



Final Environmental Assessment

Main Street and South Broadway Flood Control Project

Salem, Rockingham County, New Hampshire

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FEMA

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ACRONYMS

APE	Area of Potential Effect
BFE	Base Flood Elevation
BMP	Best Management Practices
CAA	Clean Air Act
C.F.R.	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CWA	Clean Water Act
EA	Environmental Assessment
EJ	Environmental Justice
EMMIT	Enhanced Mapping & Management Information Tool
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
HSEM	New Hampshire Homeland Security and Emergency Management
LOMR	Letter of Map Revision
MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum of 1929
NHDAMF	New Hampshire Department of Agriculture, Markets, and Food
NHDES	New Hampshire Department of Environmental Services
NHDHR	New Hampshire Division of Historical Resources
NHFG	New Hampshire Fish and Game Department
NHNHB	New Hampshire Natural Heritage Bureau
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
OSI	Office of Strategic Initiatives
PDM	Pre-Disaster Mitigation
PM	Particulate Matter
RCRA	Resource Conservation and Recovery Act
RSA	New Hampshire Revised Statutes Annotated
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SQG	Small Quantity Generator
USACE	U.S. Army Corps of Engineers

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U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WAP	Wildlife Action Plan

1.0 INTRODUCTION

New Hampshire Homeland Security and Emergency Management (HSEM) submitted to FEMA a Pre-Disaster Mitigation grant application on behalf of the City of Salem. The PDM Grant Program is authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 United States Code (U.S.C.) 5133, and under the Pre-Disaster Mitigation grant program, FEMA (Federal Emergency Management Agency) may provide technical and financial assistance to states and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost-effective and are designed to reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities resulting from natural disasters.

The Proposed Action would replace undersized culverts at two stream crossings on tributaries of Policy Brook at Main Street and the Salem Bike-Ped Corridor, a rail-trail adjacent to South Broadway near the former Rockingham Park Racetrack. Main Street and South Broadway are considered arterial roadways in the Town of Salem and are affected by flooding caused by the culverts.

The National Environmental Policy Act (NEPA) requires FEMA to follow a specific planning process to ensure that it has considered and the general public is fully informed about the consequences of a proposed federal action, such as the approval of a mitigation project under the Pre-Disaster Mitigation grant program authorized by the Stafford Act. To meet its NEPA requirements, FEMA has prepared this Environmental Assessment to analyze potential effects of the Proposed Action and alternatives on the human environment and to determine whether the project warrants preparation of an Environmental Impact Statement or a Finding of No Significant Impact (FONSI). FEMA has prepared this Environmental Assessment in accordance with NEPA, its implementing regulations, and FEMA and Department of Homeland Security policy.

2.0 PURPOSE AND NEED

The purpose of this project is to reduce flooding in the area, minimizing road closures and infrastructure and property damage. The project is needed because the undersized culverts at the two stream crossings restrict water flow during storm events, leading to flooding within an 864-acre drainage basin of Policy Brook (**Appendix A, Figure 1**). The drainage basin is composed of three subbasins, as shown in **Figure 1**. The backup of water on the upstream side of each culvert overtops the roads, resulting in road closures and erosion on the downstream side. The project is also needed because the Main Street culvert inlet's structural integrity is severely compromised, reducing its effectiveness and potentially leading to additional blockages and flood hazards.

3.0 PROJECT LOCATION AND BACKGROUND

The project is in the Town of Salem, Rockingham County, New Hampshire (**Appendix A, Figure 2**). The existing stream crossing at Main Street is near 142 Main Street, approximately 375 feet east of the Millville Street intersection, and consists of twin 24-inch oval corrugated metal pipe (CMP) culverts. From the north, the existing culverts run from the Old Post Office Wetland (a wetland complex on the north side of Main Street), under Main Street and the commercial property at 142 Main Street directly to the south for a length of approximately 660 feet, and end at a wetland complex on the southern edge of the commercial property (**Appendix A, Figure 2**).

The existing crossing at the Salem Bike-Ped Corridor rail-trail is approximately 30 feet west of and adjacent to South Broadway. The crossing is near 73 South Broadway, approximately 125 feet north of the intersection with Friendship Drive. The existing crossing consists of a historic 5-foot by 5-foot box granite culvert that is approximately 30 feet long. Water flows from the Main Street culverts through the wetlands to the south and through a recently upgraded culvert under South Broadway designed to handle up to the 50-year flood event before reaching the rail-trail culvert (see Section 5.7). The South Broadway roadway was also raised approximately 1 foot at the time the road culvert was upgraded to further protect the road from overtopping. Downstream of the rail-trail culvert, the tributary joins Policy Brook (**Appendix A, Figure 2**).

The undersized culverts restrict the flow of stormwater, resulting in flooding within an 864-acre drainage basin (**Appendix A, Figure 1**). Residential and commercial properties are negatively impacted by flooding from flood-related damage and closed roadways. Three mobile home parks along Broadway are occasionally flooded, causing damage to buildings and displacement of residents (**Appendix A, Figure 3**). Overtopping of Main Street occurs at 10-year flood events and greater. South Broadway and the Salem Bike-Ped Corridor continue to be at risk of overtopping during 50-year flood events and greater, despite the upsizing of the road culvert, because the distance between the road and rail-trail culvert is only 30 feet. Since floodwaters are not able to pass through the rail-trail culvert, water can back up through the road culvert, which may lead to the overtopping of South Broadway. Overtopping and flooding on the roads sometimes results in damage that requires repairs and increases the duration that these roadways are impassible.

The Proposed Action is part of a larger group of seven stormwater infrastructure improvement projects in the Policy-Porcupine Brook watershed. Five water infrastructure improvements that are downstream of the Main Street culvert have already been completed (see Section 5.7, Cumulative Impacts for more detail). Replacement of the Salem Bike-Ped Corridor and the Main Street culverts would be the last two of the seven projects planned in the Policy-Porcupine Brook watershed.

4.0 ALTERNATIVES

NEPA regulations state that an agency must rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination (42 U.S.C. 4332(E) and 40 C.F.R. 1508.9). Additionally, a No Action Alternative must be included. This section describes the No Action Alternative, the Proposed Action that would provide for the purpose and need, and other alternatives that were considered but eliminated from the full analysis.

Several alternative courses of action were evaluated for the Main Street and South Broadway Flood Control Project. The alternatives were evaluated based upon engineering constraints, environmental impacts, available property, and their ability to meet the purpose and need for the project. Budgetary constraints were considered but were not the controlling factor.

4.1 No Action Alternative

Under the No Action Alternative, the federal action to replace the two existing culverts at Main Street and the granite culvert at the rail-trail would not be implemented. Flooding within the 864-acre drainage basin would likely continue. The undersized culverts would continue to result in water overtopping Main Street during 10-year flood events and greater. South Broadway and the Salem Bike-Ped Corridor would still be

at risk of overtopping during a 50-year flood event and greater, despite the upsizing of the South Broadway culvert. Floodwaters would not be able to pass freely through the rail-trail culvert and would back up towards the road culvert. This back up could overtop South Broadway on the western side of the road prior to the 50-year flood event level because of the close proximity of the road and the Salem Bike-Ped Corridor. Both roads would continue to be impassable when overtopped and would continue to require repairs from flood damage that could result in additional road closures. Residential and commercial areas in the basin would also continue to experience flooding, flood-related damage and displacements.

4.2 Proposed Action

The Proposed Action would replace the undersized culverts at Main Street and the Salem Bike-Ped Corridor culvert with new culverts designed to accommodate up to a 50-year storm event.

4.2.1 Main Street Culvert Replacement

For the Main Street culvert, the subrecipient proposes to replace the 42-inch twin CMP culverts with a 3-foot by 12-foot box culvert. See **Appendix A, Figure 4** for the concept layout. The proposed box culvert would be installed where the current inlet is located north of Main Street with new headwalls angled at 90 degrees to optimize water flow. An area up to 30 feet from the inlet would be disturbed by construction equipment during removal of the current inlet structure, installation of new headwalls, and recontouring the ground. Approximately 1,000 square feet would be permanently altered by the installation of the new headwalls. Excavation would extend up to 2 feet below the existing ground surface. Wetland vegetation would be removed during construction and replanted following construction.

