Sarah Mildred Long Bridge Replacement
Standard Dredge and Fill Wetland Permit Application

Table of Contents

Plans:
Wetland Impact Plans

Available Reports:
Preliminary Design Report – Sarah Mildred Long Bridge #3641 over Piscataqua River Between Kittery, ME and Portsmouth, NH

60% Design Plans – State of Maine Department of Transportation

Sarah Mildred Long Bridge Replacement
Standard Dredge and Fill Wetland Permit Application
Supplemental Narrative

Introduction

The State of New Hampshire, in cooperation with the State of Maine, proposes to replace the Sarah Mildred Long Bridge (US Route 1 Bypass) connecting Portsmouth, New Hampshire to Kittery, Maine (Figure 1, Locus). The project involves construction of a new 2,631-foot two-level bridge (road and rail) over the Piscataqua River with a major lift span system and 1,554 feet of approaches. The proposed project includes the construction of temporary causeways, in some locations, and temporary trestles in other locations for construction and demolition of the existing bridge. Temporary causeways will be constructed of washed riprap placed on a geotextile fabric. Temporary trestles will be constructed on driven pilings. The new bridge will be constructed on both drilled shafts and spread footing piers (piers PV1, PV2, and PV3) and will also include a railroad connection. The fender protection system is proposed to be a cell filled cofferdam supported on pilings. The existing bridge and abutment will be removed and the existing piers are proposed to be removed to various depths depending on their location. The temporary trestle and causeway, new bridge and existing bridge removal are displayed graphically in the attached plan set. Construction is scheduled to begin in early 2015 and last until 2018. The attached Photo Appendix depicts the existing bridge and impact areas for the proposed bridge, and Figure 3 depicts the Photo Locations.

Proposed Impacts

Because the Piscataqua River and North Mill Pond are tidal waters, there is a 100' tidal buffer extending landward from the highest observable tide line on the New Hampshire side regulated under NHRSA 482-A:4, Fill and Dredge in Wetland. Tidal buffer in the vicinity of the bridge includes roadway and fill slopes of the US Route 1 Bypass, Market Street (which was built on fill) and fill slopes extending to the highest observable tide line, the Pan-Am Railroad line (built on fill) and the NH Port Authority facility. Impacts are depicted on Wetland Impacts Plans sheets 4, 5, and 6, and detailed in Table 2.

Bridge Construction

The proposed bridge will be constructed on piers supported by spread footings for PV1, PV2, and PV3, and drilled shafts for PR4, PS5, PR6, PS7, PR8, and for the lift tower (PT9) (See attached plan set "Wetland Impact Plans"). All construction will use appropriate erosion and turbidity controls. Dredge and drilled shaft spoils will be disposed of out of wetland jurisdiction. The vehicular bridge will extend from a bridge abutment on the western end that will be constructed within the tidal buffer zone, but above the highest observable tide line.

Bridge footings that rest on drilled shafts above the streambed but within the water are calculated as wetland impact (the footprint of the footing, rather than the footprint within the streambed). Likewise, the footprint of the lift tower fender is included as an impact. Using these parameters, the project proposes 24,787 square feet of temporary impact to Tidal Buffer Zone, and 26,689 square feet of temporary impact to tidal wetlands. Permanent impacts under NH jurisdiction total 21,230 square feet of impact to developed tidal buffer, and 24,944 square feet of impact to tidal wetlands. Impacts are detailed in Table 2, Proposed Wetland Impacts.

Spread Footing and Bridge Abutment Pier Construction

Piers PV1, PV2, and PV3 will be constructed as follows:

1. Install cofferdam frame supported by approximately 4 H-piles installed by a vibratory hammer.

2. Install sheet piles with vibratory hammer around the cofferdam frame to form a closed box.

3. Once sheet pile cofferdam is closed, MaineDOT biologist will check the cofferdam for entrapped fish.

4. Contractor will excavate streambed material within the cofferdam with a clamshell bucket.

5. Spoil will be handled as dredge and disposed of as allowed by permits.

6. A second cofferdam frame will be installed inside the sheet pile cofferdam to add stability as the excavation nears the ledge surface.

7. When the clamshell bucket has reached bedrock, the rock surface will be cleaned with the use of an airlift.

8. Spoils from the airlift will be collected, water from the airlift will be directed to a sedimentation basin as required.

9. When the bedrock surface is clean, concrete will be placed underwater by tremie (underwater pipe) to seal the bottom of the cofferdam against the bedrock surface.

10. When the concrete is cured, dewatering of the cofferdam will begin.

11. Clean water within 1 pH unit may be pumped directly back into the receiving waters.

12. Slurry laden water that has settled down to the top of the concrete seal will be pumped to a sedimentation basin.

13. Once the cofferdam is dewatered, the remaining slurry and laitance on top of the seal is removed.

14. The sheet piles are not water tight so maintenance pumping is required to keep the cofferdam dewatered, this water is typically clean and is pumped directly back to the river.

15. With a dewatered cofferdam, the contractor will form and place a reinforced concrete footing and columns directly bearing on top of the concrete seal.

