumped out of the system onto a barge where it would be treated in a settling basin or equivalent, before being discharged back into the harbor. The containment system would be removed upon completion of pier installation. In-water construction, specifically sheet pile containment and temporary pile installation, would take place between November 15th and March 15th, as directed by NOAA NMFS, when most fisheries resources are not likely to be in the Study Area, and when shellfish metabolism is greatly reduced. Potentially adverse underwater sound and vibration impacts generated during drilled shaft and column installation would also be minimized by the containment system. A detailed Stormwater Pollution Prevention Plan would be prepared to minimize water quality impacts during construction.

It is anticipated the NHDES Aquatic Resource Mitigation Fund would be utilized as mitigation for the net loss of channel bottom habitat. Additional coordination would take place with regulatory agencies during the final design and permitting phase of the project to establish final mitigation needs. No mitigation is proposed for non-listed vegetation, avian, or mammalian impacts since these impacts would be negligible.

4.11 Threatened and Endangered Species

4.11.1 *Methodology*

Information regarding the presence and characterization of rare habitats and listed species was obtained from a combination of on-site observations and survey efforts, information obtained directly from regulators, and via a literature review. Section 7 of the Endangered Species Act, 16 U.S.C. Section 1536(a)(2), requires all federal agencies to consult with NOAA NMFS for marine and diadromous fish species, marine turtles, and marine mammals or the USFWS for fresh-water biota and wildlife. Both the USFWS and the NOAA NMFS Protected Resources Division were consulted via direct correspondence for this project. In addition, NHNHB, the state agency regulating biodiversity and rare species, was also consulted. The consultation letters received from USFWS, NOAA and NHNHB are included in Appendix A. In addition, coordination with these and other natural resource agencies, including the NHFG, NHDES, USACE, and USEPA, also occurred during Natural Resource Agency Coordination Meetings held in August 2018, January 2019, December 2019, and December 2020 at the NHDOT during project development. Since the initial coordination was conducted with the USFWS for this project, the monarch butterfly has been considered as a candidate species for federal listing. The NHWAP and associated mapping was also consulted. Data on listed vegetation species was obtained from coordination with NHNHB and detailed field surveys at the site.

4.11.2 *Existing Conditions*

State Listed Plant Species

Based on initial coordination with the NHNHB, an NHB Data Check Letter was received on July 7, 2018, which identified the following exemplary natural communities in the site: Beach Grass Grassland, Intertidal Flats, and Subtidal systems. The Beach Grass Grassland is primarily located to the southwest of the existing bridge, or dune habitat area. Smaller, narrow areas of this habitat are also located along the east side of the existing roadway, south of the bridge.

Coordination was conducted early in the project with the NHNHB and NHFG to determine the potential for state listed species in the vicinity of the Project Site. A site walk was conducted with NHNHB staff to investigate the occurrence of listed plant species within the Study Area on August 24, 2018. Nine plant species and two wildlife species were identified by NHNHB as potentially occurring in the vicinity of the project. Field survey conducted on June 20-21, 2018, August 23-24, 2018, and September 26, 2018 confirmed the presence of six plant species within the Study Area as noted below:

- Seaside threeawn (*Aristida tuberculosa*) (NH endangered)
- Hairy hudsonia (*Hudsonia tomentosa*) (NH threatened)
- Gray's umbrella sedge (*Cyperus grayi*) (NH endangered)
- Sand dropseed (*Sporobolus cryptandrus*) (NH endangered)
- Seaside sandmat (*Euphorbia polygonifolia*) (NH endangered)
- Field wormwood (*Artemisia campestris* ssp. *caudata*) (NH endangered)

The plant species identified and surveyed on the Project Site are all species which prefer dune habitats. In May 2019, as part of the USACE Hampton Harbor Dredge Project and NHDOT scour repairs at the south abutment, some of the listed plants identified during the 2018 field work were relocated from the alignment of a proposed construction access drive west of the south abutment and transplanted to an area further south within the Dunes WMA. The UNH Coastal Habitat Restoration Team led community volunteers, via NH Sea Grant Extension's Coastal Research Volunteer program, in this effort.

Terrestrial Species

Coordination was initiated with USFWS in June 2018 via the Information Planning and Conservation System (IPaC) online system. The IPaC identified the Federally Threatened Red Knot ("rufa" subspecies) (*Calidris canutus rufa*) –and the Northern Long-eared Bat (*Myotis septentrionalis*) as potential species within the Study Area. Another 50 bird species were identified by the USFWS through the IPaC as additional species of conservation concern that could potentially occur in the geographical area inclusive of the site during various stages of their life history. Also, a July 2018 NHNHB report identified the State Endangered Least Tern and Piping Plover (also identified by this report as Federally threatened) potentially within the Study Area. NHFG has monitored nesting of both the Least Tern and Piping Plover in Seabrook and Hampton since 1997. Historically, Piping Plover have established nests in the immediate vicinity of the bridge, however Least Terns have not.

On February 15, 2019, in response to a letter from NHDOT, Ms. Susi von Oettingen provided an email to the NHDOT describing which species were of concern to USFWS within the Study Area; these species included the Piping Plover (*Charadrius melodus*) – Federally Threatened; the Roseate Tern (*Sterna dougallii*) – Federally Endangered; and the Red Knot. In-person meetings were subsequently held with USFWS and NHFG personnel in March and December 2019 to introduce the proposed project and to discuss project details. An IPaC Species List updated in March 2021 is provided in Appendix A.

Field survey indicated there is no habitat for Piping Plover within the Study Area on the north side of the channel, as the area above the high tide zone in the vicinity of the bridge is rip rap. The beach to the southeast of the bridge has a steep gradient rising up landward from the high tide line. The dune habitat in the vicinity of the bridge has been subject to erosion during extreme storm events. Southwest of the bridge, the beach widens out and the gradient is less steep as dunes transition to high beach, then middle,

and low beach habitats. From the beach habitats, it succeeds to intertidal sandflats, then the subtidal habitat of Hampton Harbor. Intertidal areas in the Study Area may serve as forage areas for Piping Plovers. The upper beach, or supralittoral zone, is generally used by Piping Plovers for foraging, and in some cases, for nesting. The Study Area does not fall within designated Critical Habitat for the Atlantic Coast breeding population of Piping Plover, nor does it fall within designated Critical Habitat for Roseate Tern or Red Knot (https://ecos.fws.gov/ecp/report/table/critical-habitat.html, May 13, 2020).

The monarch butterfly has recently become a candidate for listing under the Endangered Species Act (ESA). The USFWS will review the monarch's status each year until resources are available to begin developing a proposal to list the monarch as threatened or endangered under the ESA. The candidate status of the monarch does not provide protection under the ESA, and no further coordination with the USFWS is required at this time. Monarch habitat includes non-forested, non-shrubby areas where there is potential for nectar species (flowering plants) and/or milkweed plants, including, but not limited to, regularly or semi-regularly mowed areas within the ROW and where a clear zone is maintained.

Aquatic Species

Consultation with NOAA NMFS identified federally listed threatened or endangered aquatic species that may occur within Hampton Harbor. These include:

- Atlantic sturgeon (*Acipenser oxyrhynchus*) - all Distinct Population Segments (DPS) (Threatened/Endangered depending on DPA)
- Shortnose sturgeon (*Acipenser brevirostrum*) (Endangered)
- Green sea turtle (*Chelonia mydas*) - North Atlantic DPS
- Kemp's Ridley sea turtle (*Lepidochelys kempii*)
- Loggerhead sea turtle (*Caretta caretta*) - Northwest Atlantic DPS
- Leatherback sea turtle (*Dermochelys coriacea*)

Based on coordination with NOAA, while it is possible the sturgeon and four sea turtles could be present in Hampton Harbor, it is expected their presence would be limited to rare, transient individuals partaking in migrating and foraging behavior.

4.11.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the bridge would not be replaced. Thus, there would be no immediate impacts to Threatened and Endangered species. Since maintenance work to the existing bridge would be inevitable if a new bridge were not constructed, there could potentially be future impacts to listed species habitat. Depending on the type and extent of maintenance work (i.e., work within listed species habitats), these activities could potentially cause adverse impacts to listed species or their habitats, and would require coordination with NHNHB, NHDES, NOAA NMFS and USFWS to determine the effects of any of these activities. Potential future maintenance activities could include work to the bridge superstructure and pier or abutment maintenance.

4.11.4 *Impacts of Fixed Bridge Alternative*

Under the Fixed Bridge Alternative, listed species would be impacted as a result of construction work within both aquatic and terrestrial habitats. As discussed in Section 4.9 - Wetlands, the area of permanently disturbed channel bottom has been estimated to be 0.29 ac, which includes both new structures and new dredging. Approximately 0.11 ac of this is due to dredging, while 0.18 ac would be

permanently lost habitat. Based on a conservative temporary impact envelope, described in Section 4.9, it is estimated approximately 7.0 ac of channel bottom may be temporarily impacted during construction. Based on coordination with the regulatory agencies, the proposed in-water work window is from November 15th to March 15th. This time-of-year restriction on in-water work would reduce the potential exposure to listed aquatic species by conducting work when they are likely absent from the Study Area. Construction of the entire project is anticipated to take about 36 months, with the in-water expected to primarily take place during the first winter work window and the third winter work window.

Although the dredging of sediment to widen the existing channel would cause a temporary loss of benthic habitat, as well as minor impacts from suspended sediment during in-water work, the listed aquatic species identified by NOAA would not be adversely impacted since they are unlikely to occur within the Study Area and are generally transient in nature if they do occur. As noted above, an underwater noise analysis was conducted as part of the NOAA Programmatic BA to address potential adverse impacts to the listed aquatic species which may occur in the Study Area. The analysis determined some types of construction equipment had the capacity to produce high underwater noise levels – primarily pile driving activities. It was determined sound pressure would be attenuated as it travelled through the water column, and partially by cofferdams, with potential adverse impacts (e.g., undesirable behavioral responses) extending out to 389 feet along the trajectory from the cofferdam (for Atlantic and shortnose sturgeon). At 800 feet wide, the full channel width should allow listed aquatic species to minimize or avoid their exposure to underwater construction noise. NOAA concurred with FHWA/DOT's determination that the action is not likely to adversely affect listed aquatic species or critical habitat.

Both temporary and permanent impact to the breeding habitat of the Piping Plover is expected, and temporary impacts to both Piping Plover and Red Knot could occur. Temporary impacts would occur from the activity around the bridge during construction due to the operation of machinery and equipment. This includes noise and vibration from pile installation, construction of the substructure and superstructure components, concrete work, paving, and the installation of scour protection. The noise and vibration could flush the Piping Plover and Red Knot from the beach foraging areas proximal to the bridge. Some temporary impacts would occur intermittently during the three-year construction period (e.g., noise, lights, vibrations), while others would occur during the duration of the construction period (e.g., general construction noise from the work zone). Still others would occur only during a portion of the construction duration (e.g., channel dredging). The USFWS has not established comprehensive quantitative noise criteria for Piping Plovers and few studies have directly quantified potential noise impacts, however, during initial discussions with USFWS it was generally agreed that a 660-foot (200-meter) buffer distance from the Project Site would be used to determine the area of potential impact due to noise. Since both the Piping Plover and the Red Knot could occur within this 660-foot (200-meter) buffer, they would be considered susceptible to the temporary adverse effects from various disturbances discussed above. The Roseate Tern would be less likely to be subject to noise impacts during construction because they occur in the Study Area only on occasion for feeding.

The permanent impact is associated with the loss of the beach habitat on the west side of the existing bridge which could conceivably be used by Piping Plover for nesting habitat, and both Piping Plover and Red Knot for foraging. This loss is due to the areal bridge footprint (plovers do not nest under bridges) and any additional riprap placed around the abutment for scour protection. Although intertidal mud/sand flat and beach habitat would be permanently lost due to construction of the new abutment, removal of the

existing bridge abutment would largely offset this impact and provide new foraging habitat, but not new nesting habitat. Also, the area lost to abutment and riprap emplacement is minimal compared to that available further away from the bridge where the intertidal flats are much more extensive.

The Dunes WMA is a documented breeding locality of typically one pair of Piping Plovers each year, although no plovers nested on the site in the 2020 breeding season. This nesting locality is subject to ongoing impacts to the plover from noise, human disturbance, predators, and meteorological events (storms, temperature extremes, etc.). The noise, vibrations, and activity in the general area of the southwest bridge quadrant during construction could reasonably be expected to add additional stressors to breeding Piping Plovers at this location. These stressors could result in adverse effects to plovers such as discouraging Piping Plovers from breeding at the Dunes WMA. In addition, the new bridge would be located west of the existing bridge in an area identified as potential nesting and foraging habitat for the Piping Plover. The BA prepared for USFWS determined the proposed project "May Affect, and is Likely to Adversely Affect" the Piping Plover. The USFWS is currently preparing a Biological Opinion in response to the BA.

FHWA and NHDOT investigated phasing the construction to eliminate noise impacts to the plover between April 1 and August 31, when plovers might be nesting or foraging on the Dunes WMA or Sun Valley Beaches. However, over 75% of the proposed bridge lies within 660 feet (200 meters) of the plover habitat. This time-of-year restriction would reduce the allowable construction window to a seven-month period centered over the winter weather season in a difficult location with challenging work environment, thereby extending the construction from three years to six or seven years. Use of construction monitors to halt construction if adverse impacts to the receptor species were detected was also considered, but dismissed by FHWA and NHDOT because it depends upon observation and interpretation of animal behaviors and because of the potential for ongoing, unscheduled construction delays. This could result in the need to extend the construction period into additional years which would be undesirable from multiple aspects including natural resource protection, socioeconomic, financial, and safety perspectives.

A determination of "May Affect, but Not Likely to Adversely Affect" was made in the BA for the Red Knot, since this shorebird does not nest within or adjacent to the Project Site. It occurs in the Study Area only occasionally while passing through during migratory movements and may stop to feed on sand or mud flats exposed during low tides.

A determination of "May Affect, but Not Likely to Adversely Affect" was made for the Roseate Tern. Roseate Terns nest on remote offshore islands and therefore would not have to defend nests, eggs, or young at any location in the Study Area. They occur in the Study Area on occasion solely for feeding on nearshore inshore Sand Lance, hake (*Merluccius spp*.), and Atlantic herring. Noise generated from the Project Site during construction would be presumed to have negligible impacts on the Roseate Tern since Roseate Terns are not dependent upon sedentary resources while foraging.