From the inlet, the culvert would run approximately 100 feet to the southeast, then approximately 660 feet south within an easement between the commercial buildings at 142 and 144 Main Street that ends at the wetland south of these properties. The depth of excavation within the easement and under Main Street would be up to 7 feet. The excavation would be within Main Street and the easement boundaries between the buildings and would result in approximately 10,000 square feet of ground disturbance. The outlet would require up to 400 linear feet of channel restoration downstream of the culvert to reestablish the natural stream channel contours. Construction of the outlet and channel restoration area would disturb up to 8,000 square feet and would require excavation up to 2 feet deep within the stream channel and wetlands. The majority of the existing culverts would be filled with flowable fill that fills the entire culvert and abandoned in place. The remaining sections would be removed to construct the new culvert and within the town's right of way. There may be a segment of precast structure or stone box under the commercial property that would be sealed off with brick and mortar.

The subrecipient would follow standard practices for the maintenance of traffic and for the mitigation of noise impacts during construction. The final design for the Main Street culvert is contingent on the engineering study phase. If the project goes beyond the project areas delineated or if the final design substantially changes the proposal, FEMA would reevaluate the EA and its analysis and conclusions.

4.2.2 Salem Bike-Ped Corridor Culvert Replacement

At the Salem Bike-Ped Corridor culvert, the subrecipient proposes to replace the existing granite block box culvert with a 5-foot by 12-foot precast concrete rigid frame box culvert 30 feet in length. See **Appendix A, Figure 5** for the concept design. Two 10-foot-long headwalls would be constructed at the inlet, angled

at 45 degrees, to convey water through the new culvert. The outlet would have a 19-foot-long headwall angled at 52.5 degrees to the north of the brook and a 12-foot-long headwall angled at 38 degrees to the south of the brook. The new box culvert would be anchored with concrete footings to a maximum depth of 4.5 feet and up to 18 feet from the center of the culvert in each direction.

The bottom of the culvert would be a compacted common fill base overtopped with filter fabric. A streambed substrate consisting of sandy, gravelly soil and cobbles would be placed along the center of the culvert bottom to mimic a natural stream bottom. This fill would be approximately 6 feet wide and 1 foot deep, creating a stream channel within the culvert. An artificial streambank would be created with two 12-inch coir logs staked on each side of the streambed and a single layer of 12-inch riprap. A temporary water diversion structure would be installed during construction that would either: 1) divert the water across the rail trail; or; 2) create a bypass similar to that used to construct the culvert under South Broadway as shown in **Appendix B, Document 1**.

The inlet of the Salem Bike-Ped Corridor culvert would be raised to 126.2-foot National Geodetic Vertical Datum of 1929 (NGVD29), and the outlet would be raised to 126.8 feet NGVD29 to accommodate the 50-year flood event. With the elevation increase and the additional widening of the culvert, the elevation of the 50-year flood event at South Broadway would be reduced from 127.0 to 126.1 feet NGVD29.

The in-water work is expected to impact up to 1,000 square feet at the inlet and 300 square feet of wetland at the outlet (**Appendix B, Document 1**). The inlet disturbance area includes areas previously disturbed by the work completed at the adjacent South Broadway roadway culvert (see Section 5.7). The engineering designs for the Salem Bike-Ped Corridor culvert are presented in **Appendix B, Document 1**.

4.3 Alternatives Considered and Dismissed

4.3.1 Improving Hydraulic Capacities of the Existing Main Street Structure

This alternative would maintain and repair the existing infrastructure to reduce culvert failure at Main Street. This alternative was dismissed because the existing CMP culvert is undersized and providing repairs solely to the pipe would not reduce the constriction of stormwater flows through the culvert that results in flooding upstream. The structural integrity at the inlet end under Main Street is severely compromised, and the culvert's integrity throughout is likely also compromised because culverts of this age are typically rotted at the waterline. This alternative would not replace the Salem Bike-Ped Corridor culvert, and floodwaters would also continue to back up at this culvert, affecting South Broadway. Because this alternative would not reduce flood damages and road closures in the drainage basin area, it would not meet the purpose and need for the project.

4.3.2 Property Acquisition and Floodplain Replacement and Mitigation

Under this alternative, the subrecipient would purchase the property downstream from the Main Street culvert at 142 Main Street to restore the original floodplain at this location. The existing buildings and built infrastructure on the property would be demolished, and the area would be excavated and restored to wetlands. This alternative would allow for a significant shortening of a new culvert and the development of an open stream channel. The open channel would improve the hydraulics of a new culvert, allowing for a smaller size under Main Street that would still pass floodwaters. Future maintenance costs for the culvert would be reduced because of the shorter length.

This alternative was dismissed for several reasons. The assessed value of the property that would need to be acquired is \$2.9 million. Combined with the building demolition, business relocation, wetland restoration, and unknown needs for environmental remediation of the existing fill, the estimated cost would increase significantly. There are three separate businesses located on the property, which would complicate acquisition and relocation negotiations. The property was also filled over time (with most filling occurring without the benefit of permits or oversight) between 1958 and 1966. Unregulated fill material from this period could contain contaminated materials that could require special handling for removal and disposal. Finally, the residual land not needed for the wetland restoration would likely be too small to be sold or used for another purpose. While the town has an interest in acquiring property to reconstruct the nearby central fire station, the residual land would not be adequate to accommodate this potential use. Therefore, this alternative was dismissed because of the high cost and technical infeasibility.

5.0 AFFECTED ENVIRONMENT AND POTENTIAL EFFECTS

Effects include ecological, aesthetic, historic, cultural, economic, social, or health. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial” (40 C.F.R. 1508.1(g)(8)).

When possible, quantitative information is provided to establish potential impacts; otherwise, the potential qualitative impacts are evaluated based on the criteria listed in **Table 5-1**:

Table 5-1: Classification of Potential Effects

Impact Scale	Criteria
None/Negligible	Resource area would not be affected and there would be no impact, OR changes or benefits would either be nondetectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts/benefits. Impacts would be within or below regulatory standards, but historic conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Based on a preliminary screening of resources and the project's geographic location, **Table 5-2** identifies the resources that do not require a detailed assessment and the reason why.

Table 5-2: Resources Not Present

Resource	Determination
Designated Farmland Soils (Farmland Policy Protection Act)	Project areas are within incorporated municipal boundaries and are not subject to the Farmland Protection Policy Act.
Seismic Hazards (Executive Order 12699 Seismic Safety)	U.S. Geological Survey (USGS) Earthquake Hazard Program reports that the project areas are not in a seismically active area and, therefore, the alternatives would not affect seismic activity or be affected by seismic hazards.
Federally Designated Wild and Scenic Rivers (Wild and Scenic Rivers Act)	Closest designated Wild and Scenic River is an 8-mile segment of the Concord River in Massachusetts. The river is approximately 22 miles to the southwest of the project areas, according to National Parks System Wild and Scenic Rivers mapper. The alternatives would have no effect on a wild or scenic river.
Sole Source Aquifers (Safe Drinking Water Act)	U.S. Environmental Protection Agency (EPA) Sole Source Aquifer mapper indicates that the project areas are not located above a sole source aquifer; therefore, the alternatives would have no effect on sole source aquifers.
Coastal Resources (Coastal Zone Management Act)	Project areas are approximately 18 miles inland from the state's designated coastal zone based on a review of the New Hampshire Coastal Zone Map; the alternatives would have no effect on coastal management zones.
Coastal Barrier Resources System (Coastal Barrier Resources Act)	Project areas are not within a Coastal Barrier Resource Unit, an Otherwise Protected Area, or associated buffer zones, based on a review of the U.S. Fish and Wildlife Service (USFWS) Coastal Barrier Resource System mapper.
Essential Fish Habitat (Magnuson-Stevens Fishery Conservation and Management Act)	National Marine Fisheries Service Essential Fish Habitat Mapper shows that the project areas are not within or adjacent to Essential Fish Habitat or any associated tributaries.