16. When the pier is complete, the cofferdam is backfilled with original streambed material up to the original ground elevation

17. Sheet piles are then extracted with a vibratory hammer.

Drilled Shaft Construction

The remaining piers and the lift tower foundation will be constructed as follows:

1. Install drill platform.

2. Install drilled shaft template, supported by the drill platform. The template is an oversized pipe approximately 12 feet long used to guide shaft casing into the correct location.

3. Perform 2-inch rock core verification within casing to verify competent rock to set drilled shaft casing.

4. Install casing with rock teeth attached through template to bottom with assist crane.

5. Move drill rig over top of casing to screw the drilled shaft casing into the rock 1 foot (+/-) to create a seal.

6. Set up spoil containment on trestle and/or barge for excavation of overburden in casing. The containment will include weirs in order to allow sedimentation of solids and control of water.

7. Excavate overburden with service crane.

8. Set reverse circulation drill to drill rock socket.

9. Drill rock socket; rock drillings and water will be controlled by piping into containment on trestle and or on barge.

10. Clean water will be removed from spoils and deposited into river.

11. Set rebar cage into casing.

12. Install concrete tremie pipe to the bottom of the casing and pump concrete in the wet. The displaced water from the concrete will be pumped into containment.

13. The top of the concrete placement will be 2 feet above elevation, and then removed by a vacuum truck and disposed of out of wetland jurisdiction.

Causeway Construction

A 170-foot long causeway is proposed to be constructed from Market Street west into North Mill Pond. North Mill Pond is a tidal mudflat, and as such, is a Special Aquatic Site (SAS) under the Clean Water Act. Under New Hampshire's Programmatic General Permit with the Army Corps, any impact to an SAS (temporary or permanent) requires an Individual Permit from the Army Corps. In addition to the large causeway at North Mill Pond, there will be five other short causeways in other locations to provide access to temporary trestles and to barges for construction and demolition. These extend from Market Street (impacts UU, VV) and from the Pan-Am Railroad track (ZZ, V, XX). Construction of the causeways will proceed as follows:

Prior to the placement of any causeway fill for the construction access, a silt boom will be installed to encompass the perimeter of the proposed fill areas. Causeway fill will consist of 10-inch minus blasted ledge, run through a screener to remove any excess dirt and silt.

The placement of the causeway ledge fill will be constructed during low tide working towards the river as the tide lowers. As the tide rises, fill will be placed working away from the rising tide. The filling operation will be done in lifts as the tide elevations allow.

As the operation reaches the area at the North Mill Pond where the double 8-foot by 8-foot box culverts are to be installed, a 12-inch lift of stone will be placed at the bottom of the culvert. The culvert sections will be installed using the on-site crane, and stone aprons will be constructed at the inlet and outlet openings.

Removal of the causeway fill will be done using a similar procedure to the installation. The stone fill will be removed in lifts working away from the tide elevations.

Once the stone has been removed, the silt boom will remain in place for a number of days to allow any materials to settle. The silt booms will then be removed at the direction of the resident engineer.

Bridge Removal

Following the completion of the new bridge construction, the existing Sarah Mildred Long Bridge will be removed. Removal of the existing bridge will involve the removal or partial removal of 14 bridge piers, the bridge tower, and the bridge abutment. (See Exhibit s 2 and 3 and Photos 1-13.) Pier removal will be done primarily with an excavator mounted hydraulic hammer (hoe-ram) and the use of a drop ball and splitting wedge. This equipment may not be effective for deepwater work. Deepwater piers (16, 17, 18) are expected to require drilling and blasting. For both methods, the concrete elements will be broken into smaller pieces and then removed with a crane and clamshell bucket. A more detailed blasting plan including measures to protect endangered species will be provided prior to construction. A five-foot temporary impact envelope for pier removal has been included around P1-P9, P12, and P13. A 10-foot temporary impact envelope is included around P16 and P17. In some locations, where piers and footings are removed entirely and the streambed will be restored to its prior condition, a wetland impact credit has been taken.

Barge Wharf Removal

The proposed bridge alignment impacts the Port Authority facility by crossing a portion of the barge wharf. To accommodate the new rail alignment, approximately half (12,644 square feet) of the existing barge wharf will be removed (Photo 15). Concrete pilings under the wharf (Photo 16) will also be removed. An impact credit of 12,644 square feet is assumed.

Boat Ramp

The New Hampshire Port Authority has a small boat launch for use by the Portsmouth Harbor Master and the Port Authority. The boat ramp lies within the path of the proposed rail alignment and Pier PV3. The boat ramp will be removed (wetland impact EEE, Photos 17, 18) and a new boat ramp will be constructed next to the proposed railroad abutment.

Debris Removal

An existing pile of debris in front of the New Hampshire lift tower (P17) will be removed and placed out of jurisdiction. The pile would obstruct the new navigational channel following the construction of the bridge. All material above elevation -50 will be removed with a clamshell bucket and placed out of jurisdiction.

Submarine Cables

Two sets of redundant electrical cables are proposed to run between the two towers. Installation of the cables will require excavation to bury the cables to an appropriate depth in accordance with US Coast Guard requirements.