This alternative would have no effect on the NLEB, a listed mammalian species (see USFWS correspondence in Appendix A). The NHDOT would comply with all applicable Avoidance and Minimization Measures (AMMs) relative to the NLEB within FHWA's "*Range-wide Programmatic Informal Consultation for Indiana Bat and Northern Long-eared Bat*" guidance document. AMMs would likely include, but not be limited to, time-of-year restrictions for clearing of trees over three-inches diameter-breast-height (DBH), minimization of lighting, minimization of noise to background levels, and inspection of the bridge at least seven days prior to construction initiation. All details on applicable AMMs would be

determined during the permitting phase of the project, in consultation with FHWA and USFWS. A future bridge assessment of the existing bridge would be required, prior to its demolition, to identify if bats were found to be utilizing the bridge.

No specific conservation measures are being incorporated into the project for the monarch butterfly, however, it is anticipated removal of invasive species and some shrub species during construction could be beneficial for this species by promoting suitable herbaceous habitat.

4.11.5 *Impacts of Bascule Bridge Alternative*

The types of impacts to listed species, both terrestrial and aquatic, and their habitats, associated with the Bascule Bridge Alternative are very similar to the Fixed Bridge Alternative. Terrestrial impacts, those above the HOTL, would be similar to those described for the Fixed Bridge Alternative, since the approaches would be of the same design. However, since the construction period would be of longer duration than the Fixed Bridge Alternative (42 months versus 36 months), construction impacts to the Piping Plover would likely be slightly greater under this alternative.

As discussed in Section 4.9 - Wetlands, in-water impacts would be greater for the Bascule Bridge Alternative due to the larger size of the bascule pier. The permanent loss of channel bottom habitat would be greater - approximately 0.31 ac – which is approximately 0.13 ac more than the Fixed Bridge Alternative. The area required to be dredged would be similar to the Fixed Bridge Alternative, .11 ac. Since the bascule pier is larger and would be more complex to construct, the in-water work would be of a longer duration, causing potential underwater noise impacts for a longer period of time. The other notable difference for in-water work would be the need for blasting of approximately 350 sf of bedrock to the west of the proposed bridge. Although a small area, this blasting would cause additional underwater noise and potential impacts to aquatic listed species, if present. Once the existing bridge piers were removed, this would offset the permanent loss of aquatic habitat by 0.06 ac, for a net loss of 0.25 ac. It is anticipated temporary channel bottom impacts would be similar to the Fixed Bridge Alternative, approximately 7.0 ac.

4.11.6 *Mitigation*

As a result of the impacts to NH-listed plant species located in the footprint of the proposed roadway alignment, a comprehensive compensatory mitigation plan would be developed during the permitting and final design phase of the project. Based on coordination with regulatory agencies to date, it is likely that mitigation would consist of relocation of the listed plant individuals located within the impact area to a predetermined transplant area within the dune habitat to the southwest of the proposed bridge approach.

To minimize potential impacts to listed plant species, the NHDOT would not establish its typical turf grass along the roadway within most portions of this project. Disturbed soils within the southern approach area would be re-graded as part of construction, but no topsoil or grass would be planted so as not to impede reestablishment by native dune vegetation, including listed plant species. The NHDOT may plant beach grass for stabilization of these graded soils in some areas if it is deemed appropriate by regulators, and the field conditions would support it, but this would be determined during the permitting phase of the project. No landscaping trees or shrubs are proposed in areas where listed species are present.

Although no specific mitigation is proposed for potential impacts to Piping Plovers, the NHDOT is proposing several conservation measures which are expected to minimize potential impacts to this species. To minimize some of the potential stressors, the following conservation measures may be employed to avoid or reduce the risk of adverse impacts to the target organisms should they occur in the Study Area:

- Contractor education to inform construction workers on the potential presence of Piping Plovers in the work area and whom to call should they discover one;
- The use of silt fencing, or other protective fencing, to prevent young Piping Plovers from wandering into the construction area;
- Requiring the contractor to establish strict "housekeeping" requirements to keep the work site area clean and not contain food wastes from the construction workers so as not to attract scavenging animals that may prey upon Piping Plover adults, eggs or young, should they be nesting in the area, or foraging Red Knots should they occur during migratory stopovers;
- Requiring the contractor to impose a speed limit on construction vessels to prevent or control wake so as not to erode Piping Plover nesting site on the beach, inundate a nest, or inundate foraging Piping Plover chicks;
- Requiring the contractor to implement light shielding during construction and incorporate shielding in the final design to prevent the beach from being lighted at night outside of the Project Site, so as not to impact the diurnal rhythms of nesting Piping Plover and aid visual predators from potentially preying on Piping Plover eggs and chicks;
- The implementation of slope stabilization measures adjacent to the bridge and roadway on the southwest side of the roadway to prevent erosion;
- Conducting slow starts when driving casings for drilled shafts during the Piping Plover breeding season, or Red Knot migration period, so as not to startle or flush Piping Plovers or Red Knots from their habitats; and
- Use of stone chinking within the riprap to prevent void spaces from attracting rodents and other mammals that may prey upon the receptor organisms.

These conservation measures would largely benefit Piping Plover and Red Knot. Roseate Tern is unlikely to benefit from these measures as they are not exploiting fixed resources in the Study Area but pass through the area on occasion when following schools of fish.

4.12 Floodplains and Floodways

4.12.1 *Methodology*

Floodplain resources were investigated through review of Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) mapping. It is depicted on FEMA NFIP Flood Insurance Rate Map Panel No. 33015C0439E, dated January 29, 2021. The Study Area includes those areas within approximately 200 feet of the proposed limits of construction disturbance of the Neil R. Underwood Bridge and its approaches.

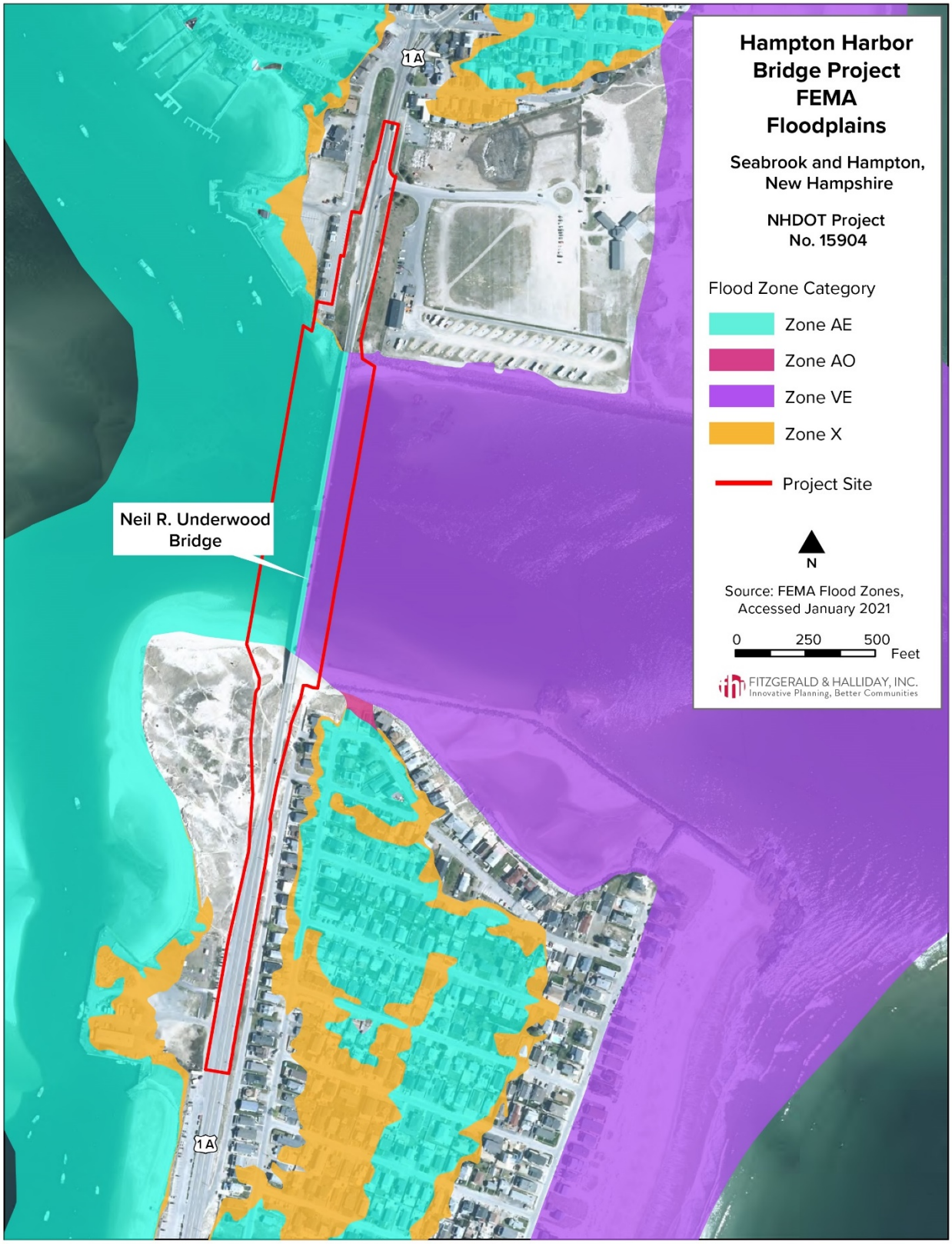
4.12.2 *Existing Conditions*

Several different flood zones are present including Zones AE, AO, VE and X (see Figure 22). The Project Site and areas to the west within Hampton Harbor are located within Zone AE. Zone AE are areas inundated by one-percent annual chance flooding (100-year flood), for which base flood elevations (BFE) have been determined. All BFE elevations are in NAVD88. The BFE at the bridge and within the harbor to the west is nine feet. Immediately east of the bridge, the Hampton Harbor Inlet is designated as Zone VE with a BFE of 14 feet; as one progresses further east towards the Atlantic Ocean, the BFE is 16 feet. Zone VE are areas subject to inundation by the one percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. North of the bridge is designated as Zone X, which is an area of minimal flood hazard that has been determined by FEMA to be outside of a special flood hazard area and is higher than the elevation of the 0.2 percent annual-chance (or 500-year) flood. The only area immediately north of the bridge in Hampton that is not within Zone X is the location of the Hampton State Pier. This area resides within Zone AE with a BFE of nine feet.

To the south of the existing bridge in Seabrook, the area along NH Route 1A and the dunes on the west are designated as Zone X. A portion of the residential area east of Eisenhower Street resides within Zone AE with an eight-foot BFE. There is one small area immediately along the southern shoreline of the Hampton Harbor Inlet southeast of the bridge that is identified as Zone AO with a two-foot depth. Zone AO are areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. The average flood depths in these areas have been derived from detailed hydraulic analyses.

The Hampton and Seabrook beaches have long been subject to shifting topography, especially the mouth of the harbor where it meets the Hampton River. Beckman's Point, which lay just north of the mouth of the channel in 1911, was located south of the channel by 1926. Houses constructed immediately north of the bridge at the turn of the century were washed away, while others were moved north to safer ground. A 1932 study initiated by the Hampton Beach Preservation Commission suggested several potential improvements to promote shoreline stabilization, including the construction of jetties within the river channel, the dredging of the harbor, and the construction of a more effective breakwater system. Although these measures were eventually put into place, the redistribution of sand along the beaches has persisted. Evidence of this on-going erosion was identified during field work.

Figure 22 - Floodplains



Source: FEMA and FHI

4.12.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the bridge would not be replaced. Thus, there would be no impacts to floodplain resources or elevations.

4.12.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

Both alternatives involve replacement of the existing bridge with one on an off-alignment to the west. Hydraulic analyses for the conceptual bridge were conducted by HDR, Inc. and took into consideration 100-year and 500-year base flood elevations at the bridge as determined by FEMA, as well as projected SLR among other variables. The SLR height used in the analyses is based on the "Intermediate-High" range of estimated 2100 rise by New Hampshire Coastal Risk and Hazards Commission. The predicted 2100 Intermediate-High SLR is reported as 3.9 feet. Design engineers used a more conservative SLR of four feet during bridge concept development and hydraulic assessment.

Overall, there would be no substantial increase in fill materials placed into the Hampton Harbor Inlet with construction of either of the replacement bridge alternatives. Materials placed for new bridge piers would be offset by removal of the existing bridge piers from within the waterway. The net change in fill would be negligible and insignificant relative to the coastal setting and resultant flood area displacement. Additionally, the hydraulic opening under either alternative would be similar to the hydraulic opening under the existing bridge. Therefore, bridge replacement, regardless of whether it is with a Fixed Bridge or a Bascule Bridge, would not exacerbate local flooding as it would not result in an increase in flood elevations or flood flow velocities. As such, impacts to floodplain resources or increases in flood elevations are not anticipated from this project.

4.12.5 *Mitigation*

Since there will be no impacts to floodplain resources as a result of either alternative, no mitigation is proposed at this time.

4.13 Coastal Zone Consistency

4.13.1 *Methodology*

Existing documentation was consulted to determine the extent of the coastal zone in New Hampshire, the presence of specific coastal resources within the Study Area, and the policies protecting the coastal zone and associated resources in the state. The New Hampshire *Guide to Federal Consistency Coastal Zone Management Act § 307* (November 2019) and 15 CFR Part 930, subpart D, were consulted and utilized to review the policies of the Coastal Zone Management Act (CZMA) with regards to the two alternatives.

4.13.2 *Existing Conditions*

The entire project site is located within the New Hampshire coastal zone, as mapped and described in the New Hampshire *Guide to Federal Consistency Coastal Zone Management Act § 307*. Of the sixteen formal coastal policies included in the guide, it is anticipated the following policies apply to this project:

- No. 1. Protect and preserve and, where appropriate, restore the water and related land resources and uses of the coastal and estuarine environments. The resources of primary concern are coastal and estuarine waters, tidal and freshwater wetlands, beaches, sand dunes, and rocky shores.

- *Relevance*: The Neil R. Underwood Bridge carries NH Route 1A over the Hampton Harbor Inlet which is an estuarine waterway connecting Hampton Harbor on the west to the Atlantic Ocean on the east. Tidal wetlands, beaches, and sand dunes exist proximate to the bridge site.

- No. 2. Manage, conserve and, where appropriate, undertake measures to maintain, restore, and enhance the fish and wildlife resources of the state.