5.1 Physical Resources

5.1.1 Geology and Soils

5.1.1.1 Existing Conditions

Geologically, the project areas and the 864-acre drainage basin are a part of the Merrimack Group, Berwick Formation (USGS 2020). This formation is made up of variations of hard and not easily erodible metamorphic rocks.

Soils in the Main Street culvert project area consist mostly of Freetown mucky peat with 0 to 2 percent slopes formed in alluvial deposits with a slight risk of erosion. The remaining area is classified as Urban Land with no erosion rating. The soils in the Salem Bike-Ped Corridor culvert project area are classified entirely as Urban Land on artificial fill deposits with no erosion rating (see **Appendix A, Figure 6**). Soils in the wetland area between the Main Street culvert and the South Broadway culvert largely consist of Freetown mucky peat with 0 to 2 percent slopes and a slight risk of erosion (NRCS 2020). Windsor loamy sand with 3 to 8 percent slopes and Chatfield-Hollis Canton complex with 0 to 8 percent slopes make up the next most prevalent soil types found in the wetland area. Windsor loamy sand in this area is classified as having a slight risk of erosion, while Chatfield-Hollis Canton complex soils in the area are classified as having moderate to severe risk of erosion (NRCS 2020). These more erodible soils are not present within the project areas but are present within the drainage basin.

Topography in the project areas and drainage basin is generally flat, sloping gradually from elevations of 200 feet in the north to 160 feet along the stream channel and associated wetlands to the south (USGS 2018).

5.1.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, the bedrock, topography, and soils in both project areas would not be disturbed by construction activity. The undersized culverts would remain in place and erosion would likely continue from overtopping events and high-velocity flows. There would be no long-term adverse effect on geology from flood and storm erosion, as erosion would not affect the bedrock. Erosion could wash away Chatfield-Hollis Canton complex soils and change the topography adjacent to the streambank or the larger drainage basin. Therefore, there would be a minor long-term adverse effect on soils and topography in the drainage basin from continued flood and storm erosion.

Proposed Action

Under the Proposed Action, there would be no short- or long-term adverse effects on geology in the project areas or the drainage basin because the project is not expected to hit bedrock during construction nor would bedrock be affected after project completion.

Construction of the Main Street culvert would disturb soils within an area of 9,000-square feet and require up to 7 feet of excavation. This accounts for 0.21 acres of the 864-acre drainage basin. Excavation would also occur underneath paved areas along Main Street to install the new culvert. The soils under the paved surfaces largely consist of artificial fill from unknown sources. There is also the potential for contaminated soils to be encountered, which could erode into surface waters (see Section 5.5.7). Construction activities would not alter the topography. Construction site best management practices (BMPs) would limit erosion.

Implementation of BMPs and compliance with Clean Water Act (CWA) permit conditions would result in a minor short-term adverse effect on soils and topography during construction (see Section 5.2.1 Water Quality for information on the permits).

Construction of the Salem Bike-Ped Corridor culvert would disturb soils within a 1,300-square-foot area in and around the culvert. This accounts for 0.030 acres of the 864-acre drainage basin. Construction activities would not alter the topography. Construction activities in this project area would result in a negligible short-term adverse effect with the implementation of the erosion and sedimentation BMPs specified in the CWA permit conditions (see Section 5.2.1 Water Quality).

Post-construction, the larger culverts would accommodate overflow from the brook. Installation of the new culverts would result in new landscape features, such as coir logs and riprap, alongside the streambed at the Salem Bike-Ped Corridor culvert, which would reduce soil erosion in the project area. The drainage basin would largely remain undisturbed, aside from a portion of the realigned stream channel located in the wetland between the outlet of the Main Street culvert and the South Broadway culvert. The Proposed Action would have a minor long-term beneficial effect on soils and topography from the reduction in storm-related erosion.

5.1.2 Air Quality

The Clean Air Act is a federal law that regulates air emissions from area, stationary, and mobile sources. Air quality standards have been enacted to protect public health and the environment. The standards include lead, nitrogen dioxide, ozone, carbon monoxide, sulfur dioxide, and particulate matter. Areas where the monitored concentration of a pollutant exceeds air quality standards are designated as non-attainment areas. Areas where all pollutants are below the standards are classified as in attainment areas.

5.1.2.1 Existing Conditions

The project area is located in Rockingham County, New Hampshire. Rockingham County is in attainment status for all criteria pollutants (EPA 2020a).

5.1.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activity to replace the undersized culverts; therefore, there would be no construction-related emissions. However, there would be a negligible, recurring, short-term, adverse effect on air quality from vehicle and equipment emissions needed for flood-related repairs and additional vehicle emissions generated by road detours.

Proposed Action

The Proposed Action would result in a negligible short-term adverse effect on air quality from equipment and vehicle emissions used for construction. All construction equipment would be required to meet current EPA emissions standards (EPA 2016). The Proposed Action would have a negligible long-term beneficial effect by eliminating recurring construction emissions for flood-related repairs.

5.1.3 Climate Change

“Climate change” refers to changes in the Earth’s climate caused by a general warming of the atmosphere. Its primary cause is emissions of greenhouse gases (GHGs), including carbon dioxide, methane, nitrous oxides, ozone, fluorinated gases, and water vapor (Ward 2020). Climate change is capable of affecting species distribution, temperature fluctuations, and weather patterns. The Council on Environmental Quality’s Final NEPA Guidance on Consideration of Greenhouse Gas Emissions and the Effects on Climate Change (CEQ 2016) suggests that quantitative analysis should be done if an action would release more than 25,000 metric tons of GHGs per year.

5.1.3.1 Existing Conditions

Rockingham County is characterized by a humid continental climate, where mean annual precipitation is 47.75 inches per year. The winter mean minimum temperature is about 25 degrees Fahrenheit and summer mean maximum temperature is about 74 degrees Fahrenheit (NOAA 2020).

Carbon dioxide makes up 92 percent of GHG emissions in New Hampshire (NHDES 2017). Most of this carbon dioxide is generated through fossil fuel burning, such as oil for heating and in vehicles, and coal and natural gas for electricity and heat. Other GHGs emitted in the state are methane, nitrous oxides, and industrial process gases such as hydrofluorocarbons. The transportation sector is the largest contributor to GHG emissions in the state—responsible for 42 percent of GHG emissions. The state reached peak GHG emissions in 2004 (approximately 23 million metric tons). By 2015 (the latest year data is available), GHG emissions in the state had dropped to 1990 baseline emissions of approximately 16 million metric tons (NHDES 2017).

5.1.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activity to replace the culverts; however, there would be emissions from equipment and vehicles used for flood-related repairs, and from detoured traffic. Therefore, the No Action Alternative would have negligible recurring short-term adverse effects on GHG emissions.

Proposed Action

The Proposed Action would result in negligible short-term adverse effects on GHG emissions caused by equipment and vehicles used to construct the culverts. All construction equipment would meet current EPA emissions standards (EPA 2016). Construction emissions would be below *de minimis* thresholds. The Proposed Action would have a negligible long-term beneficial effect by eliminating recurring construction emissions from flood-related repairs.

5.2 Water Resources

5.2.1 Water Quality

The Clean Water Act (CWA) regulates the discharge of pollutants into water and is implemented by the U.S. Army Corps of Engineers (USACE) and EPA. Section 404 of the CWA establishes the USACE permit requirements for discharging dredged or fill materials into Waters of the United States. The New Hampshire Department of Environmental Services (NHDES) administers Section 401 of the CWA and issues water

quality certifications (314 CMR 9.00) for the discharge of dredged materials, dredging, and dredged material disposal in Waters of the United States. Under Section 402 of the CWA, the National Pollution Discharge Elimination System (NPDES) regulates both point and nonpoint pollutant sources, including stormwater and stormwater runoff. Activities that involve one or more acres of ground disturbance require an NPDES permit. Section 402 is administered by the EPA in New Hampshire.

5.2.1.1 Existing Conditions

Both project areas and the drainage basin are located within the Policy-Porcupine Brook watershed (EPA Watershed River ID NHRIV700061102-18), which is within the Merrimack River Watershed (USGS Watershed Designation HUC01070002). The culverts at both stream crossings are undersized and reduce flow conveyance, particularly during times of increased water levels from storms. Sedimentation and debris occasionally cause blockages at the existing culverts that also hinder the conveyance of stream flows (Town of Salem 2017). Floodwater that backs up on the upstream end of the culverts overtop the roadways and the bike-ped path, creating high-velocity flows over the downstream embankments that cause erosion, and could contaminate the water. Erosion is localized around the culverts where overtopping water flows back into the brook and generally consists of fill and some wetland soils particulates.