The submarine cables will be covered with an articulated concrete block mat that will remain in place permanently. The mats consist of concrete blocks measuring 8 x 20 feet each, connected by cables. Mats will be placed end to end over the cables from one tower to the other. Other options for powering the lift tower were considered, such as overhead cables or powering each side independently. However, because of logistics and the difficulty of maintaining consistent power from two sources, installation of submarine cables was found to be the only practicable alternative.

Responses to 20 Questions (Attachment A)

1. The need for the proposed impact;

The purpose of the proposed project is to provide a safe, efficient, and reliable crossing between Portsmouth, New Hampshire, and Kittery, Maine, over the Piscataqua River that meets the needs for highway, railroad, and maritime transportation.

The need for this project is based on the following.

The Sarah Mildred Long Bridge is a vertical lift bridge constructed in 1940 connecting Portsmouth and Kittery along the US Route 1 Bypass over the Piscataqua River. The Sarah Mildred Long Bridge is a geographically crucial structure in a declining state of repair with limited remaining service life. Under condition ratings in the Federal Highway Administration Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges report, the overall condition of the superstructure is "serious," the overall condition of the substructure is "serious," and the overall condition of the deck is "poor." Currently, the shoulder widths on both approaches to the bridge do not meet the 6-foot minimum required for this classification of roadway, an urban major collector. The bridge itself does not meet the 30-foot minimum required width or the preferred design loading of 36 tons.

The Sarah Mildred Long Bridge is one of three bridges connecting the two communities. The I-95 Piscataqua River High Level Bridge (I-95 Bridge) is a fixed span and serves as the only Interstate highway bridge connecting Maine and New Hampshire. The third bridge is the Memorial Bridge, which was recently replaced. The Sarah Mildred Long Bridge serves as the primary alternate for trucks and other vehicular traffic when the I-95 Bridge is closed, as has occurred during severe weather conditions (e.g., icing and heavy fog), major crashes, and other incidents.

The existing Sarah Mildred Long Bridge is structurally deficient and its current load posted at 20 tons for highway traffic is obsolete. With only 175 feet between the tower faces, the Sarah Mildred Long Bridge's horizontal clearance is not adequate to support future shipping traffic utilizing vessels that will require at least a 204-foot horizontal clearance. Additionally, the current limited horizontal clearance and swift currents (including cross currents) restricts the ease of transition under the bridge as it requires that tugboats must release a vessel before reaching the bridge and pick it up after passing through. The bridge's vertical clearance is no longer efficient and results in frequent openings (and road closures) so smaller vessels can pass through.

2. The alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site;

Impacts have been avoided and minimized to the extent possible during the design process. An alternatives analysis was undertaken for all elements of the bridge construction, including a range of alignment options and pier designs. The Preliminary Design Report and figures depicting the conceptual level alternatives are available upon request, and are summarized below.

A number of criteria guided the design process. A primary consideration was to improve the skew of the bridge, currently at 25˚ from the flow of the river. Other considerations included improving the vertical clearance over the channel when the lift was in the closed position, in order to minimize the number of road closures, improving the horizontal clearance over the navigational channel (i.e., making the space between the lift towers wider), and meeting geometrics required for the road and rail. The bridge also carries the rail line to the Portsmouth Naval Shipyard, and both two-level alternatives (as exists today) and single-level bridges were considered. Because of navigational requirements, only alignments on the upstream side of the existing bridge were considered, which meant that the Port of New Hampshire would likely be affected by the bridge construction due to its location.

Alignment Alternatives

The following roadway alignments were considered at the conceptual level.

- Alignment A was the single deck option (road and rail side by side) with a 0˚ skew to the channel upstream of the existing bridge (the original 0˚ skew alternative). *This alternative was rejected because of cost.*
- Alignment B was also a single deck option (road and rail side by side) with a 13˚ skew to the channel upstream of the existing bridge and with an overlap of the existing bridge on the Kittery approach. *This alternative was rejected because the railroad grades exceeded 3% to attain the required navigational clearance, which is beyond standard Railroad grades – therefore it was not feasible.*
- Alignment C was a variation of Alignment B with improvements to the footprint and crossing over the Port of New Hampshire. It provided a stacked or two-level bridge (road and rail) with a 13˚ skew to the channel and an overlap of the existing bridge on the Kittery approach. *This alternative met the Purpose and Need and was selected for further study and refinement.*

- Alignment D was 50 feet upstream and parallel to the existing bridge (similar to that proposed in the Connections Study) with a stacked road and rail arrangement and a 26˚ skew to the channel. *This alternative provided no improvement to the available wharf bulkhead at the Port of New Hampshire and provided no improvement to the skew angle of the bridge to the navigational channel.*
- Alignment E was a new stacked bridge in the same location as the existing bridge with a 26˚ skew to the channel. *This required that the existing bridge be closed for an extended period so that demolition of the existing bridge could occur before construction of the new bridge could begin. This duration of closure was deemed unacceptable. There would not be any improvement to the available wharf bulkhead at the Port of New Hampshire. It also provided no improvement to the skew angle of the bridge to the navigation channel. Therefore, this alternative did not meet the Purpose and Need and was rejected.*
- Alignment F was a stacked alignment that straddled and crossed the existing bridge by having the Portsmouth approach upstream and the Kittery approach downstream of the existing structure and providing a 13˚ skew to the channel. *This alternative was rejected because of cost.*
- Alignment G was essentially a straight line crossing of the river from the two approaches with a stacked road and rail structure and 19˚ skew to the channel. *This would require more wetland impacts and right-of-way takes than the preferred alignment, and was rejected.*