    - *Relevance*: Because the proposed project involves construction of a replacement bridge to the west of the existing bridge and involves realignment of the northern and southern approach roadways to access the westerly alignment, it would involve in-water work and landside construction work that would affect fish and wildlife resources.

- No. 6. Identify, designate, and preserve unique and rare plant and animal species and geologic formations which constitute the natural heritage of the state. Encourage measures, including acquisition strategies, to ensure their protection.

    - *Relevance*: Construction of a new bridge and demolition of the old bridge could potentially affect fish and wildlife resources, including rare plant and animal species and their habitats.

- No. 7. Provide a wide range of outdoor recreational opportunities including public access in the Seacoast through the maintenance and improvement of existing public facilities and the acquisition and development of new recreational areas and public access.

    - *Relevance*: Construction of a new bridge could potentially affect public access to important recreational resources in the Study Area including Hampton Beach State Park, the Hampton State Pier, Sun Valley Beach, Hampton Harbor, and the Dunes WMA.

- No. 9. Reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to preserve the natural and beneficial value of floodplains, through the implementation of the National Flood Insurance Program and applicable state laws and regulations, and local building codes and zoning ordinances.

    - *Relevance*: The project site is located within the coastal flood zone.

- No. 11. Protect and preserve the chemical, physical, and biological integrity of coastal water resources, both surface and groundwater.

    - *Relevance*: Construction of a new bridge could potentially affect surface water quality and the new bridge and approaches would generate stormwater.

- No. 13. Allow only water dependent uses and structures on state properties in Portsmouth-Little Harbor, Rye Harbor, and Hampton-Seabrook Harbor, at state port and fish pier facilities and state

beaches (except those uses or structures which directly support the public recreation purpose). For new development, allow only water dependent uses and structures over waters and wetlands of the state. Allow repair of existing over-water structures within guidelines. Encourage the siting of water dependent uses adjacent to public waters.

- *Relevance*: The project involves a crossing of the Hampton Harbor Inlet.

- No. 14. Preserve and protect coastal and tidal waters and fish and wildlife resources from adverse effects of dredging and dredge disposal, while ensuring the availability of navigable waters to coastal-dependent uses. Encourage beach renourishment and wildlife habitat restoration as a means of dredge disposal whenever compatible.

    - *Relevance*: Construction of a replacement bridge would include new dredging to widen the Hampton federal navigation channel in the vicinity of the new bridge.

- No. 15. Support the preservation, management, and interpretation of historic and culturally significant structures, sites and districts along the Atlantic coast and in the Great Bay area.

    - *Relevance*: The project involves the replacement of an existing historic bridge.

4.13.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the existing bridge would not be replaced and thus it would not trigger a federal Coastal Zone Consistency Review. Potential future maintenance activities could foreseeably require Coastal Consistency Review.

4.13.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

Construction of a replacement bridge, whether it is a fixed bridge or a bascule bridge, is anticipated to be consistent with the coastal zone policies discussed above. A formal determination on coastal consistency would be undertaken during the permitting phase of the project. Below is a discussion of each of the relevant policies and the potential consistency impacts of the two replacement alternatives with respect to these policies.

- No. 1. As discussed in Section 4.9 – Wetlands, construction of either replacement bridge alternative would impact sub-tidal and intertidal estuarine resources as in-water work would be necessary to construct new bridge piers, demolish and remove existing bridge piers, and conduct new dredging to widen the navigation channel. Although the project would impact estuarine resources, it is anticipated to be consistent with this policy as measures will be taken to avoid and minimize impacts to the greatest extent practicable. These measures would include construction BMPs that would protect estuarine resources during the period of active construction.

- No. 2. As discussed in Section 4.10 - Wildlife and Aquatic Habitat, and Section 4.11 - Threatened and Endangered Species, the project, whether it involves a Fixed Bridge or Bascule Bridge replacement, would have potential impacts to fish and wildlife resources. However, conservation measures would be taken to avoid and minimize impacts to these resources; therefore, it is anticipated the project would be consistent with this policy.

- No. 6. As discussed in Section 4.11 – Threatened and Endangered Species, the project would have the potential to impact rare plant and animal resources. However, measures have been taken to avoid and minimize impacts to listed plant and avian species, and to protect rare aquatic species during construction activities through BMPs and time-of-year in-water work restrictions. Therefore, the project is anticipated to be consistent with this policy.

- No. 7. Constructing a replacement bridge, whether a Fixed Bridge or a Bascule Bridge, would improve bicycle and pedestrian facilities, including providing new bump-outs on the bridge, as described in Section 4.5 - Considerations Related to Pedestrians and Bicyclists. Also, construction of a shared-use path under the bridge along the north abutment would facilitate safe access for bicyclists and pedestrians between the Hampton State Pier and Hampton Beach State Park, two recreational resources. The height of the Fixed Bridge would be such that all known existing marine vessel traffic would be able to pass, such that recreational use of Hampton Harbor would not be permanently impacted. A movable bridge would also pass all vessel traffic. Although access to portions of the Dunes WMA would be restricted during construction, access is already restricted to portions of the area to avoid damage to listed plant species. Full access would be restored to those areas that are currently accessible to the public once construction is complete. Moreover, while there would be short-term impacts to parking at the State Pier property during construction, access would be maintained to the boat launch. Therefore, the project is anticipated to be consistent with this policy.

- No. 9. Hydraulic analyses conducted for the replacement bridge identified that there would be no substantial increase in fill materials placed into the Hampton Harbor Inlet and the hydraulic opening under either alternative would be similar to the hydraulic opening under the existing bridge. Impacts to floodplain resources or increases in flood elevations are not anticipated from this project and there would be no effect on the existing risk of flood loss, human safety, health and welfare, or the natural and beneficial value of floodplains. Therefore, the project is anticipated to be consistent with this policy.

- No. 11. As discussed in Section 4.8 - Water Resources and Water Quality, construction of a new bridge, whether it is a Fixed Bridge or a Bascule Bridge, would potentially impact surface water quality due to the need for in-water work to either erect new piers, demolish obsolete piers, or carry out limited dredging. Although there could be temporary impacts to surface water quality, the project is anticipated to be consistent with this policy since measures would be taken to avoid and minimize these impacts, and to protect water quality during construction activities through BMPs. The project would also be constructed to be consistent with applicable stormwater regulations and guidelines.

- No. 13. Construction of a replacement bridge over the Hampton Harbor Inlet is consistent with this policy, which allows construction of a state structure over coastal waters.

- No. 14. Construction of a new Bascule Bridge would require limited dredging of the Hampton Harbor navigation channel to accommodate the new bascule pier and widen the navigation channel. This dredging could also require blasting due to the presence of a bedrock ledge. The Fixed Bridge Alternative would also require dredging to widen the navigation channel at the bridge. The dredging would be fully coordinated and permitted with the USACE pursuant to Sections 404 and 408 of the CWA and with the NHDES to ensure the dredging activities proceed

in a manner that is consistent with this policy. As such, it is anticipated that the project would be consistent with this policy.

- No. 15. As discussed in Section 4.14 - Historic and Archaeological Resources, construction of a new bridge would require removal of the existing Neil R. Underwood Bridge which has been determined eligible for listing on the National Register of Historic Places. However, measures to mitigate this adverse effect are being developed in consultation with NHDHR and Consulting Parties. Because an adverse effect to historic properties is unavoidable, and that FHWA and NHDOT are working with NHDHR and Consulting Parties to identify appropriate mitigation measures, the project is anticipated to be consistent with this policy.

4.13.5 *Mitigation*

No mitigation is proposed at this time. A full Federal Coastal Consistency Review will be conducted during the permitting phase of this project, at which time mitigation may be considered on a resource specific basis. Coordination initiated with state and federal regulatory agencies during the Preliminary Design phase will continue, as necessary, through Final Design.

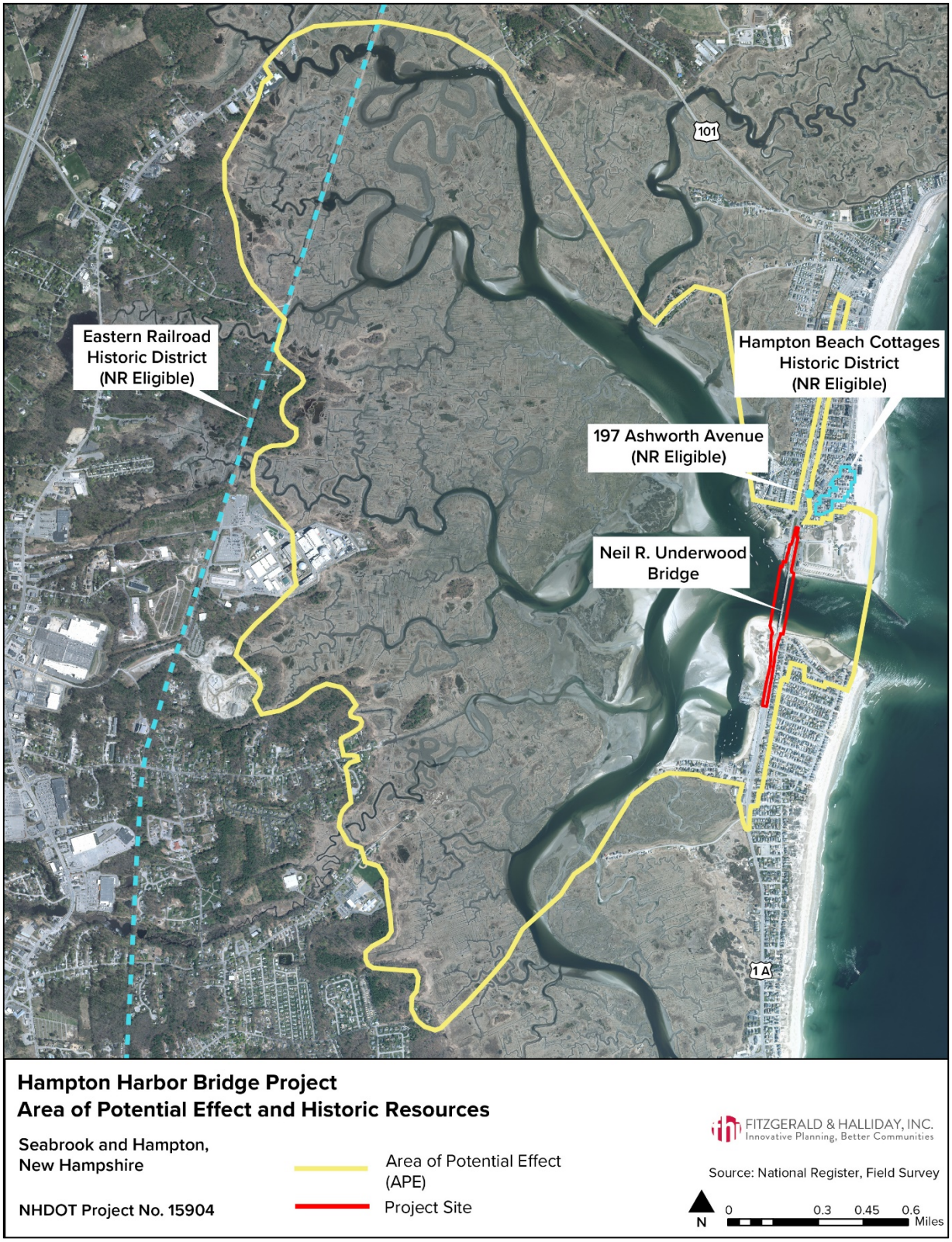
4.14 Historic and Archaeological Resources

4.14.1 *Methodology*

The CEQ Regulations for Implementing NEPA require an evaluation of impacts to historic resources as part of an EA. Historic resources may include buildings, structures, sites, objects and districts. In addition to the CEQ Regulations, Section 106 of the National Historic Preservation Act (NHPA) establishes standards for evaluating effects to historic properties. NHPA defines an effect as "an alteration in the character or use of a historic property qualifying it for inclusion in or eligibility for the National Register." An effect is considered to be adverse "when an undertaking may alter, directly or indirectly, any of the characteristics of the historic resource that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association" (36 CFR 800.5).

The APE was defined through a field survey conducted in June 2018 based on the potential for the undertaking to be visible from surrounding properties. The potential for auditory and atmospheric effects were also taken into consideration. The APE includes properties north of the bridge along Ashworth Avenue; portions of the Hampton Beach State Park and adjacent residential streets; properties adjacent to Ocean Boulevard south of bridge; properties along River Street; and properties west across Hampton Harbor in both Seabrook and Hampton (see Figure 23). A file search was undertaken at NHDHR to identify properties that may be listed or eligible for listing on the NRHP within the APE which identified one property, the National Register-eligible Eastern Railroad Historic District. In addition, buildings and structures that lie within the APE were inventoried through field survey and online tax records, and those greater than 50 years old were identified. This data was submitted to the NHDHR in July 2018 to formally initiate the Section 106 consultation process.

Figure 23 - APE and Historic Properties



Source: FHI

A potential area of direct physical disturbance was also defined early in the planning process. This area, which encompassed all of the alternatives initially under consideration, was used to focus the assessment of potential impacts to archaeological resources. It included all portions of the property that could be directly altered by the proposed undertaking, extending east and west somewhat outside of the roadway footprint along both sides of the bridge alignment terminating just north of the State Park driveway in the north, and at the southern end of the Yankee Fisherman's Co-op in the south. A site file search was undertaken at NHDHR to identify archaeological sites within and in the vicinity of this area.

In support of the Section 106 process, eight properties within the APE were evaluated for individual eligibility for the National Register, including the Neil R. Underwood Bridge, the Hampton Beach Saltwater Pumphouse, 197 Ashworth Avenue, 177-179 Ashworth Avenue, 16 Portsmouth Avenue, 20 Portsmouth Avenue, 266 Portsmouth Avenue, and 54 River Street. Of these properties, the Neil R. Underwood Bridge and 197 Ashworth Avenue were determined eligible by NHDOT for National Register listing. NHDOT found 54 River Street (Ceal's Clam Stand) and a residence at 266 Portsmouth Avenue in Seabrook to be ineligible for National Register listing, however NHDHR disagreed with this finding. Nevertheless, impacts on these properties were evaluated and determinations were made by FHWA that the impacts would not affect the properties, and as such their eligibility determination could remain unresolved. In addition, NHDOT identified a National Register-eligible historic district, the Hampton Beach Cottages Historic District, north of the bridge. A Phase 1 Archaeological Sensitivity Assessment and a Phase 1B Archaeological Survey were also completed.