The NHDES classifies the streams in the Policy-Porcupine Brook watershed as Class B designated rivers, which are acceptable for fishing, swimming, and other recreational purposes, but requires treatment to be used as a water supply. The State of New Hampshire 2018 305(b) Watershed Assessment report found that the current water quality in the Policy-Porcupine Brook watershed does not meet standards for aquatic life and fish consumption (NHDES 2020a). The waterway is also on the 303(d) impaired list for aquatic life (chloride) and fish consumption (mercury). NHDES conducted total maximum daily load studies for both chloride and mercury load reduction, which were approved by EPA in January 2009 and December 2007, respectively (EPA 2020b). In the studies, NHDES identified the main source of chloride as runoff from roads and paved lots and the main source of mercury as atmospheric deposition.

5.2.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activity that could cause potential erosion or sedimentation into the Policy-Porcupine Brook watershed. The undersized culverts would continue to hinder the conveyance of water during heavy flows, potentially causing upstream flooding within the drainage basin. There would be a continued risk of soil erosion, sedimentation, and debris blockage in the project areas. Flooding would likely continue and, during overtopping events, nonpoint source pollutants, particularly chloride, could wash from the roads and trail into the stream and wetlands. During winter months, the presence of road salt could increase the concentration of chloride levels in the runoff during these overtopping events. Therefore, the No Action Alternative would have a minor long-term adverse effect on water quality and flow conveyance.

Proposed Action

The Proposed Action would require in-water work, including excavation, dredging, and temporary water diversion in both project areas during construction. The in-water work requires permit approvals from the USACE and NHDES in accordance with Section 401 and 404 of the CWA. The subrecipient has already obtained approvals for construction of the Salem Bike-Ped Corridor culvert from NHDES (Non-Site-

Specific Permit No. 2018-01022 dated August 29, 2018) and USACE (General Permit No. 23 NAE-2018-02204 dated October 9, 2018). FEMA would require the subrecipient to coordinate with NHDES to confirm the new water diversion structure is covered under the Non-Site Specific permit. Similar permits and authorizations would be required to replace the Main Street culvert. The subrecipient would be required to adhere to the BMPs and conditions specified in the permit approvals during all phases of construction. BMPs include, but are not limited to, siltation and erosion control measures (e.g., silt fences), turbidity control, site restoration measures (e.g., replanting exposed soils), and minimizing work within the water. Before construction begins, FEMA would condition the grant so that the subrecipient obtains a National Pollution Discharge Elimination System permit (under Section 402 of the CWA) from the EPA. The subrecipient must provide FEMA with a copy of the permit or documentation from the EPA that the permit is not required before, and no later than, submission of a project closeout package. As long as the subrecipient complies with all BMPs and permit conditions of the issued and future permits and authorizations, construction would have a minor short-term adverse effect on water quality.

Post-construction, the larger box culverts would reduce the restriction of high flow conveyance. The larger culverts would allow for better flow conveyance and reduce debris buildup. This would mitigate against upstream flooding within the drainage basin (see Section 5.2.2). Overtopping of the roads and trail would decrease up to the 50-year flood event, reducing nonpoint source pollutants, including chloride (primarily from road salts) in the watershed. Soil erosion from flooding and sedimentation would likely decrease because of improved flow conveyance and reduced overtopping. The Proposed Action would likely have no long-term effect on mercury levels in the Policy-Porcupine Brook watershed since atmospheric deposition is the main source of the pollutant. The Proposed Action would have a minor long-term beneficial effect on flow conveyance, water quality, and erosion reduction.

5.2.2 Floodplains

Executive Order (EO) 11988 Floodplain Management requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Each federal agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities. FEMA uses an 8-step decision-making process to evaluate potential effects on and mitigate effects to floodplains in compliance with EO 11988 and 44 C.F.R. Part 9 (See **Appendix B, Document 2**). FEMA published initial public notice for the project on June 19, 2020 and will issue a final notice as part of the EA public notification process in accordance with 44 C.F.R. 9.8 and 9.12. The purpose of the notices is to solicit feedback from the public regarding the potential effects on floodplains and to notify the public of FEMA's final decision.

At the state level, the Office of Strategic Initiatives (OSI) administers and regulates floodplains in New Hampshire in accordance with the National Flood Insurance Act and the National Flood Insurance Program. The subrecipient participates in the National Flood Insurance Program and regulates floodplain development through its Floodplain Development Ordinance (Article VII §490-705).

5.2.2.1 Existing Conditions

The Main Street culvert project area is located within the 100-year floodplain (Zone AE) and regulatory floodway of Policy Brook, as shown on Flood Insurance Rate Map (FIRM) panel number 33015C0561E dated May 17, 2005 (**Appendix A, Figure 7**). The Salem Bike-Ped Corridor culvert is located within the 100-year floodplain (Zone AE) and regulatory floodway of Policy Brook, as shown on FIRM panel number 33015C0563E dated May 17, 2005 (**Appendix A, Figure 8**). Parts of the drainage basin are also located within the 100-year floodplain (Zone AE) or regulatory floodway of Policy Brook, as shown on FIRM panel numbers 33015C0561E and 33015C0563E dated May 17, 2005 (**Appendix A, Figure 9**).

The 864-acre drainage basin is frequently inundated from 10- to 25-year frequency flood events, including the “Mother’s Day Flood” of May 2006 (Town of Salem 2017). The Mother’s Day Flood was the largest in the area since the hurricane of 1938 and measured between the 10- and 25-year frequency flooding event. The existing culverts at Main Street and the Salem Bike-Ped Corridor overtop at 10-year frequency flooding events (Town of Salem 2017).

5.2.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, overtopping events would continue to cause temporary road closures and prevent passage for residents and emergency vehicles (see Section 5.5.3). Main Street would overtop during a 10-year flood event and greater. South Broadway and the Salem Bike-Ped Corridor would continue to remain at risk of overtopping during the 50-year flood event, despite the upsizing of the South Broadway culvert. Floodwaters would not be able to pass freely through the rail-trail culvert, backing up through the road culvert, and then overtopping the road because the culverts are within 30 feet of each other. The flood risk on residential and commercial properties would continue within the drainage basin, causing damage and potentially temporary or permanent displacement of residents. For these reasons, the No Action Alternative would have a moderate long-term adverse effect on the community’s infrastructure and the health of the floodplain from continued flooding. The 8-step process determined that the No Action Alternative is not a practicable alternative because it does not meet the purpose and need for the project (see **Appendix B, Document 2**).

Proposed Action

The 8-step process determined that the Proposed Action was the only practicable alternative, and there were no practicable alternatives outside the floodplain (i.e., relocate roads, homes, and businesses) because it would be prohibitively expensive (see **Appendix B, Document 2**). The Proposed Action is functionally dependent on its location within the floodplain (44 C.F.R. 9.11(d)(1)(i)) and, as the only practicable alternative, potential effects would be minimized as long as all permit and grant conditions are adhered to (44 C.F.R. 9.11(d)(5)).

Construction activities for the Proposed Action would occur within and adjacent to the floodplain and floodway, including excavation, dredging, and temporary water diversion and dewatering. As part of the 8-step process, and in compliance with 44 C.F.R. Parts 9, 60, and 65, FEMA would condition the project grant requiring the subrecipient to obtain a no-rise certification issued by the local floodplain administrator prior to starting any work within a mapped floodway (44 C.F.R. 60.3). The no-rise certification would document that the Proposed Action would not increase (in any amount) the floodwaters from the 100-year

flood event, also known as the Base Flood Elevation, anywhere in the community. Additionally, because the Proposed Action may lower the Base Flood Elevation in the project areas, the subrecipient would be required to initiate a Flood Insurance Rate Map change and receive a Letter of Map Revision (LOMR) in accordance with 44 C.F.R. 65.6. FEMA would also condition that the subrecipient obtain a local floodplain permit for the Proposed Action, demonstrating consistency with the Town of Salem Floodplain Development Ordinance (Article VII § 490-705) in accordance with 44 C.F.R. 9.11(d)(6).