Alignment C was further modified to avoid obstructions in the river (a debris pile), and to minimize impacts to historic residential properties in Portsmouth and to wetlands in and around North Mill Pond. Efforts were made to minimize impacts to the NH Port and to minimize impacts to the barge wharf at the north end of the NH Port facility. Additional refinements to the railroad curvature were made, with the resulting C4 alignment being the basis for all additional design.

Substructure Alternatives

Two alternatives, drilled shafts and spread footings, were studied for the pier footings. Drilled shafts have a smaller footprint and less impact to the riverbed. However, spread footings are more economical where there is bedrock near the riverbed surface. The bridge as designed uses nine drilled shaft piers and three spread footing piers (PV1, PV2, PV3).

The moveable span tower structure will also be constructed on drilled shafts, with a concrete fender cap. Concrete caissons (similar to what exists today) were considered, but were rejected due to cost. Drilled shafts have a smaller footprint on the streambed than caissons.

Superstructure and Span Length Alternatives

A number of alternatives for the bridge superstructure were considered at the conceptual level, including:

- Concrete Segmental
- Prestressed Concrete Northeast Bulb Tee (NEBT) Girders
- Prestressed Concrete U-Girders
- Prestressed Concrete Northeast Extreme Tee (NEXT) Beams
- Hybrid-Composite Beam (HCB)
- Steel Girders

Concrete segmental construction has a number of advantages over the other construction types, including lower maintenance costs, ability to accommodate complex horizontal alignments, and the ability to accommodate longer superstructure units.

A primary consideration was minimizing the risk of vessel collisions. To this end, a Vessel Collision Analysis was conducted that determined that longer spans with piers positioned further from the channel and out of the waterway offered the best and most cost-effective vessel collision protection. In addition, the use of fewer piers overall helps minimize collision risk. The use of the concrete segmental superstructure requires that the first span be 5/8 as long as the longer span length to accommodate balanced cantilevered construction.

Alternatives considered for the pier placement were dependent upon the vehicle approach span length, which is in turn dependent upon the structure type (concrete segmental superstructure). An early concept (C4R4b) utilized a 660-foot cast-in-place cantilevered span for the bridge but it was determined that the depth of a span of this length would create vertical clearance challenges over the railroad. Another option (C4R4a) would have utilized a 360-foot span, which would have avoided the need for a pier within North Mill Pond. However, this would have required a substantial amount of fill for the bridge abutment within North Mill Pond (more than the pier), heavier girders and potentially larger foundations, and an additional deep water pier.

A summary of span alternatives for the C4 alignment option follows.

Table 1 Span Alternatives for Alt C4

FEATURES	C4R4a	C4R4b	C4R5a	C4R5b
Maximum span length	360' roadway, 120' RR	660' roadway, 120' RR	300' roadway, 150' RR	320' roadway, 160' RR
Feasible?	yes	No -would not clear the RR due to depth of girder	yes	yes
Navigational advantage	Additional deepwater pier (10 total).	More deepwater piers (10) than C4R5 alternatives.	Fewest deepwater piers (8 total).	Fewest deepwater piers (8 total).
Cost	Heavier girders, increased foundation load. 120' RR spans increases cost.	Heavier girders, increased cost.	Comparable to selected alternative.	Most economical - fewest deepwater spans.
Environmental considerations	Eliminates pier in North Mill Pond, but extensive fill in North Mill pond for abutment required.	Eliminates pier in North Mill Pond, but extensive fill in North Mill pond for abutment would be required.	Abutment in Mill Pond	Still requires a pier in North Mill Pond and a pier in Cutts Cove. Roadway abutment is in upland.

Several alternatives for the towers and lift span types were also studied in detail. These alternatives have no bearing on the amount or degree of wetland impact, and are described in detail in the Preliminary Design Report.

Construction Method Alternatives

The proposed bridge will be constructed using trestles supported by temporary pilings and temporary causeways, in shallow water areas. One temporary causeway will extend from Market Street southward across North Mill Pond. This causeway will provide access for construction of Pier PV1, for the bridge superstructure, and for demolition of the existing bridge. The causeway will include two eight-foot by eight-foot box culverts to accommodate the tidal flow into the back (westerly) part of the pond. A hydraulic analysis, attached to this report, was conducted that shows there will be no effect to the tidal elevations due to the causeway.

The use of causeways in shallow water areas was primarily a cost consideration, however, they will create less noise and vibration when being installed than the trestle installation. Total cost for trestles in New Hampshire was estimated at $2,406,600, whereas the total cost for the causeways (including materials, installation, and removal) was estimated at $636,390. For this reason, temporary trestles were not selected for access.