Effects to identified historic properties were determined in consultation with NHDHR and Consulting Parties through meetings in July 2018, February 2019, March 2020, and October 2020. In addition to assessing the effects of the loss of the Neil R. Underwood Bridge, NHDOT and FHWA also evaluated the effects resulting from the potential loss of the bascule bridge type in the State of New Hampshire, due to the potential replacement of both the Neil R. Underwood Bridge and the NH 1B Bridge over Little Harbor with fixed bridges. Thus, the identification of mitigation measures for both projects is being undertaken together through meetings and correspondence between NHDOT, NHDHR and Consulting Parties. An MOA will be prepared outlining mitigation measures to address adverse effects resulting from the Preferred Alternative. A separate MOA will be prepared for the NH 1B Bridge over Little Harbor.

4.14.2 *Existing Conditions*

A brief profile of the historic properties identified within the APE is provided below, together with a summary of the archaeological findings.

Neil R. Underwood Bridge (NR Eligible)

The Neil R. Underwood Bridge is the second bridge at the crossing over the Hampton Harbor Inlet. The "Mile-Long" Bridge was constructed on oak piles, and when completed in 1902 the owners claimed it was the longest wooden bridge in the world, having a span of over 4,750 feet and a deck more than 30 feet in width. The construction of the bridge was spurred by the construction of a trolley system through Hampton. The new bridge carried the railway tracks, as well as a pedestrian way and toll car path. The Mile-Long Bridge remained in use until the 1940s when it was replaced with the existing bascule bridge of steel and concrete, later named the Neil R. Underwood Bridge (see Figure 24).

The Neil R. Underwood Bridge is a single-leaf fixed-trunnion bascule bridge, with twelve steel-girder approach spans and one bascule span. As noted previously, this movable bridge is one of two remaining

bascule bridges in New Hampshire, the other being the NH Route 1B Bridge over Little Harbor. The bridge was determined eligible for listing on the National Register under Criterion C as a rare example of a bascule bridge in New Hampshire. It retains a high level of integrity of location, design, setting, materials, workmanship, feeling and association. The bridge embodies the distinctive characteristics of its type and method of construction, including the underdeck counterweight, the control house, the single-leaf fixed-trunnion deck, and the split-faced granite veneer on the piers.

Figure 24 - Neil R. Underwood Bridge Looking South

Source: FHI

Hampton Beach Cottages Historic District (HBCHD) (NR Eligible)

The HBCHD is chiefly comprised of a discrete, definable collection of early 20th century seasonal cottages, reflecting the expansion of seaside recreation during the first four decades of the 20th century. It is located northeast of the bridge and encompasses properties both within and outside the APE (see Figure 25, Figure 26). Several of the cottages were moved over time to accommodate the shifting sands in Hampton Beach. The mobility of the houses within the district is a significant determinant on the physical appearance of the neighborhood today and an important character-defining feature. Other character-defining features include the street grid, village-like atmosphere, simple detailing and repeated forms. The district was determined eligible for listing under Criterion A for its association with seaside tourism and under Criterion C as a representation of a significant era of construction history in New Hampshire and a representative example of seasonal dwellings constructed for recreation.

Eastern Railroad Historic District (NR Eligible)

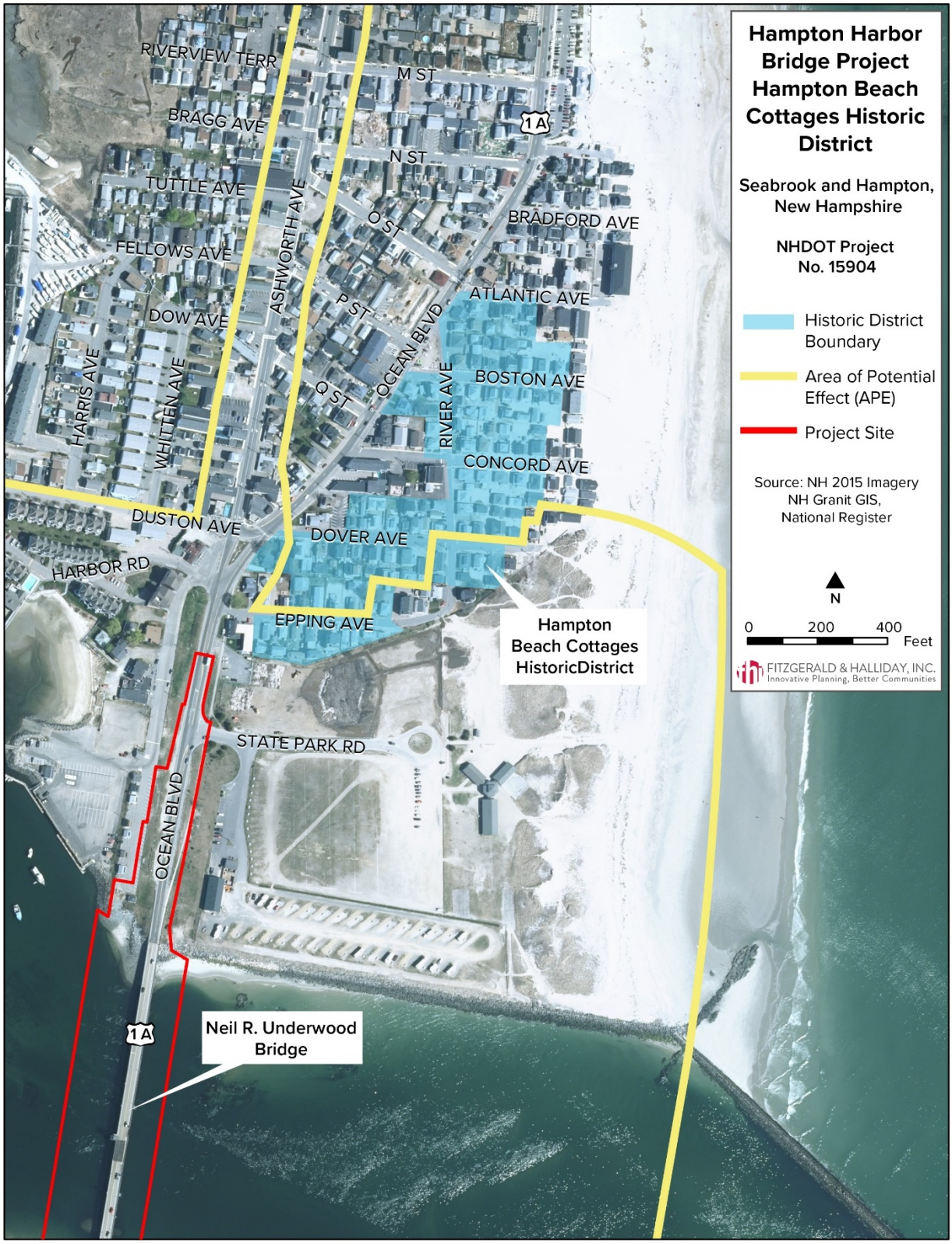
The Eastern Railroad Historic District traverses a length of 16 miles through Rockingham County, including the Towns of Seabrook and Hampton. It is located to the west of the Neil R. Underwood Bridge, across

the marsh. Built in 1839, the Eastern Railroad was the second railroad constructed in New Hampshire and was an important link between Portsmouth and Boston. The historic district, which was determined eligible under National Register Criteria A and C, includes the right-of-way as recorded in 1914, along with all buildings, structures, and objects that served the railroad during its period of historical significance from 1839 through 1952.

Figure 25 - The Hampton Beach Cottages Historic District, Looking east on Boston Avenue

Source: FHI

Figure 26 - Hampton Beach Cottages Historic District



Source: FHI

197 Ashworth Avenue (NR Eligible)

197 Ashworth Avenue, a two-story, single-family dwelling, was constructed in the first decade of the 20th century on Ocean Boulevard and moved to its present location in 1952 (see Figure 27). 197 Ashworth Avenue represents a once-common house form found on Ocean Boulevard and reflects zoning in place along that street which required cottages to be of higher valuation than elsewhere in the lands leased from the town. Unlike examples which remained along the now-commercial strip of Ocean Boulevard, and because of its move, 197 Ashworth has retained a high level of integrity to its period of construction. It was determined eligible for listing under Criterion A as an intact, largely-unaltered example of a large seasonal cottage built in Hampton Beach in the early 20th century, and under Criterion C as it continues to embody the characteristics and appearance of a substantial beachside seasonal cottage constructed in early 20th century New Hampshire, and retains the form and vernacular detailing typical of that period.

Archaeological Resources

The Phase IA Archaeological Sensitivity Assessment concluded that, due to the degree of disturbance in the area, and the preponderance of fill, the potential for Pre-Contact archaeological features was low. Similarly, the potential for the presence of intact historic archaeological features dating from before 1900 was also relatively low. The Phase 1A Sensitivity Assessment and associated fieldwork did identify archaeological features under the south side of the bridge, including wooden pilings associated with the bridge's construction. A subsequent Phase 1B Survey was undertaken to document these resources. The Phase 1A Assessment also identified the potential for late-19th and early-20th century deposits at the north end of Project Site.

Figure 27 - 197 Ashworth

Source: FHI

4.14.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the Neil R. Underwood Bridge would not be removed. Over time, the continued deterioration of the structure could lead to increased emergency repairs, potentially diminishing the property's integrity.

4.14.4 *Impacts of Fixed Bridge Alternative*

The Fixed Bridge Alternative would replace the National Register-eligible Neil R. Underwood Bridge, a movable bridge, with a fixed span located slightly west of the existing bridge. Movable bridges played key roles in the maritime history of the state and its commerce. The replacement of the Neil R. Underwood Bridge would result in the loss of a historic resource that contributes to the understanding of this context. It could also require the removal or demolition of at least a portion of the wooden piles under the south side of the bridge, remnants of a temporary trestle used during the construction of the bridge, and their removal would diminish the bridge's integrity as a historic property. However, the bridge itself would be replaced and these pilings have been documented in a Phase 1B Archaeological Survey. FHWA determined in consultation with NHDHR that the undertaking would result in an adverse effect on the National Register-eligible Neil R. Underwood Bridge due to its removal and replacement. The signed Effects Memorandum is included as Appendix C.

FHWA also determined that the Fixed Bridge Alternative would have no effect on the Hampton Beach Cottages Historic District. The historic district is located northeast of the Neil R. Underwood Bridge and Hampton Beach State Park and is located outside of the construction footprint. Therefore, the Fixed Bridge Alternative would not physically impact the historic district. The new fixed bridge would be visible as a distant element looking southwest from the rear of properties along Epping Avenue, and from several properties at the east end of Dover Avenue. While it would appear as a modern element without an operator's house and slightly higher than the existing bridge, the general scale and view of the new bridge would be similar to that of the existing bridge. Considering the distance between the district and the bridge, as well as the partially obscured views, visual impacts would be minimal. FHWA and NHDOT have determined in consultation with NHDHR that the undertaking would not diminish the district's integrity of location, design, setting, materials, workmanship, feeling or association.

FHWA determined that the Fixed Bridge Alternative would have no effect on the Eastern Railroad Historic District. Due to distance and viewshed, the Fixed Bridge Alternative would be minimally seen from the railroad alignment, if at all, and would therefore not alter characteristics of the railroad that qualify it for inclusion on the National Register. FHWA also determined that the project would have no effect on 197 Ashworth Avenue. Due to distance and viewshed, the Fixed Bridge Alternative would either be minimally seen or not seen at all and therefore would not alter characteristics of the property that qualify it for inclusion on the National Register.

The Fixed Bridge Alternative could impact an area of potential archaeological sensitivity at the north end of the Project Site, as identified through the Phase 1A Archaeological Sensitivity Assessment for the project.

4.14.5 *Impacts of Bascule Bridge Alternative*

The Bascule Bridge Alternative would replace the existing historic bascule bridge with another bascule bridge slightly west of the existing bridge. It would result in the loss of a historic resource that contributes to the understanding of its context. However, the Bascule Bridge Alternative would maintain the bascule bridge type in the state and a movable span at the Hampton Harbor crossing. The alternative could also require the removal or demolition of at least a portion of the wooden piles under the south side of the bridge, remnants of a temporary trestle used during the construction of the bridge. Their removal would diminish the bridge's integrity as a historic property. However, the bridge itself would be replaced and these pilings have been documented in a Phase 1B Archaeological Survey. FHWA determined in consultation with NHDHR that the undertaking would result in an adverse effect on the National Register-eligible Neil R. Underwood Bridge due to its removal and replacement.

Similar to the Fixed Bridge Alternative, FHWA determined that the Bascule Bridge Alternative would have no effect on the Hampton Beach Cottages Historic District, the Eastern Railroad Historic District, and 197 Ashworth Avenue. The Bascule Bridge Alternative could also impact an area of potential archaeological sensitivity at the north end of the Project Site.

4.14.6 *Mitigation*

Mitigation measures developed in consultation with NHDHR and Consulting Parties include:

- Marketing of the bridge for relocation;
- Interpretive panels mounted in the vicinity of the bridge potentially describing the history and significance of the Neil R. Underwood Bridge and the mechanical function of the bascule bridge type;
- Website with links to information on movable bridges;
- Archeological survey, including monitoring, as needed if ground disturbance occurs in the area of archeological sensitivity north of the State Park entrance; and
- Video(s) focused on the history and function of bascule bridges in New Hampshire.

4.15 Visual Resources

4.15.1 *Methodology*

A Visual Impact Assessment (VIA) was prepared for this project in accordance with FHWA's *Guidelines for the Visual Assessment of Highway Projects* (2015). The VIA findings are incorporated by reference into the visual impacts assessment below, and the full document is attached in Appendix D.

Information on the visual environment was collected through desktop reviews and site visits conducted between 2018 and 2020. The methodology in FHWA's guidelines was followed to establish the affected environment (or Area of Visual Effect), the affected population (or viewers), and the intersection between the two (the relationship viewers have with the visual environment). The guidelines call for the evaluation of existing aesthetic resources in the landscape; the identification of the visual features, or resources, of the landscape; the assessment of the character and quality of those resources relative to overall visual character; and the identification of the importance to people, or sensitivity, of views in the landscape.