Post-construction, the Proposed Action would have a moderate long-term beneficial effect on the floodplain and would reduce flooding within the project areas. The hydraulic and hydrologic study completed in 2017 demonstrated the larger culverts would provide adequate capacity to handle flows up to the 50-year frequency flood event, as summarized in **Table 5-3**.

Table 5-3: Upstream Water Surface Elevations for the 50-Year Flood Event (Feet NGVD29)

Culvert Location	Approximate Minimum Elevation to Overtop Road	Existing 50-Year Flood Elevation	50-Year Flood Elevation with Proposed Action	Change in 50-Year Event Elevation
Main Street	127.5	128.3	127.5	-0.8
South Broadway	127.4	126.1	126.1	0.0
Salem Bike-Ped Corridor	125.7	127.0	126.1	-0.9

Source: Town of Salem 2017

Note: Elevations reported in the National Geodetic Vertical Datum of 1929.

The excavation of the realigned channel would open up the streambed, creating a negligible amount of additional floodwater storage. The increase in flow capacity and channel restoration would reduce flooding within residential and commercial properties within the drainage basin. Therefore, there would be a long-term moderate beneficial effect from reduced flooding and an improvement in floodplain health in the drainage basin.

5.2.3 Wetlands

Executive Order (EO) 11990 Protection of Wetlands requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Each federal agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. FEMA uses the 8-step decision-making process to evaluate potential effects on and mitigate effects to wetlands in compliance with EO 11990 and 44 C.F.R. Part 9 (See **Appendix B, Document 2**). FEMA published an initial public notice for the project on June 19, 2020 and will issue a final notice as part of the EA public notification process in accordance with 44 C.F.R. 9.8 and 9.12. The purpose of the notices is to solicit feedback from the public regarding the potential effects on floodplains and to notify the public of FEMA's final decision.

At the state level, the NHDES administers and regulates wetlands in New Hampshire under the Wetlands Act (Revised Statutes Annotated [RSA] 482-A). Work within and adjacent to wetlands requires coordination with USACE and NHDES for potential permits. Work that would result in dredge or fill within wetlands may require a permit from NHDES. The Town of Salem places additional restrictions on development in wetlands through its Wetlands Conservation Ordinance (Article VII § 490-706).

5.2.3.1 Existing Conditions

The USFWS National Wetlands Inventory (NWI) identifies freshwater emergent and freshwater forested/shrub wetlands in the southern and northern portions of the Main Street Culvert project area (**Appendix A, Figure 10**). The NWI classifies wetlands within this project area as palustrine, emergent, seasonally flooded/saturated wetland dominated by common reed (*Phragmites australis*) (PEM5E), and palustrine, scrub-shrub, broad-leaved deciduous, emergent, persistent, seasonally flooded/saturated wetlands (PSS1/EM1E). The NWI does not identify any wetlands in the Salem Bike-Ped Corridor project area; however, the subrecipient conducted a wetland delineation that identified wetlands at the inlet (300 square feet) and outlet (1,000 square feet) of the existing culvert (see **Appendix B, Document 1**).

The NWI also identifies wetlands within the drainage basin, which are classified as freshwater emergent and freshwater forested/shrub wetlands (**Appendix A, Figure 10**). During flooding and overtopping events, the wetlands in the drainage basin become inundated with floodwaters. The higher velocity flows during a flood result in erosion, sedimentation, and runoff from roads and other impervious surfaces, resulting in the contamination of the nearby wetlands (see Section 5.2.1).

5.2.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activities within or adjacent to wetlands, and the culverts would not be replaced. The wetlands would continue to be susceptible to erosion, sedimentation, and contamination from flooding and overtopping events, resulting in minor long-term adverse effects. Water inundation in the wetlands would likely continue as well; however, it would likely have a negligible long-term adverse effect as wetlands are adapted to occasional inundation. The 8-step process determined that the No Action Alternative is not a practicable alternative because it does not meet the purpose and need for the project (see **Appendix B, Document 2**).

Proposed Action

The 8-step process determined that the Proposed Action was the only practicable alternative, and there were no practicable alternatives outside the wetlands (i.e., relocate roads, homes, and businesses) because it would be prohibitively expensive (see **Appendix B, Document 2**). Also, the Proposed Action is functionally dependent upon its location within wetlands (44 C.F.R. 9.11(d)(1)(i)), and potential effects would be minimized as long as all permit and grant conditions are adhered to (44 C.F.R. 9.11(d)(5)).

Construction activities for the Proposed Action would involve work within and adjacent to wetlands, including excavation, dredging, and temporary water diversion and dewatering. During construction of the Main Street culvert, an area of approximately 1,000 square feet at the inlet, 8,000 square feet at the outlet, and approximately 10,000 square feet under Main Street and the easement would be disturbed, much of which would be in wetlands. The disturbance would result from the installation of headwalls and stream channel restoration. These activities would result in the permanent loss of wetlands with no compensatory

mitigation. As part of the 8-step process, and in compliance with 44 C.F.R. Part 9, FEMA would condition the grant to require compliance with federal, state, and local regulations for work in wetlands. The subrecipient would be required to apply for a permit pursuant to Sections 401 and 404 of the CWA (see Section 5.2.1) and the State of New Hampshire Regulation RSA 482-A for the wetland alterations. For the Salem Bike-Ped Corridor culvert, NH permit No. 2018-01022 allows for the permanent impact of 1,000 square feet at the inlet and 300 square feet at the outlet of the Salem Bike-Ped Corridor culvert. The subrecipient would also be required to comply with the local Wetland Conservation Ordinance (Article VII § 490-706) to address wetland impacts in both project areas.

Post-construction, the Proposed Action would have a minor long-term adverse effect from the permanent loss of wetlands. The Proposed Action would reduce road overtopping and potentially reduce the number of pollutants entering the wetlands. The improved flow capacity of the new culverts could reduce erosion of the road and trail embankments reducing sedimentation of the wetlands.

5.3 Biological Resources

5.3.1 Vegetation

The New Hampshire Natural Heritage Bureau (NHNHB) manages state-designated rare plants and natural communities under the Native Plant Protection Act of 1987 (RSA 217-A) (NHNHB 2020a). The NHNHB finds, tracks, and facilitates the protection of rare plants and exemplary natural communities in compliance with the law. Exemplary natural communities represent the best remaining examples of New Hampshire's biological diversity (NHNHB 2020c).

EO 13112, Invasive Species, requires federal agencies, to the extent practicable, to prevent the introduction of invasive species, provide for their control, and to minimize the economic, ecological, and human health effects that invasive species cause. Invasive species prefer disturbed habitats and generally possess high dispersal abilities, enabling them to outcompete native species. Invasive species are regulated by the state through Chapter Agr 3800 of the New Hampshire Administrative Code, which states “No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1, New Hampshire prohibited invasive species list.” The table identifies 27 invasive plant species that are prohibited in the state. The New Hampshire Department of Agriculture, Markets, and Food (NHDAMF) is the lead state agency responsible for the management of invasive plant species in accordance with state law.

In addition to invasive plant species, the USDA established quarantines for the invasive Emerald Ash Borer Beetle and the European Gypsy Moth, two species that cause damage to native trees within the area (USDA 2020).

5.3.1.1 Existing Conditions

Rockingham County has 1,261 species of known vascular plants (NHNHB 2020a). Within the Town of Salem, NHNHB identifies nine species of rare state-listed plants and two exemplary natural communities: dry Appalachian oak forest and Atlantic-white cedar, yellow birch, and pepperbush swamp (NHNHB 2020b). On June 15, 2020, NHNHB indicated that there are no rare state-listed plants or exemplary natural communities in the project areas and the drainage basin; therefore, these will not be analyzed in this section (NHNHB 2020b).