3. The type/classification of the wetlands involved;

The Piscataqua River is estuarine, fed by a 990 acre watershed (Figure 2). Cowardin classifications of the wetland resources are: E1UB3 (Estuarine, subtidal, cobble/gravel), E2US1 (Estuarine, intertidal, cobble/gravel), E2US3 (Estuarine, intertidal, mud); and Tidal Buffer Zone (developed).

4. The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters;

The project will impact the Piscataqua River and adjacent intertidal wetlands adjacent to the Piscataqua River, including North Mill Pond.

5. The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area;

The intertidal wetlands being impacted by the project are industrialized, urban wetlands and upland buffers that do not have rare features and (according to NH Natural Heritage Bureau) do not support threatened or endangered species or exemplary natural communities. The Piscataqua River does support a number of fisheries and aquatic species, including Distinct Population Segments of Atlantic and Shortnose sturgeon.

6. The surface area of the wetlands that will be impacted;

Table 2 Proposed Wetland Impacts

LOC	Wetland Plan No.	CLASS	WET NO.	NHWB TBZ TEMP	NHWB TBZ PERM	NHWB TEMP	NHWB PERM	NHWB TEMP + PERM	IMPACT DESCRIPTION
A	1	E2US3	3			11,743		**11,743**	temp causeway from Market Street
B	1	E2US3	3			264		**264**	Abt 1V construction
C	1	E2US3	3			509		**509**	abutment removal
D	1	TBZ	2	19,281	9,652			**28,933**	roadway approach, retaining wall
E	1,2	TBZ	4,8	34				**34**	temporary trestle piles
F	1,2	E2US3	5,7			137		**137**	temporary trestle piles

LOC	Wetland Plan No.	CLASS	WET NO.	NHWB TBZ TEMP	NHWB TBZ PERM	NHWB TEMP	NHWB PERM	NHWB TEMP + PERM	IMPACT DESCRIPTION
G	1,2,3	E1UB3	6			687		**687**	temporary trestle piles
H	1	E2US3	3			236		**236**	Pier 1 removal
I	1	E2US3	3			296		**296**	Pier 2 removal
J	1	E2US3/ TBZ	3/4	318		339		**657**	Pier 3 removal legs only
K	1	TBZ	4	750				**750**	Pier 4 removal
L	1	E2US3/ TBZ	5/4	266		471		**737**	Pier 5 removal
M	1,2	E1UB3	6			441		**441**	Pier 6 removal
Q	1	E2US3	3				671	**671**	PV1 construction
R	1	E1UB3	6				672	**672**	PV2 construction
S	2	E2US1	7			665		**665**	Pier 7 removal
T	2	TBZ	8		6,698			**6,698**	rr approach and Pier 8 removal
U	2	TBZ	8		3,261			**3,261**	rr approach
V	2	E2US1	7			1,235		**1,235**	temp work causeway
W	2	TBZ	8	222				**222**	Pier 9 removal
X	2	TBZ	8	657				**657**	Pier 12 removal
Y	2	TBZ	8	830				**830**	Pier 13 removal
Z	2	E2US1	7				3,776	**3,776**	rr approach
AA	2	E1UB3/ E2US1	6/7				672	**672**	PV3 construction - spread footing
BB	2	E1UB3/ E2US1	6/7				1,700	**1,700**	boat ramp construction
CC	2	E2US1	7				1,500	**1,500**	RR Abutment
DD	2	E1UB3	6				79	**79**	PR4 construction - 1 - 10' drilled shaft
EE	2	E1UB3	6				675	**675**	PS5 construction - 2 - 10' drilled shafts - pier cap
FF	2	E1UB3	6				79	**79**	PR6 construction 1 - 10' drilled shaft
GG	2	E1UB3	6				675	**675**	PS7 construction - 2 - 10' drilled shafts - pier cap
KK	2,3	E1UB3	6			1,520		**1,520**	P16 removal
LL	3	E1UB3	6			1,915		**1,915**	P17 removal
MM	3	E1UB3	6				79	**79**	PR8 construction
NN	3	E1UB3	6				7,598	**7,598**	Fender footprint over drilled shafts
OO	2	E2US1	7			236		**236**	Temp impact Pier 13 removal
PP	2	TBZ	8		1,619			**1,619**	boat ramp construction
RR	2	E1UB3	6			600		**600**	temp impact Pier 14 removal
SS	2	E1UB3	6			1,560		**1,560**	temp impact Pier 15 removal