4.15.2 *Existing Conditions*

The overall topography of the Area of Visual Effect (AVE) is characterized by coastal lowlands, tidal pools and salt marshes, which supports the visual quality of the area. New Hampshire Route 1A is a designated State Scenic and Cultural Byway, the New Hampshire Coastal Byway. The bridge affords travelers expansive views to the east and west across the water as it crosses the Hampton River at the inlet to Hampton Harbor. The Hampton and Blackwater Rivers, as well as Hampton and Seabrook Harbors and salt marshes, lie to the west of the bridge. The Atlantic Ocean lies to the east of the bridge. To the north and south are residential, recreational, and tourism-based development. Hampton Beach State Park is located north of and on the east side of the bridge; the Hampton State Pier is located north and west of the bridge; the Dunes WMA is located southwest of the bridge; and Sun Valley Beach lies to the southeast of the bridge. Each of these recreational resources affords unobstructed views of the bridge. Several commercial uses are located along NH Route 1A north of the bridge before its intersection with Ashworth Avenue, and south of the bridge, including the Yankee Fisherman's Co-op south of the Dunes WMA. Residential uses lie north of the bridge, immediately north of the State Pier, along Ashworth Avenue, and north of the Hampton Beach State Park. Sun Valley, a solidly residential neighborhood, lies southeast of the bridge, between Eisenhower Street, which is parallel and directly adjacent to NH Route 1A, and the Atlantic Ocean. Low-scale residential uses also line River Street further south of the bridge.

The VIA defines five landscape units within the AVE that afford distinguishable views of the bridge as well as views out from the bridge. The AVE map, full descriptions and photos of each landscape unit are included in Appendix D.

- **Ashworth Avenue:** The landscape unit along Ashworth Avenue includes a variety of small commercial structures, motels, condominiums, and one-to-three story single- and multi-family housing. Views south on Ashworth are tightly framed by the building lines; the bridge's operator house appears as a vertical element in the distance at the center of the view.

- **Hampton Beach State Park and State Pier:** The Hampton Beach State Park and State Pier landscape unit is characterized by waterfront recreational and commercial activity. The area is generally flat with low-lying topography. The State Pier's small, one-story wood frame commercial structures look onto NH Route 1A and the bridge approach across a surface parking lot. Hampton Beach State Park adjacent to the bridge is a large, open, and flat recreational area with grass and both sandy and paved parking areas. Views from the State Park towards the bridge include a combination of both natural and man-made elements. The park's campground has direct views of the bridge to the southwest as it crosses the Hampton Harbor Inlet.

- **Dunes and Beach:** The Dunes and Beach landscape unit is characterized by a system of sand dunes partially covered in established low grasses and a few small shrubs to the west of the bridge and a broad soft sand beach to the east of the bridge, just south of the Hampton Harbor Inlet. These natural areas with recreational functions have direct, open views of Hampton Harbor and the Inlet, the bridge and abutments, and the Hampton Beach development across the water.

- **Eisenhower Street and NH Route 1A:** The Eisenhower Street and NH Route 1A landscape unit includes single-family, one-to-three story residential units and vacation rentals lining the east side of Eisenhower Street. The west side of Eisenhower Street is open to and runs parallel to NH Route

1A, separated by a planted sand berm. The views from Eisenhower Avenue are open across the vegetated sand berm and NH Route 1A to the harbor to the northwest. As travelers cross the bridge, they experience expansive views of the Atlantic Ocean to the east and the Hampton Harbor and salt marshes to the west.

- **River Street:** The River Street landscape unit is characterized primarily by one- and two-story commercial and residential structures, asphalt driveways, open sand and gravel parking areas. The buildings on the north side of the street look out over the docks and the harbor towards the Neil R. Underwood Bridge.

4.15.3 *Impacts of No-Build Alternative*

Under the No Build Alternative, the Neil R. Underwood Bridge would not be replaced and there would be no impacts to visual resources.

4.15.4 *Impacts of Fixed Bridge Alternative*

Overall, in closer views experienced from the properties adjacent to the bridge, the bridge structure would appear bulkier than the existing bridge and at a higher elevation, due to the additional roadway width, massing of the steel superstructure, and raised bridge elevation. The Fixed Bridge Alternative would remove the large bascule pier and would also include longer spans with fewer piers and therefore wider openings, which would create opportunities for additional views under the bridge. This would be a similar change for marine users experiencing the bridge in close proximity from the water. From more distant views, the bridge would have a stronger profile than it currently does, however the overall form and massing would appear similar to the existing bridge. The primary difference would be the absence of the operator's house as a vertical element on the structure. Travelers would generally perceive a similar visual character and quality when approaching and traversing the bridge, as it would continue to appear as a concrete and metal structure, although rising higher in the foreground at the bridge approaches. The expansive views available to travelers to the east and west when traversing the bridge would also continue. The Fixed Bridge Alternative would result in minor adverse impacts on visual quality by causing some noticeable changes to the viewshed along Eisenhower Street, and within Hampton Beach State Park and the State Pier. The Fixed Bridge Alternative would not result in adverse impacts to visual quality in the remaining landscape units.

4.15.5 *Impacts of Bascule Bridge Alternative*

The impacts of the Bascule Bridge Alternative would be similar to the Fixed Bridge Alternative. In closer views experienced from the properties adjacent to the bridge, the structure would appear bulkier than the existing bridge and at a slightly higher elevation, due to the additional roadway width, massing of the steel superstructure, and raised bridge elevation. The Bascule Bridge Alternative would include longer spans with fewer piers and therefore wider openings, which would create opportunities for additional views under the bridge. This would be a similar change for marine users experiencing the bridge in close proximity from the water. From more distant views, the bridge would have a stronger profile, however the overall form and massing would appear similar to the existing bridge, including the blocky vertical form of the operator's house and the massing of the bascule pier. Travelers would generally perceive a similar visual character and quality when approaching and traversing the bridge, as it would continue to appear as a concrete and metal structure, although rising slightly higher in the foreground at the bridge

approaches. The expansive views available to travelers to the east and west when traversing the bridge would also continue. The Bascule Bridge Alternative would result in minor adverse impacts on visual quality by causing some noticeable changes to the viewshed within the Eisenhower Street, and Hampton Beach State Park and State Pier. The Bascule Bridge Alternative would not result in adverse impacts to visual quality in the remaining landscape units.

4.15.6 *Mitigation*

The concrete retaining walls on the north side of the bridge would be faced with ashlar formliners to add a stone masonry texture, create visual interest, and integrate the retaining walls into the State Pier and Hampton Beach State Park. Landscape plantings that could serve as visual screening elements for the retaining walls on the north side of the bridge are not proposed but would be considered for incorporation during the final design if found to be appropriate or requested.

4.16 Sections 6(f) Resources

4.16.1 *Methodology*

Administered by the US Department of the Interior, the Land and Water Conservation Fund Act of 1965 (16 USC 460 1-4) (Section 6(f)) was enacted to preserve, develop, and assure accessibility to outdoor recreation resources. Properties acquired (either wholly or partially), developed, or redeveloped through the Land and Water Conservation Fund (LWCF) are identified as Section 6(f) properties and are afforded protection under the Act. In accordance with Section 6(f)(3) of the Act, no property acquired or developed with LWCF money can be converted to other than public outdoor recreation uses without the approval of the Secretary of the Interior. Requests are made through the state agency with Section 6(f) oversight, in this case the DNCR. If approved by the Department of the Interior, the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location is required.

Section 6(f) considers several types of conversion. A full conversion occurs when the entire Section 6(f) property is converted to a use other than public recreation. A partial conversion occurs when a portion of a Section 6(f) property (greater than 10 percent) is converted to another use, while a small conversion occurs when no more than 10 percent is converted. A temporary non-conforming use is the authorized use of a Section 6(f) property for less than six months. If the temporary occupancy is longer than six months, it is considered a conversion under Section 6(f).

Section 6(f) resources were investigated and identified through review of GIS data from the Town of Hampton, Town of Seabrook, and NH GRANIT databases to identify public parks and recreation areas within the Study Area. For the purposes of this analysis, the Study Area encompasses those properties directly abutting the Project Site. The locations of public parks and recreation areas were compared with the list of Section 6(f) properties in the State of New Hampshire obtained from the National Park Service. Coordination was also undertaken with DNCR to identify 6(f) properties and their potential boundaries, as well as to identify potential impacts. Documentation is provided in Appendix E.

4.16.2 *Existing Conditions*

The Section 6(f) parks and recreation resources in the Study Area include Hampton Beach State Park and the Hampton State Pier on the north side of Hampton Harbor in the Town of Hampton, and Harborside

Park in Seabrook (see Figure 4). Although Hampton Beach State Park and the Hampton State Pier are distinct properties divided by NH Route 1A, they are considered a single Section 6(f) resource due to the use of LWCF monies for the construction of a boat launch, 35 additional parking spaces, improvements and additions to a gangway and dock (referred to as a stage in the application). Funding in 2007 rendered Harborside Park a Section 6(f) property.

Hampton Beach State Park is owned and managed by the DNCR's Division of Parks and Recreation (DPR). The park is a recreational destination with over a mile of ocean-front beaches, swimming, fishing, picnicking, and RV camping. It offers a range of recreational facilities including parking, restrooms, an RV campground, a park store, and picnic pavilion in the area immediately northeast of the bridge. Further north, between Ocean Boulevard and the Atlantic Ocean, additional amenities include a Visitor Information Center, a playground, the Seashell Pavilion, and the Marine Memorial. The park is open year-round, with a full staff and facilities as well as RV campground reservations available during the summer season. The State Pier facility is owned and operated by the Pease Development Authority, Division of Ports and Harbors. The pier includes a fuel dock, a State boat launch ramp, and commercial and recreational moorings. There is also a large parking area for the facilities, a bait and tackle shop, and several commercial businesses along its eastern edge. The Hampton State Pier provides access to water-based recreational activities including recreational boating, fishing, and charter services such as deep-sea fishing, whale watching, and day or evening cruises. There is a small, abandoned salt water pumphouse located within the State Pier site.

Harborside Park is owned by the Town of Seabrook and was opened in 2013. It provides picnic benches and ADA-accessible facilities to the harbor for fishing, a carry in/carry out boat ramp, and paved ramps down to the water. It is also the location of the Fisherman's Memorial.

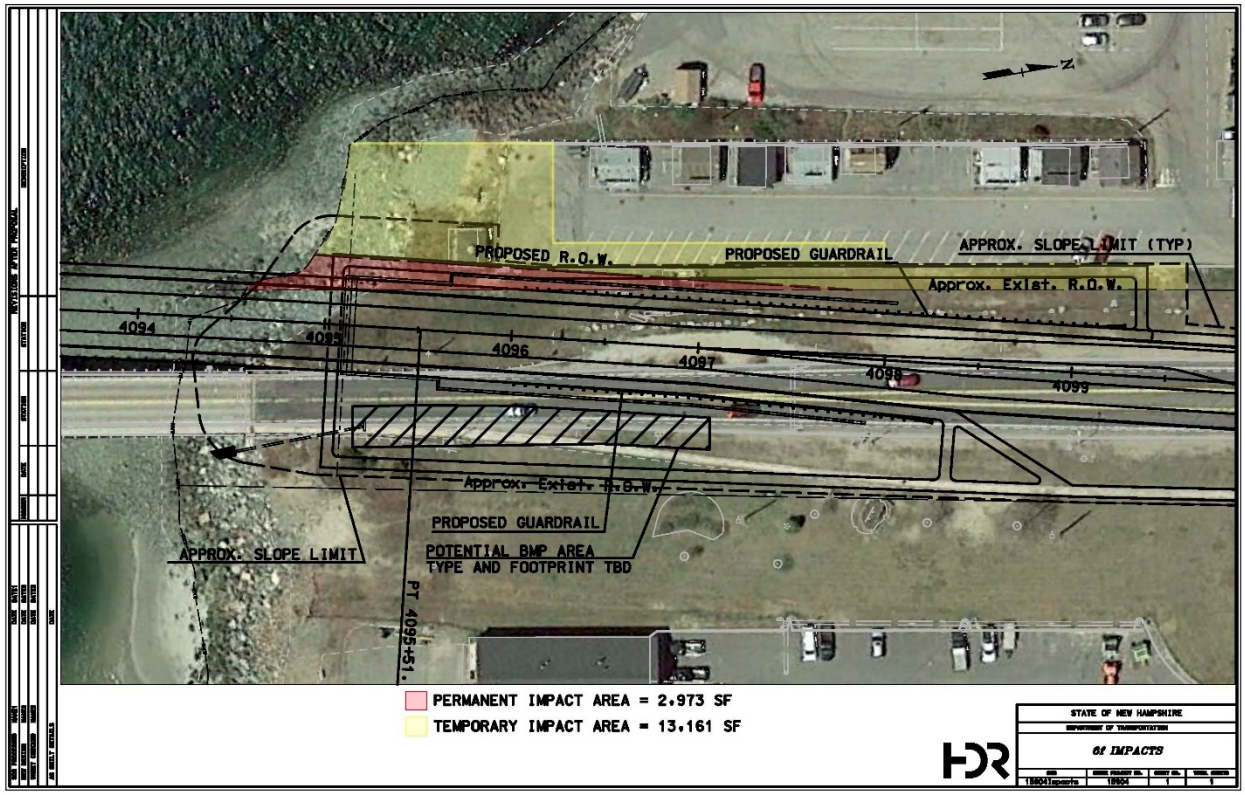
4.16.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the Neil R. Underwood Bridge would not be replaced and therefore there would be no impacts to Section 6(f) properties.

4.16.4 *Impacts of Fixed Bridge Alternative*

The Fixed Bridge Alternative would shift the alignment of the bridge's north approach slightly west encroaching on the Hampton State Pier property. While a retaining wall would be employed to minimize impacts in this area, approximately 2,973 sf of the Hampton State Pier property would be converted to a transportation use (see Figure 28). This area would be less than 10 percent of the property and therefore, although a 6(f) conversion would be required, it would be classified as a small conversion.

Figure 28 – Temporary and Permanent Impact Areas at State Pier Property



Source: HDR, Inc.

Construction staging for the Fixed Bridge Alternative would also occur on the State Pier, with the eastern parking lot serving as a vehicular access point for the in-water construction trestle that would be located west of the existing bridge. The area of impact would be approximately 13,161 square feet. This area would be required for greater than six months and therefore could require a 6(f) conversion. However, NHDOT is working with DPR and the Pease Development Authority to identify potential mitigation measures, including the provision of a pedestrian path under the bridge which would connect the Hampton State Pier and State Park properties (see Figure 8).

Hampton Beach State Park on the east side of the bridge and Harborside Park southwest of the bridge lie outside of the project footprint and therefore these Section 6(f) properties would not be impacted.