Rockingham County could contain all 27 invasive plant species that are prohibited by state law (NHDAMF 2011). Of the 27, the University of New Hampshire and the NHADMF identified three species that should be prioritized for management in the Town of Salem. These include blunt-leaved privet (*Ligustrum obtusifolium*), Dame's rocket (*Hesperis matronalis*), and garlic mustard (*Alliaria petiolata*) (NHDAMF 2013). These invasive species are spread by birds, animals, floodwaters, and human transport (NHDAMF 2011). Rockingham County is in a USDA quarantine zone for the Emerald Ash Borer Beetle and the European Gypsy Moth.

5.3.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, vegetation would not be disturbed by construction activities within the project areas. Recurring flooding caused by the restriction at the culverts would inundate vegetation in the area, causing a minor short-term adverse effect to non-wetland species. Continued flooding of the drainage basin could spread invasive plant species that are prohibited under state regulation by flooding areas beyond the streambed where they are located. Floods could potentially flush seeds and plants out of areas where they are established into the floodwaters, which could result in the spread of these species into new areas downstream. Flooding may also impact trees that might contain USDA-quarantined species, which could spread if the trees are damaged during a flood event. The insects could spread if snags and loose woody debris are carried to new areas by floodwaters because the movement of wood is the largest factor in the spread of Emerald Ash Borer Beetle and one of the factors in the spread of the European Gypsy Moth. The spread of plant and insect invasive species would likely be localized, causing a negligible long-term adverse effect.

Proposed Action

Construction would remove some vegetation within the project areas of both culverts and along the realigned stream channel. The subrecipient would be required to comply with NHDAMF invasive plant removal guidelines if state-regulated invasive plant species are encountered in accordance with Chapter Agr 3800 of the New Hampshire Code of Administrative Rules (NHDAMF 2020). Removal of invasive vegetation would have a minor short-term beneficial effect by minimizing their spread during the construction period. Tree removal is not expected to occur in the project areas; therefore, there would be no effect on the spread of Emerald Ash Borer Beetle and the European Gypsy Moth.

Post-construction, flooding would still occur during storm events; however, the larger culverts and the realigned channel would increase flow capacity and reduce the amount of water that backs upstream of the culverts (Town of Salem 2017). Flooding could still spread invasive species, and dispersal patterns could be affected by changes in the flood elevations (see Section 5.2.2). The Proposed Action would have a negligible long-term beneficial effect if the flood pattern changes because the changed dispersal may not reduce spread, but the removal of invasive species in the construction phase would reduce the number of species within flooded areas. Native vegetation would be planted, where possible, once construction is complete.

5.3.2 Wildlife and Fish

The New Hampshire Fish and Game Department (NHFG) conserves, manages, and protects wildlife and fish species within the state through the Wildlife Action Plan (WAP) (NHFG 2015). The WAP, approved

by the USFWS and last updated in 2015, provides a blueprint for conserving Species of Greatest Conservation Need (SGCN) and their habitats within the state. The plan identifies 169 SGCN and focuses on 27 habitats in the state that support these species. Each SGCN and habitat has an individual profile that includes information about the population, threats, and actions needed to conserve these features within the state (NHFG 2015).

The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" Bald and Golden Eagles, including their parts, nests, or eggs. Like the MBTA, the law makes it illegal for anyone to "take," possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, feathers, nests, or eggs. "Take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities. Golden Eagle is not applicable in New England.

A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. The Migratory Bird Treaty Act provides a program for the conservation of migratory birds that fly through lands of the United States. The lead Federal agency for implementing the Migratory Bird Treaty Act is the USFWS. The law makes it unlawful at any time, by any means or in any manner to take any part, nest, or egg of migratory birds. "Take" is defined in regulation (50 C.F.R. 10.12) as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.

The Emerald ash borer and the European gypsy moth, invasive insect species that are present in the Town of Salem, are evaluated in Section 5.3.1 Vegetation.

5.3.2.1 Existing Conditions

The Town of Salem contains 60 SGCN and 12 supporting habitat types as identified in the WAP (NHFG 2015). The drainage basin contains nine of the NHFG-classified habitat types and all 60 SGCN (see **Appendix A, Figure 11** for Habitat Map). Of the 60 SGCN that could be found in the Town of Salem, 11 are reptiles and amphibians, 8 are fish and mussels, 26 are birds, 5 are insects and 10 are mammals (NHFG 2015). Within the project areas, there are two NHFG-classified habitat types: "developed impervious" and "marsh and shrub wetland." These two habitat types could provide habitat for 24 of the 60 SGCN species (NHFG 2015). Some of the habitat within the drainage basin is set aside as state- or town-owned conservation land. The conservation land includes the town-owned Old Post Office Wetland conservation area north and adjacent to the Main Street culvert project area (see **Appendix A, Figure 12**).

The USFWS Information for Planning and Consultation (IPaC) system reported that Bald Eagles (*Haliaeetus leucocephalus*) could be present in the area but does not provide specific information on sightings or nests. NHNHB reported that there are no known occurrences for Bald Eagles within or near the project areas based on information maintained by the agency. The entire State of New Hampshire is located within the Atlantic Flyway and there may be occurrences of migratory bird species in the project areas, including the Rusty Blackbird (*Euphagus carolinus*) and the Wood Thrush (*Hylocichla mustelina*), species of conservation concern (USFWS 2020).

5.3.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, existing habitats would not be altered by construction activities. Overtopping and associated erosion and sedimentation within the project areas and drainage basin would continue to occur. This would have a minor short-term adverse effect on non-wetland species, including SGCN, as they would be temporarily displaced from the floodwaters. There would likely be no effect on wetland species during floods, as they have adapted to periodic wetland inundation. However, runoff, with nonpoint source pollutants that flush into wetlands during some overtopping events, could have a minor long-term adverse effect on some SGCN and other aquatic organisms that are sensitive to pollutants, particularly chloride (see Section 5.2.1). In the long-term, habitat conditions would also be degraded by the presence of invasive vegetation, potential blockage of the undersized culverts preventing fish passage, and proximity of the habitats to roads and commercial development.

There would be no effect on Bald Eagles because there are no known occurrences in the area and there would be no impact on existing trees.

Migratory terrestrial birds would experience a minor short-term adverse effect from floods as they move away from the disturbed area, but they would likely return once floodwaters recede; therefore, there would be no long-term effect. Migratory waterfowl might experience short-term beneficial effects if shallow floodwaters allow access to new areas.

Proposed Action

Construction activities for the Proposed Action would include dredging and excavation of streams and wetlands, including those in the Old Post Office wetland conservation area, and the realignment of the stream channel south of the Main Street culvert. Construction activities would also generate additional noise in areas away from the roads and would require temporary dewatering. Temporary dewatering could potentially take species and temporarily block stream migration for fish. Because of the ground disturbance, noise, and dewatering, it is likely that wildlife in the project areas, including SGCN, would be temporarily displaced during construction, resulting in a minor short-term adverse effect on these species. Once construction is complete, most wildlife species would migrate back to the area. However, some species may be permanently affected by wetland removal and dewatering during construction.

The subrecipient would be required to adhere to the BMPs and conditions specified in the permit approvals during all phases of construction to reduce temporary and permanent effects on wildlife and wetland habitat (see Section 5.2.1 and 5.2.3). The subrecipient would also be required to coordinate with the Town of Salem Conservation Commission prior to construction activity to determine permitting requirements for project effects on the Old Post Office Wetland conservation area pursuant to the Town of Salem Wetlands Conservation Ordinance (Article VII § 490-706). Where vegetation removal occurs, any invasive species present would be removed and replaced with native vegetation in accordance with state law (See Section 5.3.1.2).

Post-construction, flooding would continue within the wetland habitats, though flood patterns may be different (see Section 5.2.2), causing recurring temporary movements of non-wetland wildlife species similar to the No Action Alternative. The Proposed Action would remove some wetland habitat with the installation of headwalls, riprap, and culverts. Permanent wetland habitat loss would include 9,000 square

feet of wetlands at the Main Street Culvert and 800 square feet at the Salem Bike-Ped Corridor culvert (See Section 5.2.2). Reduction of road overtopping may reduce concentrated flushes of nonpoint source pollutants that enter wetlands and other habitats, providing a healthier habitat for species sensitive to pollutants, particularly to chloride. The larger culverts would likely reduce debris blockage and provide a larger passage for fish. Therefore, there would be a minor long-term beneficial effect on wildlife and fish, including SGCN, from reduced flushes of nonpoint source pollution and improved habitat conditions and a negligible long-term adverse effect from permanent wetland habitat loss (see Section 5.2.3).