LOC	Wetland Plan No.	CLASS	WET NO.	NHWB TBZ TEMP	NHWB TBZ PERM	NHWB TEMP	NHWB PERM	NHWB TEMP + PERM	IMPACT DESCRIPTION
TT	1	TBZ	4	293				**293**	temp causeway Cutts Cove
UU	1	E2US1	5			1,112		**1,112**	Access demolition
VV	1	E2US1	5			417		**417**	Access construction
WW	1	TBZ	4	484				**484**	temp causeway North Mill Pond
XX	2	E2US1	7			1,338		**1,338**	temp causeway west of RR tracks
YY	2	TBZ	2	516				**516**	temp causeway west of RR tracks
ZZ	2	TBZ	8	710				**710**	temp causeway off railroad
AAA	2	TBZ	8	426				**426**	temp causeway off railroad
BBB	2	E2US1	7			108		**108**	temp causeway off railroad
CCC	3	E1UB3	6				2,234	**2,234**	submarine cables dredge and fill to depth
DDD	3	E1UB3	6				854	**854**	submarine cables concrete mat
FFF	1	E2US3	3			256		**256**	PV1 within cofferdam
GGG	1	E1UB3	6			348		**348**	PV2 within cofferdam
HHH	2	E1UB3	6			256		**256**	PV3 within cofferdam
III	3	E1UB3	6				808	**808**	submarine cable (south)
JJJ	3	E1UB3	6				2,872	**2,872**	rubble pile removal
				24,787		**26,689**		**51,477**	**TOTAL TEMP IMPACT (SQUARE FEET)**
					21,230		**24,944**	**46,174**	**TOTAL PERMANENT IMPACT (SQUARE FEET)**
								97,651	**TOTAL IMPACT, TEMP AND PERM (SQUARE FEET)**
				0.57	0.49	0.61	0.57	**2.24**	**TOTAL IMPACT ACRES**

Wetland Impact Plans Sheets 1-10 depict the proposed impacts to jurisdictional wetlands and tidal buffers. Table 2 details the proposed impacts at each location. The tidal buffer is entirely developed in the vicinity of the bridge. Temporary impacts to intertidal and subtidal wetlands are proposed for the trestle and causeway construction, for pier construction, and for bridge demolition. Permanent impacts are related to the bridge abutment and pier construction. Note that for all piers with bridge “caps” the impact is calculated as the total footprint within the water column, rather than the footprint on the streambed. Piers PS 5 and PS 7 are to be constructed on drilled shafts, but the impact is calculated as the rectangular footprint of the pier cap which rests above the streambed, within and above the water column. Likewise, the lift tower rests on ten 10-foot drilled shaft columns, but the impact is calculated as the fender footprint (7,598 square feet) that rests within the water column but not on the streambed.

7. The impact on plants, fish, and wildlife including:

a. Rare, special concern species-

No rare or special concern non-marine species were identified in the project area.

b. State and federally listed threatened and endangered species-

The project is located within the range of Distinct Population Segments of Atlantic sturgeon (listed as Threatened under the Endangered Species Act) and shortnose sturgeon (listed as Endangered under the Endangered Species Act). MaineDOT (on behalf of FHWA) has initiated consultation with NOAA. A final determination will be forwarded to NHDES when available.

c. Species at the extremities of their ranges-

None.

d. Migratory fish and wildlife-

MaineDOT (on behalf of FHWA) has initiated Essential Fish Habitat Consultation with NOAA. A final determination will be forwarded to NHDES when available.

e. Exemplary natural communities identified by the New Hampshire Natural Heritage Bureau (NHB), Department of Resources and Economic Development-

The results of the NH Natural Heritage Bureau database review is attached (Exhibit 5). This review determined that no known rare (non-marine) species or exemplary natural communities are in the vicinity of the project area.

8. The impact of the proposed project on public commerce, navigation and recreation;

The proposed action would increase the horizontal and vertical clearance of the bridge, thus improving efficiency for maritime navigation of the channel, while reducing vehicular delays. The alignment reduces the skew of the lift span from 25˚ to 15˚, which aligns better with the channel’s underwater topography and currents. The horizontal clearance would increase from 175 feet to 204 feet, improving the ability of larger ships to safely pass through the lift span. The roadway at its apex within the lift span would be raised 30 feet higher than the current road, improving the vertical clearance of the bridge, and reducing the number of lifts by 64% and the amount of vehicular delays by 68%. The increased vertical and horizontal clearances of the lift span would greatly improve efficiency of the crossing for vessels and vehicular traffic.

9. The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake the applicant would be required to indicate the type of material to be utilized and the effect of the construction of the wall on the view of other users of the lake;

The project design team completed a public design workshop that considered visual elements of the bridge design. Users of the Piscataqua River in the project vicinity include railroad, shipyard, and other marine traffic. The aesthetic interests of the general public will not be substantially changed as a result the project; the proposed bridge will replace an existing bridge of similar size and scale.

10. The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel the applicant would be required to document the extent to which the dock would block or interfere with the passage through this area;

There will be closures of the Piscataqua River during the lift span erection and during lift span demolition of the existing bridge. All closures will be coordinated with the US Coast Guard. Roadway detours will occur during construction of the new bridge approaches. The existing bridge will remain open (except for occasional construction closures) until opening of the new bridge.

11. The impact upon abutting owners pursuant to RSA 482-A, II. For example, if an applicant is proposing the rip-rapping of a stream the applicant would be required to document the effect of such work on upstream and downstream abutting properties;

The project will impact the NH Port Authority by limiting use of the north wharf barge. Compensatory measures are under development to mitigate these impacts. The Port has been involved in the project design process and is amenable to the proposed impacts.