4.16.5 *Impacts of Bascule Bridge Alternative*

The impacts of the Bascule Bridge alternative would generally be the same as the Fixed Bridge Alternative. There would be no long-term impacts to Hampton Beach State Park or Harborside Park.

4.16.6 *Mitigation*

In order to mitigate the construction-period impacts, NHDOT is investigating the provision of a pedestrian walkway under the bridge's north side which would serve to connect two recreational resources, the Hampton State Pier and Hampton Beach State Park. The walkway would extend north along the edge of the retaining walls on the east and west sides of the north approach in order to provide connections to the existing pedestrian infrastructure within Hampton Beach State Park and the Hampton State Pier.

Under current conditions, there is no designed pedestrian crossing. However, pedestrians do cross NH Route 1A at this location in an undefined and uncontrolled manner creating a safety hazard. Where the new path emerges from under the bridge, the State Pier land would be filled and regraded creating a new slope that supports/protects the abutment and walkway, and a level area that could be used for viewing the Hampton Harbor Inlet to the south.

4.17 Contamination/Hazardous Materials Sites

4.17.1 *Methodology*

The Environmental Protection Agency (EPA) and NHDES regulate the handling, storage, generation and use of Oil and Hazardous Materials (OHMs). The EPA and NHDES maintain records of known environmental risk sites and enforce specific guidelines for the treatment and removal of OHMs at these sites.

A preliminary records review of various federal and state environmental listing databases was conducted by Environmental Risk Information Services (ERIS) in June 2019. The records review looked at a broad screening area, within one mile of the Project Site. The Study Area for the analysis was subsequently defined as the area within 1,000 feet of the Project Site. The environmental databases reviewed include, but are not limited to:

- National Priority List (NPL);
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS);
- No Further Remedial Action Plan (NFRAP);
- Resource Conservation and Recovery Act (RCRA);
- Federal Brownfields;
- Emergency Response Notification System (ERNS);
- Facility Registry Service/Facility Index (FINDS);
- State and Federal Drycleaner Facilities;
- OneStop Sites (All SITES);
- State Hazardous Waste Sites (SHWS);
- State Initial Response and Oil Spills (SPL);
- State/Tribal Solid Waste Landfills (SWF);
- State/Tribal Leaking Underground Storage Tanks (LUST);
- State/Tribal Leaking Aboveground Storage Tanks (LAST);
- State/Tribal Underground Storage Tanks/Aboveground Storage Tanks (UST/AST); and
- State/Tribal Brownfields.

A visual inspection of the Project Site and the environmental listings identified in the ERIS report within the Study Area was conducted on July 30, 2019. The inspection was conducted from the street and none of the subject properties were accessed. No on-site testing or assessment was conducted as part of this inspection.

Each environmental listing in the ERIS report within the Study Area was assigned a High-Medium-Low risk ranking relative to the possibility of encountering OHMs. The High-Medium-Low risk site designations are based upon review of the federal and state environmental listing databases contained in the ERIS database report within the Study Area. A High-risk ranking was assigned to those properties with a database listing that indicates a documented release of OHMs, or past site use known to have a higher likelihood of a release. A High-risk property must also be located in proximity to the Project Site and could therefore impact project design or construction. Where a property has more than one database listing, the highest risk rating was assigned. A Medium-risk ranking was assigned to properties with a database listing, but details about the release and clean-up activities was not provided in the ERIS report. A Low-risk ranking was assigned to properties where there is no documented release; or where a documented release has been reported at a site, and database records indicate that remediation actions have been completed and no further actions are warranted.

The findings of this preliminary hazardous substances and materials screening and evaluation are not intended to substitute for more detailed studies, such as an American Society for Testing and Materials (ASTM)-compliant Phase I Environmental Site Assessment or subsurface soil and groundwater investigations. This screening is meant to identify Low-, Medium-, and/or High-risk properties as a guide for identifying potential contamination in the Study Area that would be affected by the proposed construction of the Neil R. Underwood Bridge's replacement and approaches. Further technical and more detailed investigations may be required to determine the existence of OHMs prior to property acquisitions, utility relocations, and construction of project elements. The identification of a site in the analysis that follows does not conclusively confirm that the property has a spill or release of contamination that would impact the Study Area, but rather that it has the potential to contain OHMs. There may be additional sites with contamination issues that have not been identified in this screening due to noncompliance with regulations or incomplete regulatory/historical information.

Per- and Polyfluoroalkyl Substances (PFAS) are a large group of man-made chemicals that are prevalent in commercial products, including stain and water-repellents, non-stick products, and fire-fighting foam. In 2016, NHDES identified PFAS as emerging contaminants and have developed Ambient Groundwater Quality Standards (AGQS) for two PFAS compounds, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Groundwater that has the potential to have PFAS concentrations above AGQSs may be subject to management through a Groundwater Management Plan. The NHDES PFAS Online Mapper was reviewed as part of this assessment.

4.17.2 *Existing Conditions*

Review of properties identified in the ERIS report revealed six environmental risk sites located within the 1,000-foot Study Area. The listings of concern are located both north and south of the Project Site, with five out of six sites located in Hampton, north of the Neil R. Underwood Bridge. There were no listings identified within the Project Site itself. The six listings of concern located within the Study Area have been identified and explained in Table 12. All are ranked as Low-risk. Please note that desktop survey, confirmed by field assessment of the locations, revealed that three properties (Sites 1, 2, & 3) appeared to have been incorrectly located on the ERIS mapping. The adjusted locations of these properties are shown in Figure 29. The field assessment did not reveal additional properties with potential sources of OHMs in the Study Area. Review of the NHDES PFAS Sampling Online Mapper revealed that the nearest mapped PFAS sampling location is at the NextEra Energy nuclear power plant, approximately 1.6 miles

west of the Project Site. The two sampling locations at the NextEra Energy property reported total PFAS as 0.0. Therefore, PFAS are not anticipated on the Project Site.

Table 12 - Environmental Risk Sites and Risk Rankings within the Study Area

Site Number	Site Name	Address	Database(s)	Description of Release(s)	Risk
1	Smith & Gilmore Fishing Pier I	23 Harbor Rd., Hampton	UST	No documented release, UST removed	Low
2	Nikosey Joseph Donald & Dale	9 Ocean Blvd., Hampton	UST	No documented release, UST removed	Low
3	Yankee Fisherman's Co-op	725 Ocean Blvd., Seabrook	AST	No documented release, 3 active ASTs	Low
4	Pier Properties	23 Harbor Rd., Hampton	RCRA-NON GEN	No details on RCRA	Low
5	Hampton River Marina	55 Harbor Rd., Hampton	ALL SITES; LUST; RCRA-NON GEN (2); SPL; UST	1 quart of petroleum leaked from a boat – case closed; 10 gallons of gasoline leaked from a boat – case closed; 1 gallon of gasoline from sunken boat - case closed; 3 USTs closed and 2 USTs active	Low
6	Patriots Corner Grocery Store	29 Ocean Blvd., Hampton	LUST; RCRA-NON GEN; UST	LUST case closed; no details on RCRA; 3 USTs closed and 2 USTs active	Low

Source: ERIS 2019 and FHI

Figure 29– Environmental Risk Sites

Source: FHI and ERIS

Sediment sampling was undertaken by USACE in 2018 in preparation for the maintenance dredging of the Hampton Harbor Navigational Channel. The sampling was undertaken west of but in proximity to the Hampton Harbor Bridge Project Site and confirmed there was no significant fraction of fine-grained materials (silt or clay) in any of the sediments within their proposed dredging area. It is assumed the sediments at the bridge site would be of similar composition to those identified by USACE, and therefore would have a low probability of contamination. NOAA concluded that the sediment sampling undertaken by USACE was sufficient for the BA and EFH for this project, and as such, further sediment sampling was not undertaken for the project.

Based on the age of the existing bridge, the paint system may include lead-based paint (LBP). The bridge may also contain asbestos cement conduit on the bridge and in the operator house. Given the age of the existing salt water pumphouse at the north end of the bridge, asbestos containing materials (ACMs) and LBP may also be present in the building.

4.17.3 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the bridge would not be replaced. Thus, there would be no increased risk of disturbance of oil and hazardous materials.

4.17.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

The potential for impacts from hazardous substances resulting from the Fixed and Bascule Bridge Alternatives were evaluated based on the proximity of the potential OHM risk sites to the Project Site and the details of those environmental risk sites. Because there are no environmental risk sites located within the Project Site, the potential for disturbing any of the six OHM risk sites is anticipated to be minimal. In addition, because the risk rankings of the six OHM risk sites located within the Study Area are Low-risk, the likelihood of encountering OHMs that would impact the project design and construction is anticipated to be minimal.

The demolition of the existing bridge and pumphouse have the potential to disturb ACMs and LBP. Investigations of these materials would be required prior to demolition. These investigations would be conducted by a qualified professional in accordance with all applicable, local, state, and federal regulations. If these materials are confirmed, proper abatement or mitigation in accordance with applicable regulations would be required.

4.17.5 *Mitigation*

Depending on construction staging, additional investigations for the presence of OHMs may be required to determine if mitigation would be necessary for either of the action alternatives.

For environmental risk sites that are ranked as Low-risk for potential impact, an updated review of agency files, environmental databases, and public records should be undertaken prior to construction to determine if changes have occurred since the report was prepared. Further investigations, such as site-specific ASTM-compliant Phase I Environmental Site Assessments (ESAs) are not recommended at the sites identified within the Study Area as none are considered High- or Medium-risk properties.

The Contractor will be responsible to ensure that all project waste generated during removal and demotion work, including debris, soils, and groundwater impacted by contamination, is properly collected, handled, stored, classified, transported, and disposed of in accordance with applicable

regulations. The Contractor performing the removal work will submit a Compliance Plan including applicable worker protections from the Occupational Health and Safety Administration (OSHA), environmental protections from the NHDES, and other local, state, and federal regulations that may apply. Removal or demolition work will not begin prior to the approval of this Compliance Plan. If contaminated soils, sediments, or groundwater are encountered during construction, NHDES would be consulted, and contaminated materials would be disposed of in an appropriate manner in compliance with federal and state regulations. If contaminated groundwater is encountered and dewatering is required, provisions would be made to comply with applicable federal and state standards for the handling of wastewater.

Limited Reuse Soils (LRS) include roadside soils and street wastes that have limited reuse potential due to the presence of elevated levels of regulated compounds such as polycyclic aromatic hydrocarbons (PAHs) and metals. Roadside soils currently managed as LRS by NHDOT include all topsoil within the limits of the existing right-of-way, regardless of its depth. In those instances where there is no measurable topsoil, LRS will be measured from the top of ground to a depth of six inches. The LRS excavated from within the operational ROW will be addressed in accordance with applicable NHDES rules and/or waivers. Soils that are anticipated to meet the definition of LRS will be subject to management through a Soils Management Plan (SMP) developed prior to construction. The design will incorporate materials within the ROW to the extent practicable.

4.18 Public Utilities and Service

4.18.3 *Methodology*

The following section documents utility lines in the vicinity of the Project Site and evaluates the potential for the project to impact these lines and utility service to the surrounding area. The locations of existing utilities that could potentially be affected by the proposed project were determined through plans provided by FairPoint Communications, Unitil Corporation, Hampton Public Works Department, and the Seabrook Water Department. Potential impacts were determined based on a review of conceptual plans and coordination with project engineers. The Study Area includes an area within approximately 200 feet of the Project Site.

4.18.4 *Existing Conditions*

Existing utilities in the Study Area include two water lines, one sewer line, one gas line, and two cooling tunnels associated with the Seabrook Station Nuclear Power Plant (SSNPP) that are buried below the harbor bed. There are also aerial utilities within the area and electric, lighting, telecommunications and gas services that service the bridge operator house and lighting.

The water and sewer lines within the Study Area include a water line that crosses NH Route 1A just north of the Seabrook-Hampton town line and continues westerly into Hampton Harbor. The line continues north across the harbor approximately 100 feet west of the bridge, and then crosses NH Route 1A to Hampton Beach State Park and continues north on the east side of the road. There is an additional water line on the west side of NH Route 1A that runs parallel to the first line across the Hampton Harbor Inlet and continues north along NH Route 1A. A sewer line crosses NH Route 1A approximately 150 feet south of the bridge, from a metering station east of NH Route 1A near Campton Street, and then continues west into Hampton Harbor approximately 150 feet west of the bridge before turning north and crossing the

harbor, remaining on the west side of the roadway until reaching a sewer manhole in the southwest corner of the Hampton State Pier parking lot.

Separate gas lines were identified on each side of NH Route 1A south of the bridge. The easterly gas line crosses the roadway and joins the westerly line approximately 340 feet south of the bridge. The combined gas line continues north across Hampton Harbor between 20 and 50 feet west of the bridge and separates into two lines approximately 125 feet north of the bridge. The two separate gas lines continue north on the west side of NH Route 1A through the remainder of the project limits. Documentation indicates the lines have been abandoned.

The SSNPP is located less than two miles west of the Project Site. The intake and discharge cooling tunnels for the plant pass directly under Hampton Harbor and the Neil R. Underwood Bridge. They were bored through bedrock approximately 200 feet below bedrock surface.

Aerial utilities in Seabrook are found along the east shoulder of NH Route 1A; they stop approximately 500 feet south of the existing south bridge abutment. On the north side of the bridge in Hampton, aerial utilities cross NH Route 1A from west to east just south of the entrance to Hampton Beach State Park and continue a short distance south, stopping well outside the limits of the existing roadway. The existing bascule span operator house has electric, lighting, telecommunications and gas services that are supported on the existing structure, along with bridge navigational lights and the roadway lighting on the west side of the bridge that is a continuation of approach roadway lighting. Power to the poles is provided via bridge-mounted conduit.

4.18.5 *Impacts of No-Build Alternative*

Under the No-Build Alternative, the existing bridge would remain and there would be no impacts to utilities or utility service.

4.18.6 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

The abandoned gas line lies under the proposed alignment of the new Fixed and Bascule Bridges. During final design it would be determined whether the line needs to be wholly or partially removed or relocated. Two water lines and one sewer line would be relocated to allow for the installation of the temporary work trestles required for bridge construction. These relocations would be coordinated in advance with utility providers and would not result in lengthy disruption of service. Once relocated, the utility lines could be placed atop the bed in the navigational channel, at least temporarily. The Fixed Bridge could be designed to allow for the water, sewer, and gas lines to be attached to the bridge in the future, however, the design of the Bascule Bridge would not. Instead, the lines would have to be run along, or buried within, the channel bottom. The Fixed and Bascule Bridge Alternatives would not create an additional demand for utility service or otherwise impact service in the area. The cooling tunnels from the SSNPP would not be impacted given their depth and location in bedrock.