There are no known Bald Eagle occurrences or nests in or near the project areas or in the drainage basin; thus, there would be no effect on Bald Eagles under the Proposed Action. If a Bald Eagle nest is discovered within 660 feet of construction activity, work must stop, and the subrecipient would be required to coordinate with FEMA and the USFWS New England Field Office to identify measures that avoid or minimize effects on the eagles.

Construction activities could result in a minor short-term adverse effect on migratory bird species protected by the MBTA if construction activity occurs during the breeding season. Vegetation removal and construction noise could result in the loss of nests, eggs, and young. However, because the habitats in the potential disturbance areas are degraded and already impacted by noise and activity from the arterial roadways, the potential for adverse impacts on MBTA species is low. If construction activity occurs outside the nesting season, there would be a negligible short-term adverse effect as birds temporarily migrate away from the construction activity and return afterward. The long-term effect on migratory birds would be similar to the effect described for SGCN and other wildlife. Migratory birds could still experience recurring, minor, short-term, adverse effects from floods, but they would likely return once floodwaters recede, resulting in no long-term effects.

5.3.3 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act (ESA) provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead Federal agency for implementing the ESA in Vermont is the United States Fish and Wildlife Service (USFWS). The law requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a “taking” of any listed species of endangered fish or wildlife. “Take” is defined in regulation (50 C.F.R. 10.12) as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.

NHFG manages conservation efforts for fish and wildlife that are listed as threatened and endangered under the New Hampshire Endangered Species Conservation Act (RSA 212-A:1 to 212-A:15). The law protects 55 threatened and endangered wildlife and fish species found in the state (NHFG 2020a). NHFG works in cooperation with the NHNHBB in maintaining information on these species (NHNHBB 2020a).

5.3.1.1 Existing Conditions

The IPaC system, accessed on July 12, 2020, reported one federally threatened species, the northern long-eared bat (*Myotis septentrionalis*) as potentially present in the general area. The species may be found underneath tree bark, in cavities, or within crevices of both live trees and snags in both project areas during the summer. The closest known hibernacula for the bat species is approximately 19 miles to the southeast

of the project areas (MDFW 2020). USFWS has not designated any critical habitat for the northern long-eared bat. Trees within the project areas are likely not suitable for northern long-eared bats because the trees are small and would lack cavities and crevices typically found on larger trees. There are suitable trees with cavities and crevices within the drainage basin that could potentially have bats.

On June 15, 2020, the NHHNB notified FEMA via email correspondence that there are known occurrences of the spotted turtle (*Clemmys guttata*), a state-listed threatened species, within the Town of Salem (NHHNB 2020b); however, there are no known occurrences within the project areas or the drainage basin. Spotted turtle habitat consists of wetlands with shallow, permanent water bodies and emergent vegetation (NHFG 2020b). Terrestrial habitat includes open meadows and fields that the species uses while searching for nesting sites. The project areas and drainage basin provide potentially suitable habitat for the spotted turtle.

5.3.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be a negligible effect on the northern long-eared bat because flooding would have a limited effect on roosting locations in trees, as floodwaters would not reach roosting spots. There could be a minor long-term adverse effect on the spotted turtle because nests could be disturbed by floods during the June and July nesting period. This adverse effect would only occur if spotted turtles attempt to nest in the drainage basin.

Proposed Action

FEMA determined there would be no effect on the northern long-eared bat under the Proposed Action because there would be no tree removal in either project area. Both construction of the project and post-project conditions would have no effect on the bats, and consultation with USFWS is not required.

The documented occurrences of the spotted turtle are outside of the project areas and drainage basin and no effect is anticipated to this species under the Proposed Action. The Proposed Action would restore some natural wetland habitat through native plantings, which could provide additional habitat for the spotted turtle. Habitat restoration could provide a minor long-term beneficial effect on the species in the project areas.

The New Hampshire Code of Administrative Rules Sections Env-Wt 316.05 and Env-Wt 311.01 require the subrecipient to coordinate with the NHFG on effects to rare and protected species and exemplary natural communities, including the spotted turtle, when seeking a permit under Section 401 of the CWA (See Section 5.2.1). NHDES will not issue a permit approval until NHFG has reviewed and commented on a project application for work where state-listed species may be present. The subrecipient would be required to follow all conditions placed within the NHDES permit as a result of their coordination with NHFG.

5.4 Cultural Resources

Federal agencies must consider the potential effects of their actions upon cultural resources prior to engaging in any undertaking. Cultural resources are defined as prehistoric and historic sites, structures, districts, buildings, objects, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Section 106 of the National Historic Preservation Act (NHPA) codifies this obligation and is implemented by regulation

in 36 C.F.R. Part 800. The NHPA defines a historic property as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register.” Eligibility criteria for listing a property on the National Register of Historic Places (NRHP) are found at 36 C.F.R. Part 60. While the definition of a cultural resource under NEPA can be broader, FEMA regularly uses Section 106 to meet its obligations to consider effects to cultural resources. For this project, FEMA determined that it was appropriate to utilize its NHPA review to fulfill its NEPA obligations.

Cultural resources determined to be potentially significant under NHPA are subject to a higher level of review and federal agencies must consider the effects of their projects on those resources and consider steps to avoid, minimize, or mitigate those effects. To be considered significant, a cultural resource must meet one or more of the criteria established by the National Park Service (NPS) that would make that resource eligible for inclusion in the NRHP. The term “eligible for inclusion in the NRHP” includes all properties that meet the NRHP listing criteria, which are specified in the Department of Interior regulations Title 36, Part 60.4 and NRHP Bulletin 15. Properties and sites that have not been evaluated at the time of the undertaking may be considered potentially eligible for inclusion in the NRHP and, as such, are afforded the same regulatory consideration as nominated properties.

5.4.1 Identification of APE, Cultural Resources, and Consultation Process

FEMA considered effects to cultural resources within the Area of Potential Effect (APE) identified during the Section 106 process. Pursuant to 36 CFR 800.4(a)(1), the APE is defined as the geographic area(s) within which the undertaking may directly or indirectly affect cultural resources. For this undertaking, the APE includes two separate areas of work, which are comprised of the limits of ground disturbance, staging areas, and a 30 to 40-foot buffer around the limits of ground disturbance to account for the movement of heavy equipment around each site.

The New Hampshire Department of Historic Resources (NHDHR) maintains a database of cultural resources called the Enhanced Mapping & Management Information Tool (EMMIT), which includes known archaeological sites, prior surveys, and historic properties (NHDHR 2020b). FEMA reviewed EMMIT and the National Register of Historic Places (NRHP) to determine if there were previously identified cultural resources within the area of effect for this undertaking (NPS 2020). The research identified one cultural resource (a historic standing structure) within the area of effect, the Manchester & Lawrence Railroad Historic District (NRHP – Determination of Eligibility, ID# ZMT-MLRR).

FEMA made a finding of “Adverse Effect to Historic Properties” and proposed to use the abbreviated consultation process outlined in Stipulation II.C.6 of the *Programmatic Agreement Among the Federal Emergency Management Agency, the New Hampshire State Historic Preservation Officer, and New Hampshire Homeland Security & Emergency Management*, including the use of Standard Treatment Measure C (Public Interpretation) to mitigate the undertaking’s adverse effect in letters sent to the NHDHR, Advisory Council on Historic Preservation (ACHP), Penobscot Nation, Aroostook Band of Micmacs, Mashpee Wampanoag Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and the Boston & Maine Railroad Historical Society on September 2, 2020, and the Town of Salem Historic District Commission and the Salem Historical Society on September 3, 2020 (ACHP 2020, FEMA 2019, 2020a, 2020b, 2020c, 2020d, 2020e, 2020g, 2020h, 2020j, 2020k). NHDHR concurred with this finding and proposal on September 3, 2020, and ACHP concurred on September 22, 2020 (ACHP 2020, NHDHR 2020b).