12. The benefit of a project to the health, safety, and well being of the general public;

The purpose of the proposed project is to provide a safe, efficient, and reliable crossing between Portsmouth, New Hampshire, and Kittery, Maine, over the Piscataqua River that meets the needs for highway, railroad, and maritime transportation. The current crossing is in disrepair. The proposed replacement will improve safety for marine, vehicular, and railroad users.

13. The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands he/she would be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site;

The impacts of the project will be located within the Piscataqua River and adjacent wetlands. Approach fill is limited and is not likely to substantially change the volume or quality of water entering and exiting the project area. Closed drainage is being added to the roadway approach. Treatment design of this drainage is under development and will be submitted to NHDES in conjunction with the 401 Water Quality Certification application. Because of limited space, the presence of wetlands, and the presence of buried utility lines, stormwater treatment will be achieved via a hydrodynamic separator (such as a Vortechnic© unit).

14. The potential of a proposed project to cause or increase flooding, erosion, or sedimentation;

Temporary erosion and sedimentation control devices will be utilized during construction in accordance with the lead State's Best Management Practices for Erosion and Sedimentation Control and Special Provision 656. The bridge design team completed an analysis of Riverine Hydrology and completed a Hydraulic Analysis to ensure the bridge was designed to withstand the impacts of land-side flooding, maximum tidal fluctuation, and storm surge on the proposed bridge and adjacent areas. The potential to cause increased flooding, erosion and sedimentation is low.

15. The extent to which a project that located in surface waters reflects or redirects current or wave energy which might cause damage or hazards;

The design team completed an analysis of Riverine Hydrology and Hydraulics. The bridge was designed by Professional Engineers in accordance with U.S. Coast Guard and Federal Bridge Design standards.

16. The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owned only a portion of a wetland would document his percentage of ownership of that wetland and the percentage of that ownership that would be impacted;

NA - The project purpose is to construct public infrastructure.

17. The impact of the proposed project on the values and functions of the total wetland or wetland complex;

The primary functions of wetlands adjacent to the Piscataqua River were identified as fish and shellfish habitat, sediment/toxicant retention, nutrient removal/retention/transformation, production export and shoreline stabilization. In addition, the Piscataqua River supports a number of recreational and commercial fisheries. The proposed project includes removal of the existing bridge, which will restore some functions lost by the construction of the new bridge. The proposed bridge is not likely to substantially decrease the potential for the wetlands in the project area to provide primary functions. As previously noted, an Essential Fish Habitat Assessment is being completed to address the impact to fisheries that will occur.

18. The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication;

This project is not located in or near any of the following Natural Landmarks listed on the National Register: Lake Umbagog East Inlet and Floating Island, Pondicherry Wildlife Refuge, Franconia Notch, Nancy Brook Scenic Area, Heath Pond Bog, Madison Boulder, White Lake Pitch Pine Forest, Mount Monadnock, Rhododendron Natural Area, and Spruce Hole Bog.

19. The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries.

None

20. The degree to which a project redirects water from one watershed to another.

None

Stream Crossing Criteria

As a Tier 3 stream crossing, the Sarah Mildred Long Bridge replacement must comply with Env-Wt 900, Stream Crossings. Below in bold are sections of Env-Wt 900 followed by responses stating how the requirements will be met.

Tier 3 stream crossings shall be a span structure or an open-bottomed culvert with stream simulation, not a closed-bottom culvert or pipe arch;

The replacement bridge will be a multi-span structure with fewer piers than the existing bridge.

Env-Wt 904.05 Design Criteria for Tier 2 and Tier 3 Stream Crossings. Replacement Tier 3 stream crossings shall be designed and constructed:

(a) **In accordance with the NH Stream Crossing Guidelines, University of New Hampshire, May 2009.**

The NH Stream Crossing Guidelines require that replacement structures be evaluated for their potential impacts on:

<u>Downstream flooding</u>

There will be no effect to the 100-year frequency flood. While there will be a minor amount of fill within the 100-year floodplain, flooding in the Piscataqua River occurs primarily due to storm surges during high tide and is not related to or affected by available floodplain storage along the riverbank (See Figure 4, FEMA Floodplain).

<u>Upstream flooding</u>

The proposed bridge will have no effect on upstream flooding, as above.

<u>Upstream and downstream habitat (instream habitat, wetlands, riparian buffer, riparian areas)</u>

As noted previously, the Piscataqua River supports a number of fisheries and aquatic species, including Distinct Population Segments of Atlantic and shortnose sturgeon. An Essential Fish Habitat Assessment has been undertaken for the proposed project and the response from the National Marine Fisheries Service will be submitted when available.

<u>Potential for erosion and headcutting</u>

A hydraulic study was undertaken for the project that indicates that any scouring or headcutting is within allowable tolerances.

<u>Channel dimension, pattern, and profile in the vicinity of the structure</u>

The proposed bridge will have no effect on channel dimensions, patterns, or river profiles.

<u>Sediment transport capacity</u>

The proposed structure will have no effect on sediment transport capacity.

<u>Stream vertical and lateral stability.</u>

The proposed structure will have no effect on stream vertical or lateral stability.

The NH Stream Crossing Guidelines also require that the following be avoided or mitigated:

<u>Inlet drops</u>

The proposed replacement structure would not create an inlet drop.