In order to maintain electric, lighting, telecommunications and gas services during construction, installation of temporary services and relocation of these utilities could occur in the area of the north approach of the bridge during construction. Similarly, the navigational lights and the roadway lighting on the approaches and over the bridge would need to be kept in service as long as the existing bridge remains in use. The construction of the new bridge would not be expected to impact these utilities although electric service would need to be provided to the bridge for navigational and roadway lighting. Overall,

there would be no long-term impacts to utility service in the area under either of the two alternatives. The Fixed Bridge Alternative would have the benefit of being able to accommodate utility lines placed by others in the future.

4.18.7 *Mitigation*

Coordination with utility providers will be undertaken to plan any required utility relocation before other project construction commences to ensure that construction activities will not disturb existing lines. If there are any outages required related to the work, the end users will be notified of the timing and duration.

4.19 Climate Change/Resilience

4.19.1 *Methodology*

This section discusses each of the proposed project alternatives in the context of climate change and sea level rise. The analysis that follows assesses the vulnerability of each of the alternatives to future sea level rise attributed to climate change.

The Coastal and Great Bay Region Reports (RSA 483-B:22) requires that New Hampshire state agencies involved in planning, siting, and design of state-funded structures and facilities, public works projects, and transportation projects, as well as land acquisition and management, and other environmental activities in the coastal and Great Bay regions of New Hampshire reference the 2014 New Hampshire Coastal Risks and Hazards Commission report, *Sea-level Rise, Storm Surges, and Extreme Precipitation in Coastal New Hampshire: Analysis of Past and Projected Future Trends* for guidance on all potentially affected activities. It also directs NHDES to update the projections in the 2014 Coastal Risks and Hazards Commission report at least every five years beginning on July 1, 2019. RSA 483-B:22 further directs that projects designed under a previous report are not required to adapt their designs to an updated report's findings.

4.19.2 *Existing Conditions*

The New Hampshire Coastal Risk and Hazards Commission's Science and Technical Advisory Panel (STAP) reviewed available scientific information about coastal hazards and flood risks in New Hampshire and analyzed past and projected future trends. Their 2014 report, *Sea-level Rise, Storm Surges, and Extreme Precipitation in Coastal New Hampshire: Analysis of Past and Projected Future Trends,* includes SLR scenarios based on different emissions levels in 2100. In November 2016, the Commission published *Preparing New Hampshire for Projected Storm Surge, Sea-Level Rise, and Extreme Precipitation: Final Report and Recommendations*. The report summarizes vulnerabilities to projected coastal flood hazards and provides recommendations and associated actions to prepare for projected sea-level rise and other coastal watershed hazards. 2014 STAP projections were used by the Commission to develop its 2016 recommendations, including to consider SLR in planning and design at the "Intermediate High" SLR of 3.9 feet for the 2100 time period (see Table 13). While NHDES updated the projections and released the 2019-2020 New Hampshire Coastal Flood Risk Summary in August 2019 (Part I: Science) and March 2020 (Part II: Guidance for Using Scientific Projections), this EA references the Commission's 2016 report due to the project's design timeline.

Table 13 - SLR Scenarios in 2100 Under Different Emissions Levels

Emissions scenario	Relative Global Mean Sea Level Rise in 2100*
Intermediate Low	+1.6 feet
Intermediate High	+3.9 feet
Highest	+6.6 feet

Source: NHCRCH 2016 final report (as adapted from NHCRHC STAP (2014))

***using mean sea level in 1992 as a reference.**

4.19.3 *Impacts of No-Build Alternative*

Under No-Build Alternative, the existing bridge would remain in its current condition and there would be no changes to existing navigational clearances or dimensions in the short term. Based on the Intermediate High emissions scenario, the 2014 STAP report projected a rise in relative mean sea level of 3.9 feet, which would reduce the vertical clearance at the bridge while in its closed position which would further restrict the type of vessels capable of navigating into the harbor without opening the bridge. The unlimited clearance within the navigational channel when the bridge is open would continue as long as the bridge remains operational.

4.19.4 *Impacts of Fixed Bridge Alternative*

The Fixed Alternative would replace the existing movable bridge with a fixed bridge that has a vertical underclearance of 48 feet. This clearance would accommodate all regular and known users of the channel and USACE dredging equipment, as well as include an allowance of four feet for potential SLR based on the "Intermediate-High" range of 3.9 feet estimated for 2100. This allowance would reduce the potential that maritime navigation (specifically vertical underclearance) would be impacted by future SLR. The Fixed Bridge Alternative would not contribute to SLR or storm surge in the area.

4.19.5 *Impacts of Bascule Bridge Alternative*

The Bascule Bridge Alternative would replace the existing bridge with a new bascule structure, with unlimited vertical clearance with the bridge raised, and an increased vertical underclearance of 34 feet when the bridge is down, which includes an allowance of four feet for potential SLR based on the "Intermediate-High" range of 3.9 feet estimated for 2100. This allowance would reduce the potential that maritime navigation (specifically vertical underclearance) would be impacted by future SLR when the bridge is in a closed position. The unlimited clearance within the navigational channel when the bridge is open would continue. The Bascule Bridge Alternative would not contribute to SLR or storm surge in the area.

4.19.6 *Mitigation*

The design of the Fixed Bridge and Bascule Bridge alternatives include resiliency measures related to SLR consistent with state regulations and therefore mitigation is not proposed.

4.20 Secondary and Cumulative Impacts

4.20.1 *Methodology*

In addition to direct impacts, NEPA requires Federal agencies to consider secondary, or indirect, and cumulative impacts of federal actions. Indirect impacts 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). A cumulative impact is 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 regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

The analysis that follows focuses on current and reasonably foreseeable trends, events, actions, and projects and the potential secondary and cumulative impacts to specific natural, social and cultural resources. The analysis that follows does not assess cumulative impacts on all resource areas discussed in this EA but focuses only on those resources where direct and indirect impacts have been identified.

4.20.2 *Current and Reasonably Foreseeable Actions*

Current and reasonably foreseeable trends, actions, events and projects that contribute to the cumulative impact analysis are identified below.

Hampton 40797 Ocean Boulevard (NH Route 1A)

The Hampton Ocean Boulevard improvements project is located in the Town of Hampton along Ocean Boulevard (NH Route 1A) from the Hampton Beach State Park driveway running north to High Street (NH Route 27). The project is evaluating safety and mobility, as well as opportunities to address drainage. Project planning was initiated in the summer of 2020; construction is anticipated to commence in 2024.

Hampton Harbor Federal Navigation Project

The Hampton and Seabrook Channels, and the Entrance Channel, are periodically dredged by USACE to maintain their depth as part of the Hampton Harbor Federal Navigation Project. The navigable Hampton Channel is approximately 100 to 150 feet wide and runs nearly parallel to the bridge approximately 70 to 90 feet to the west. The Seabrook Channel meets the Hampton Channel immediately west of the bascule span and extends south and west at 200 to 250 feet wide. The Entrance Channel is 150 feet wide east of the bridge but narrows to 40 feet at the bridge. The inner channels are dredged to eight feet (MLLW), plus an additional one foot of overdepth. In addition, the project maintains the eight-foot MLLW anchorage on the Seabrook side of the harbor, and the eight-foot and six-foot MLLW anchorage areas on the Hampton side. This work has allowed vessels to maintain safe navigation in Hampton Harbor, and will continue to with future dredging.

The Hampton and Seabrook Channels were last dredged in 2019. The USACE vessel, the *Currituck*, was not used at that time because its width exceeds the horizontal clearance at the bridge. The project is a periodic future activity, but it is not likely to occur within the construction timeline of the Hampton Harbor Bridge Project.

New Castle-Rye, 16127 - Replacement of NH 1B Bridge over Little Harbor

NHDOT, in cooperation with FHWA, proposes to replace the bridge that carries NH Route 1B over Little Harbor (Bridge No. 066/071) connecting the towns of New Castle and Rye, NH. The Neil R. Underwood Bridge and the NH 1B Bridge over Little Harbor are the two remaining bascule bridges in the State of New Hampshire. The NH 1B Bridge Replacement is currently in the planning stages and an EA is being prepared that identifies the replacement of the NH 1B Bridge with a fixed bridge as the Preferred Alternative.

4.20.3 *Impacts of No-Build Alternative*

The No-Build Alternative would continue existing conditions which could lead to the eventual closure of the bridge; however, there would be no secondary or cumulative impacts.

4.20.4 *Impacts of Fixed Bridge and Bascule Bridge Alternatives*

Construction of the project under either of the alternatives is anticipated to begin in 2024. This would likely overlap with the adjacent Ocean Boulevard improvements in 2024 and 2025, resulting in the potential for cumulative impacts to the transportation network, especially at the intersection of the two projects (at the southern State Park Entrance). The Construction Management Plans would be coordinated for the two projects to limit the potential for conflicts. While listed avian species occur in the vicinity of both projects, cumulative noise impacts are not anticipated to these species because the southern limit of the Ocean Boulevard Improvement Project is more than 660 feet (200 meters) from identified nesting and foraging habitat south of the bridge, and because nesting and foraging habitat on Hampton Beach north of the Project Site is buffered from the Ocean Boulevard Improvements by residences.

Both bridge alternatives would provide additional horizontal navigational clearance through the bridge once complete. Taken together with the dredging undertaken as part of the Hampton Harbor Federal Navigation project, there would be a cumulative beneficial impact on navigation. Moreover, either alternative, taken together with the Ocean Boulevard Improvements project would also likely improve multi-modal circulation along Ocean Boulevard with the additional of pedestrian and bicycle enhancements in both projects, leading to cumulative beneficial impacts.

When taken together with the USACE Hampton Harbor Federal Navigation Project, which addresses a larger area including Hampton and Seabrook Channels and the Entrance Channel, there could be cumulative adverse impacts to channel bottom habitat in the vicinity of the bridge as both Hampton Harbor Bridge Project alternatives would require dredging to widen the navigational channels. While dredging causes permanent impacts to the channel bottom, it would be in the form of a shift in habitat type rather than a loss of habitat. Although dredging of the channel would cause a temporary loss of benthic habitat and a corresponding decrease in foraging potential for bottom-foraging fish species, this habitat would not be lost, and over time would return to normal conditions once recolonized.

Cumulative adverse impacts to water quality due to the Ocean Boulevard and Hampton Harbor Bridge Projects would be minimized through BMPs and the preparation of Stormwater Pollution Prevention Plans during construction for both projects. In addition, the Hampton Harbor Bridge Project would have long-term beneficial impacts to water quality due to the new stormwater treatment proposed in both alternatives. The Ocean Boulevard project is anticipated to similarly include additional stormwater treatment measures.

When taken together with the Replacement of NH 1B Bridge, the Fixed Bridge Alternative would have an adverse cumulative effect on historic resources due to the potential loss of the bascule bridge type in the State of New Hampshire. The Bascule Bridge Alternative would maintain the bascule type in the state, with a modern bascule bridge replacing the Neil R. Underwood Bridge. This would also result in a cumulative adverse effect because both historic bascule bridges would be lost, however the bridge type would be maintained. Both projects are coordinating the identification of mitigation measures to address potential adverse cumulative effects. A separate MOA will be prepared for the NH 1B Bridge over Little Harbor project.

The Fixed and Bascule Bridge Alternatives are not anticipated to have notable growth effects or other indirect effects related to changes in land use, population density or natural systems.

5 Section 4(f) Resources

5.1 Introduction

Section 4(f) of the U.S. Department of Transportation Act of 1966 requires the consideration of park and recreation lands, wildlife and waterfowl refuges, and historic sites during transportation project development. The law applies only to the U.S. Department of Transportation (U.S. DOT) and is implemented by FHWA and the Federal Transit Administration through the regulation 23 Code of Federal Regulations (CFR) 774.

In accordance with Section 4(f), every effort must be made to "preserve the natural beauty of the countryside, publicly owned parks, recreation areas, wildlife and waterfowl refuges, or any historic sites of national, state, or local significance." As such, Section 4(f) prohibits federal transportation agencies from approving a project that uses land from a significant public park, recreation area, wildlife or waterfowl refuge, or historic site listed on or eligible for listing on the NRHP, unless the agency determines that there is no feasible or prudent avoidance alternative to the use of that property and that the proposed project includes all feasible planning to minimize harm to the property resulting from its use; or the agency determines that the use, including any measures to minimize harm, will have a *de minimis* impact. The use of a Section 4(f) property occurs when the property is permanently incorporated into the transportation project through a taking of the land; when it is temporarily occupied; or when its significant features are substantially impaired such that its value as a 4(f) resource will be meaningfully diminished or lost.

This analysis sets forth the basis for a Programmatic Section 4(f) approval that there are no feasible and prudent alternatives to the use of the historic Neil R. Underwood Bridge over the Hampton Harbor Inlet in Hampton and Seabrook, NH which is to be replaced by a new bridge with federal funds and that the project includes all possible planning to minimize harm resulting from such use.

The analysis also sets forth the basis for FHWA's *de minimis* Impact Finding for the Hampton State Pier in accordance with Section 4(f) of the Department of Transportation Act.

5.2 Proposed Action

The Proposed Action is the replacement of the existing bascule bridge with a fixed bridge structure. The new structural steel and concrete bridge would be constructed approximately 75 feet west of the existing bridge and the existing bridge would then be demolished. The total length of the bridge would be approximately 1,300 feet and the approaches would be curved slightly to allow the new bridge alignment to tie into NH Route 1A north and south of the bridge. The bridge would have two 11-foot travel lanes, with eight-foot shoulders and six-foot sidewalks on each side, resulting in a 50-foot inside width. At its peak, the deck of the new fixed bridge would be approximately 30 feet higher than that of the existing bascule bridge. The vertical underclearance on the new bridge would be 48 feet, which includes the 44 feet of required vertical clearance to accommodate the USACE Special Purpose (dredge) Vessel (S/P/V) *Currituck*, plus four feet for SLR. This would accommodate all regular and known maritime users of Hampton Harbor.

The bridge would be comprised of seven spans supported on six piers and two abutments. The increased clearance between the piers would allow for the widening of the navigational channel under the bridge from the current 40 feet to 150 feet. This would match the full width of the existing Entrance Channel approaching the bridge. Scenic overlooks would be installed at Piers 2 and 5 on the east and west sides of the bridge. Retaining walls would be employed on either side of the ROW on the north side to minimize permanent impacts to the Hampton State Pier property and avoid permanent impacts to the Hampton Beach State Park.

During construction, temporary access would be required for the new bridge. Work trestles would be constructed adjacent to, and west of, the proposed bridge alignment from both the north and south shores, but not across the navigation channel. Likewise, during the demolition of the existing bridge, temporary trestles would be built adjacent to, and east of, the existing bridge from both the north and south shores. Construction of the new bridge and demolition of the existing bridge are estimated to occur over approximately 36 months, anticipated to begin in 2024. Construction staging would occur on the State Pier during a portion of the construction period (when the new bridge is under construction), with the eastern parking lot serving as a vehicular access point for the in-water construction trestle that would be located west of the existing bridge. Additional details regarding the Proposed Action and the bridge's construction are provided in Section 3.2.

5.3 Project Purpose and Need

The purpose of the project is to provide a safe, reliable, and structurally sound crossing over the Hampton Harbor Inlet, while also improving mobility for the traveling public. This includes drivers, bicyclists and pedestrians, as well as maritime users.

The project is necessary because the existing bridge is structurally deficient and functionally obsolete. The bridge's superstructure is in poor condition and the substructure is just in satisfactory condition. The bridge's mechanical system is in overall poor condition with a few components in severe condition and the electrical system is outdated and doesn't meet current standards. The current roadway width doesn't adequately accommodate the combined use by vehicles, bicyclists and pedestrians, and the shoulders and sidewalk widths are substandard. Additional details on the need for the project are provided in Chapter 2.

5.4 Neil R. Underwood Bridge Programmatic Section 4(f) Evaluation

5.4.2 *Applicability of 4(f) Criteria*

This project meets the following criteria which qualifies it for application under the Programmatic Section 4(f) Evaluation for the Use of Historic Bridges:

1) The bridge will be replaced with Federal Funds.
2) The project will require the use of an historic bridge structure, which is eligible for listing on the National Register of Historic Places.
3) The bridge is not a National Historic Landmark.
4) The FHWA has determined that the facts of this project match those set forth in the FHWA Programmatic Section 4(f) Evaluation for Historic Bridges.

5) Agreement among the FHWA, the State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) has been reached through procedures pursuant to Section 106 of the National Historic Preservation Act (NHPA).

5.4.3 *Description of Section 4(f) Resource*

Constructed in 1949, the Neil R. Underwood Bridge crosses the Hampton Harbor Inlet, connecting the Towns of Seabrook and Hampton along NH Route 1A. It is a single-leaf fixed-trunnion bascule bridge, approximately 1,199-feet long by approximately 33-feet wide (53 feet wide at the barrier gates), including a 24-foot-wide roadway, a one-foot shoulder on either side, and a four-and-a-half-foot-wide sidewalk on the east side. The bridge consists of thirteen spans – six approach spans to the south, six approach spans to the north, and a movable bascule span in the center at the navigational channel. The twelve approach spans are each 94 feet in length and are comprised of two steel girders supporting floor beams and stringers with a composite concrete deck. The approach substructure consists of reinforced concrete piers and abutments; five of the approach piers are founded on spread footings, while the remaining seven piers and the abutments are supported on timber piles. The center span is a single-leaf steel bascule with an open steel grid deck, with the operator's deck on the northwest side of the bascule span.

The bridge was determined eligible for listing on the National Register of Historic Places under Criterion C as a rare example of a bascule bridge in the State of New Hampshire; the current bridge is one of only two bridges of this type remaining in the state. The bridge retains a high level of integrity of location, design, setting, materials, workmanship, feeling and association. It embodies the distinctive characteristics of its type and method of construction, including the underdeck counterweight, the control house, the single-leaf fixed-trunnion deck, and the split-faced granite veneer on the piers. See Figure 1, Figure 2, and Figure 24.

5.4.4 *Alternatives Considered Which Avoid the Use of the Section 4(f) Resource*

In addition to the Replacement with Fixed Bridge Alternative, three other action alternatives, as well as a No-Build Alternative, were evaluated in detail in the planning process. These alternatives are discussed in detail in Chapter 3 of this EA. Only one of these alternatives, the No-Build, avoided the use of the Neil R. Underwood Bridge. The No-Build Alternative is discussed below. In accordance with the requirements of this Programmatic Evaluation, two additional alternatives, Construction of a New Bridge on a New Alignment without Affecting the Historic Integrity of the Existing Bridge, and Rehabilitation of the Bridge without Affecting its Historic Integrity, are discussed below.

<u>No-Build</u>

A No-Build Alternative was considered as part of the analysis. Under the No Build Alternative, the Neil R. Underwood Bridge would not be replaced. As such, there would be no use of Section 4(f) properties. However, the No-Build Alternative would not address the structural or functional deficiencies of the existing bridge. Ongoing maintenance would occur, but deterioration, due to harsh marine conditions, would continue. Mechanical failures, such as occurred in 2017, would likely become more frequent, and the cost to maintain the bridge would increase. Over time, the bridge would be down posted for vehicular loads and could eventually be closed, restricting access for residents, visitors, business owners and emergency vehicles. The No-Build Alternative would not meet the project's Purpose and Need and was determined not to be feasible or prudent due to the bridge's deteriorated condition and the potential for ongoing maintenance and eventual potential closure.

Rehabilitate the Existing Bridge Without Affecting its Historic Integrity

As discussed in Section 2.2 of this EA, the existing bridge is structurally deficient and functionally obsolete. Based on the results of the initial bridge ratings and existing superstructure evaluations undertaken as part of the Rehabilitation Report in 2018, it was determined that the existing steel girders and diaphragms require strengthening and stiffening in order to support the existing 31'-7" inch wide section while also meeting current design standards. The modifications to the girders would require the full removal and replacement of the deck because the girder deficiencies are widespread. Due to the interconnected nature of the structural elements, modifications to the girders would also require the removal of and modifications to the floorbeams and stringers, as well as the replacement of the counterweight, a character-defining feature of the historic bridge. In addition to the modifications to the superstructure, minor modifications would be required to the piers and abutments. The extent of the necessary replacement of the bridge's historic fabric would diminish the bridge's integrity. Rehabilitation of the bridge without affecting its historic integrity would not adequately address the functional obsolescence of the current bridge. The bridge would have to have a weight restriction on it, and the shoulder widths and pedestrian facilities would remain substandard. Therefore, this alternative would not adequately address the project Purpose and Need. Thus, the rehabilitation of the existing bridge without affecting its historic integrity is not a feasible or prudent alternative.

Construct New Bridge on a New Alignment Without Affecting the Historic Integrity of the Existing Bridge

If a new bridge were constructed on another alignment to carry the NH Route 1A vehicular traffic and the existing bridge remained in place as a pedestrian and bicycle facility, the existing bridge would need to remain operable to provide vessel access to Hampton Harbor. Therefore, the existing mechanical and electrical systems would require immediate replacement and the bridge would have to be retrofitted to ensure pedestrian safety. Structural repairs noted under the Rehabilitation Alternative above would also be required, including modifications to the girders, floorbeams and stringers, and the replacement of the bridge's counterweight.

If a new bridge were constructed, it would need to be a bascule, or a fixed bridge on a higher alignment, to provide continued access to Hampton Harbor. A second bridge crossing the Hampton Harbor Inlet would also lengthen the restricted portion of the channel, making navigating through the channel, more challenging, especially in light of the strong tides. If a second bascule bridge was constructed, the lifting of the two bridges would need to be coordinated to provide safe passage for vessels, presenting logistical challenges. Ultimately, the construction of a new bridge on a new alignment would not be feasible or prudent due to the challenges posed to navigability and the cost of the repairs and ongoing maintenance to the existing bridge, when coupled with the cost of the construction and ongoing maintenance of a new bridge.

5.4.5 *Measures to Minimize Harm/Mitigation*

Measures to minimize harm have been undertaken in all aspects of the preliminary design to date. Further measures to mitigate for the replacement of the existing bridge have been identified in consultation with NHDHR and Consulting Parties. These measures include:

- Marketing of the bridge for relocation;
- Interpretive panels mounted in the vicinity of the bridge potentially describing the history of the crossing, the significance of the Neil R. Underwood Bridge, and the mechanical function of the bascule bridge type;

- Website with links to information on movable bridges;
- Archeological survey, including monitoring, as needed if ground disturbance occurs in the area of archeological sensitivity north of the State Park entrance; and
- Video(s) focused on the history and function of bascule bridges in New Hampshire.

These measures will be finalized and documented in a Section 106 MOA submitted to the Advisory Council on Historic Preservation and signed by NHDHR, FHWA and NHDOT.

5.4.6 *Coordination and Public Participation*

FHWA and NHDOT have undertaken three public meetings on the project, five PAC meetings, and individual meetings with interested parties including State agencies and abutters. Four NHDOT Monthly Coordination meetings were also held among NHDHR, FHWA, NHDOT and Consulting Parties throughout project development to discuss alternatives and measures to minimize harm to Section 4(f) resources. A site walk was also undertaken with NHDHR, FHWA, NHDOT and Consulting Parties in January 2019. The measures that were considered reasonable were evaluated and incorporated into the design of the project.

5.4.7 *Conclusion*

This project meets the criteria included in the Programmatic 4(f) evaluation. All required alternatives have been evaluated and the findings indicate that it is not possible to achieve the Purpose and Need of the project without impacting the Section 4(f) resources. The project includes all planning to minimize harm. The officials with jurisdiction over this property have agreed with the assessment of impacts. NHDOT and FHWA will continue to coordinate with NHDHR to finalize mitigation for the project.

Following the completion of the public review and comment period for the EA, an MOA will be executed and FHWA's approval of this Programmatic evaluation will be documented in the Final EA and Finding of No Significant Impact anticipated for the project.

5.5 Hampton State Pier *de Minimis* Impact Determination

The Hampton State Pier is located on the northwest side of the bridge. It is owned by the Pease Development Authority, Division of Ports and Harbors. The pier includes a fuel dock, a State boat launch ramp, and commercial and recreational moorings. There is also a large parking area for the facilities, a bait and tackle shop, and several commercial businesses and a parking area along its eastern edge. The Hampton State Pier qualifies as a Section 4(f) resource because it is publicly owned, open to the public and its primary purpose is recreation.

The proposed project would shift the alignment of the bridge's north approach slightly west toward the Hampton State Pier and would require the installation of a retaining wall within the Hampton State Pier property at the border of the existing parking lot adjacent to the right-of-way (see Figure 28). This would necessitate the permanent incorporation of a narrow strip of land along the southeast edge of the State Pier, comprising approximately 2,973 sf. However, the addition of a retaining wall at the State Pier adjacent to the existing parking lot would not adversely affect the activities, features, and attributes of the State Pier that qualify it for protection under Section 4(f). There would be no impacts to visitors' use of the boat launch, the fuel dock, or the commercial and recreational moorings. Further, there wouldn't

be any permanent impact to the businesses at the State Pier or their parking. The recreational uses and functions at the State Pier would be maintained. During construction of the new bridge, access to a trestle would be provided through the parking lot at the southeast end of the property, temporarily impacting approximately 13,161 sf including 18 parking spaces for a portion of the construction period. However, it would not interfere with the recreational functions of the facility, and the parking spaces would be fully restored and returned to service once construction is complete.

NHDOT and FHWA have coordinated with DNCR and the Pease Development Authority about the use of the State Pier property. As mitigation for the use of the State Pier property, NHDOT has proposed the inclusion of a pedestrian walkway under the new bridge's north side which would connect the Hampton State Pier and Hampton Beach State Park. Under current conditions, there is no designated pedestrian crossing. However, pedestrians do cross NH Route 1A at this location in an undefined and uncontrolled manner creating a safety hazard. Where the new path emerges from under the bridge at the State Pier, the land would be filled and regraded creating a new slope that supports/protects the abutment and walkway, and a level area that could be used for viewing the Hampton Harbor Inlet to the south.

Based on the foregoing analysis, FHWA has made a *de Minimis* Impact Finding in accordance with Section 4(f) of the Department of Transportation Act. The Pease Development Authority has provided concurrence with the finding (see Appendix F).

6 Permits, Approvals, and Certifications

Implementation of either replacement bridge alternative would require several permits, certifications, and technical reviews at various federal and state levels of jurisdiction. Because this is a state-sponsored project, federal and state regulations apply and local ordinance are not applicable. Furthermore, since project funding is derived from a combination of shared state and federal highway-related monies, the lead federal agency is the FHWA which reviews, consents to, and thus guides NHDOT in the sponsorship of this project. As permit applicant, NHDOT must fulfill all steps in the multilevel permit process summarized below.

Federal Permits and Approvals

- National Environmental Policy Act Environmental Assessment (FHWA as sponsor)
- Section 4(f) of the U.S. Department of Transportation Act (FHWA)
- Section 6(f) of the Land and Water Conservation Act (NPS)
- Section 106 of the National Historic Preservation Act (ACHP)
- Endangered Species Act Section 7 Biological Assessments (NOAA and USFWS)
- Endangered Species Act Section 7 "*Range-wide Programmatic Informal Consultation for Indiana Bat and Northern Long-eared Bat*" for NLEB (USFWS)
- Essential Fish Habitat Assessment Worksheet (NOAA)
- US Coast Guard Bridge Permit and Section 401 Water Quality Certification (USCG)
- Clean Water Act Section 401 Water Quality Certification approval (NHDES)
- Section 404/Section 10 Permit (USACE)
- Section 408 Approval (USACE)
- Federal Coastal Zone Consistency Determination (NHDES)
- 2017 Construction General Permit for Stormwater Discharges (as modified in 2019) (USEPA)
- Municipal Separate Stormwater Sewer Systems Permits (MS4) compliance (USEPA)
- Clean Air Act General Conformity Rule compliance (USEPA)
- Hazardous materials management approvals (USEPA)

State Permits and Approvals

- Standard Dredge and Fill Wetland permit (NHDES)
- Shoreland permit (NHDES)
- Alteration of Terrain (NHDES)
- Hazardous materials management approvals (NHDES)

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8 Appendices

Appendix A: Agency Correspondence

Appendix B: Environmental Justice Analysis

Appendix C: Effects Memorandum

Appendix D: Visual Impact Assessment

Appendix E: Section 6(f) Coordination

Appendix F: Section 4(f) de Minimis Concurrence

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