<u>Outlet drops</u>

The proposed replacement structure would not create an outlet drop.

<u>Flow contraction that produces significant turbulence and increased velocities</u>

No flow contraction will occur.

<u>Tailwater armoring</u>

A hydraulic analysis was undertaken to ensure that piers for the bridge could withstand the riverine and tidal forces.

<u>Tailwater scour pools</u>

The proposed replacement structure will not create tailwater scour pools.

<u>Headwater pools</u>

The proposed replacement structure will not create headwater pools.

<u>Headwater flooding</u>

The proposed replacement structure will not create headwater flooding.

<u>Physical barriers to aquatic organism passage</u>

The proposed replacement structure will not create physical barriers to aquatic organism passage. The temporary causeway in North Mill Pond, which will use two 8-foot box culverts, will allow for adequate tidal flow and aquatic organism passage during construction.

Embankment failures/instabilities

The proposed structure will require a temporary causeway, constructed of clean riprap, within North Mill Pond. There will also be bank impacts along both sides of North Mill Pond where the existing abutment and Pier 3 are to be removed, and impacts to the bank on the east side of Market Street where Pier 5 will be removed. Piers 3 and 5 are proposed to be removed at the surface of the substrate, with the footings remaining in the bank, in order to minimize impacts. Pier 13, adjacent to the New Hampshire Port, will also be removed at the surface to minimize the potential for bank failure and erosion. In all cases, all appropriate measures to prevent erosion and sedimentation will be taken during construction, and the areas will be stabilized following construction.

Channel entrenchment

The proposed replacement structure will not create channel entrenchment.

Channel sedimentation

The proposed replacement structure will not create channel sedimentation.

904.05(b) With the bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing;

Water depths and velocities within the crossing structure will be comparable to those in the natural channel upstream and downstream.

904.05(c) To provide a vegetated bank on both sides of the watercourse to allow for wildlife passage;

The bridge is constructed in an urban environment where there is little terrestrial wildlife habitat. The bridge abutment is situated west of North Mill Pond. Following construction, there will be a 10-foot wide strip of upland riverbank between the bridge and the high tide line, which will provide adequate passage for any species that might use this area.

904.05(d) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain;

The alignment and gradient of the stream channel will not change following the bridge construction.

904.05(e) To accommodate the 100-year frequency flood, to ensure that:

a. There is no increase in flood stages on abutting properties; and

b. Flow and sediment transport characteristics will not be affected in a manner which could adversely affect channel stability;

There will be no effect to the 100-year frequency flood. While there will be a minor amount of fill within the 100-year floodplain (less than 5,000 square feet), flooding in the Piscataqua River occurs primarily due to storm surges during high tide and is not related to or affected by available floodplain storage along the riverbank.

904.05(f) To simulate a natural stream channel;

The stream channel will retain the characteristics it now exhibits.

904.05(g) So as not to alter sediment transport competence.

There will be no effect to sediment transport competence.

Mitigation

As a major impact project that proposes to permanently impact a total of 46,174 square feet of tidal wetland and tidal buffer in New Hampshire, the project requires permittee-responsible mitigation under Env-Wt 803.01. NHDOT proposes to mitigate for these impacts through restoration of previously impacted tidal wetlands and via an in-lieu fee. 11,810 square feet of tidal wetlands will be restored to their prior condition following the removal of piers and footings of the existing bridge, removal of a concrete boat ramp, and removal of a portion of the north barge wharf at the NH Port Authority facility.

Under Env-Wt 803.05, Compensatory Mitigation Ratios, DES requires a 2:1 ratio for restoration of tidal wetlands for mitigation. Since 11,810 square feet of wetlands will be restored, a mitigation credit of 5,905 square feet has been assumed and subtracted from the 46,174 square foot mitigation obligation. An in-lieu fee based on 40,269 square feet has been calculated (see Exhibit 6, ARM Fund Payment Calculation, attached). The ARM fund payment is calculated at $350,285.78. Table 3 details the calculation of the mitigation obligation.

Table 3 Impact Mitigation Summary Table (Square Feet)

Location	Sheet	Class	Wetland Number	Mitigation Credit	Description
N	*1*	*E2US3*	*3*	*208*	Pier 1 removal
O	*1*	*E2US3*	*3*	*243*	Pier 2 removal
P	*1*	*E1UB3*	*6*	*243*	Pier 6 removal
HH	*2*	*E1UB3/ E2US3*	*6/7*	*12,644*	Barge wharf removal
BB	2	E1UB3/ E2US1	6/7	-1,700	Proposed boat ramp (within barge wharf removal area)
CC	2	E2US1	7	-1,500	Proposed railroad bridge abutment (within barge wharf removal area)
QQ	*2*	*E1UB3*	*6*	*720*	Pier 15 removal
EEE	*2*	*E2US1*	*7*	*952*	Boat ramp removal
				11,810	**Tidal wetlands restored**
				46,174	**Total Wetland and Buffer Permanent Impact**
				5,905	**Mitigation Credit for Tidal Wetlands Restored (2:1 mitigation ratio)**
				40,269	**Net Mitigation Obligation**