On October 8, 2020, FEMA sent a formal proposal to resolve Adverse Effects to the Manchester & Lawrence Railroad Historic District using Standard Treatment Measure C (Public Interpretation) to HSEM and the Town of Salem (FEMA 2020f, 2020i). FEMA received HSEM's concurrence on October 8, 2020 (HSEM 2020). Concurrence from the Town of Salem is currently pending; however, concurrence is anticipated.

5.4.2 Historic (Standing) Structures

5.4.2.1 Existing Conditions

The Manchester & Lawrence Railroad Historic District, determined eligible for listing on the NRHP and the State Register in 2009, was affirmed to retain its historic status. The granite culvert to be replaced as part of the undertaking (also known as the Salem Bike-Ped Corridor Culvert), a contributing element to the historic district, was also affirmed to retain its historic status.

The 22.29-mile New Hampshire portion of the Manchester & Lawrence Railroad was chartered in 1847, beginning passenger travel in 1849 and freight service in 1850. The line's original stations were located in Salem, Windham, Derry, Londonderry, and Manchester. Construction required many cuts through granite ledges and extensive land filling, and locally obtained granite was used for the line's built features, including culverts and bridges, which gave the corridor a uniform appearance. Several notable local companies and industries utilized the line to ship goods, including several in Salem Village.

In 1856, the line was leased to the Concord Railroad (an early competitor), and later purchased by the Boston & Maine Railroad in 1887. The former line never became an important link in the new, larger system. In 1906, a spur was installed to allow access to a new horse racing track at Rockingham Fair (later Rockingham Park, the former site is located adjacent to the project area). Beginning in the 1920s and 1930s, rail traffic steadily declined in favor of motor buses. In the late 1930s, passenger transit consisted of a single roundtrip each day, with passenger service ending in 1953. Trains to Rockingham Park were discontinued in 1962, and freight service ceased in 1980. The line was slowly abandoned and removed in the succeeding years. More recently, a 4.1-mile section of the line has been developed into a paved recreational path by the Windham Rail Trail Alliance.

5.4.2.2 Potential Effects and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative there is the chance that cultural resources within the vicinity could be adversely affected by continued flooding, including the potential of structural damage to the culvert and trail. Effects would be **minor**.

Alternative 2: Proposed Action

Under the Proposed Action Alternative, the Salem Bike-Ped Corridor Culvert would be demolished and replaced, resulting in an adverse effect to the Manchester & Lawrence Railroad Historic District. For a historic resource to be able to convey its significance, it must retain its integrity. Integrity is comprised of seven components – location, design, setting, materials, workmanship, feeling, and association. Demolition and replacement of the culvert would diminish the historic district's integrity of design, materials, and workmanship. Loss of the culvert and the subsequent diminishment of its integrity would impact the historic district's ability to convey its significance, resulting in an adverse effect under the NHPA. FEMA has

proposed to mitigate this adverse effect through the implementation of a Public Interpretation Standard Treatment Measure, which would most likely take the form of an interpretive panel. Planning, design, and implementation of the Standard Treatment Measure would occur after the proposal is agreed to by all parties and the project is awarded by FEMA.

Effects would be moderate, but conditional on the completion of Standard Treatment Measure C (Public Interpretation).

5.4.3 Archaeological Resources

5.4.3.1 Existing Conditions

No previously identified prehistoric or historic resources were located within the APE for this project. Based on the lack of previously recorded archaeological sites, previous ground disturbance within the APE, and the heavily developed surrounding area, FEMA determined it unlikely that any intact, undisturbed soils are located within the APE and therefore it is unlikely that there are any potential archaeological resources within the APE. Based on previous disturbance, FEMA did not believe any additional identification efforts were needed for the undertaking, to which NHDHR concurred in their September 3, 2020 letter.

5.4.3.2 Potential Effects and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative there is a negligible chance that archaeological resources within the vicinity could be affected by continued flooding. Effects would be none/negligible.

Alternative 2: Proposed Action

Under the Proposed Action Alternative, given existing conditions and the scope of the proposed action, effects to archaeological resources would be none/negligible. Although it is unlikely that any potential archaeological resources are located within the APE, NHDHR concurred in their September 3, 2020 letter with FEMA's recommendation to place conditions on the project to address the potential for inadvertent discoveries.

5.5 Socioeconomic Resources

5.5.1 Land Use and Planning

5.5.1.1 Existing Conditions

Existing land use in the Main Street culvert project area consists of commercial uses, including a pharmacy and two local restaurants. The Main Street culvert project area and adjacent properties are all zoned as CI-C (Commercial-Industrial District, Subdistrict C) (Town of Salem 2019a).

The Salem Bike-Ped Corridor culvert project area is currently vacant but is surrounded by commercial land uses to the north and east. The Salem Bike-Ped Corridor is a recreational path for pedestrians and bicyclists (transportation use) that passes through the project area. The Salem Bike-Ped Corridor culvert project area is also zoned CI-C (Town of Salem 2019a). The former Rockingham Park Racetrack is adjacent to and west of this project area. The former racetrack is a 170-acre vacant property, also zoned CI-C, that is currently being redeveloped into a mixed-use commercial and residential development named Tuscan Village (Town of Salem 2019b).

The 864-acre drainage basin comprises six different zoning districts: the CI-C zoning district, two other commercial districts, two residential districts, and a “Town Center” district for municipal government services.

5.5.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, flooding would continue in both project areas. The recurring flooding would have no short- or long-term effect on zoning or land use plans. However, the No Action Alternative could have a minor long-term adverse effect on existing residential land uses because three mobile home parks in the drainage basin (shown in **Appendix A, Figure 3**) would be at continued risk from recurring flooding and the potential displacement of residents.

Proposed Action

Under the Proposed Action, there would be no short-term adverse effect on existing land uses or zoning during construction because construction activities would be confined to within the project area boundaries. The Proposed Action would also have no long-term adverse effect on zoning and land use plans in the project areas, including the redevelopment of the former Rockingham Park Racetrack. There would be no effect on land use downstream because there would be no increase in downstream flooding under the Proposed Action (see Section 5.2.2, Floodplains). The Proposed Action would have a moderate long-term beneficial effect on existing land use in the drainage basin by reducing the flood risk potential and reducing the potential for displacement of residents and businesses.

5.5.2 Noise

EPA developed federal noise-emission standards in accordance with the Noise Control Act of 1972 (42 U.S.C. §4901 et seq.). The EPA identified major sources of noise and determined appropriate noise levels for activities that would infringe on public health and welfare in accordance with the law. The “Levels Document” is the standard reference in the field of environmental noise assessment. EPA identifies a 24-hour exposure level of 70 decibels as the level of environmental noise that would prevent any measurable hearing loss over a lifetime (EPA 1974). Noise levels of 55 decibels outdoors and 45 decibels indoors are identified as “preventing activity interference and annoyance” (EPA 1974). Areas of frequent human use that would benefit from a lowered noise levels are identified as sensitive receptors: typical sensitive receptors include residences, schools, churches, hospitals, nursing homes, and libraries. The Federal Highway Administration (FHWA) established acceptable noise levels and ranges for construction equipment (FHWA 2006). The Occupational Safety and Health Administration (OSHA) also established thresholds for occupational noise exposure to protect the health and safety of workers (29 C.F.R. 1926.52).

5.5.2.1 Existing Conditions

The project areas are located within commercial districts on major roads through the town (Main Street and South Broadway). Noises in the project areas are consistent with urban sounds (e.g., traffic, operation of businesses). The closest sensitive receptor to the Main Street culvert is a neighborhood consisting of single-family homes approximately 400 feet northeast. The closest sensitive receptor to the Salem Bike-Ped Corridor culvert is a residential neighborhood approximately 300 feet southeast.

5.5.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activity, and no noise generated from construction equipment and vehicles. However, noise levels could occasionally increase from vehicles and equipment used for emergency repairs following flood events but would remain under EPA, FHWA, and OSHA standards. The repair activities would result in minor, recurring, short-term adverse effects on noise levels.

Proposed Action

Under the Proposed Action, construction activities would temporarily increase noise levels in the project areas but are not expected to exceed regulatory thresholds established by FHWA and OSHA. Construction activities would remain under EPA, FHWA, and OSHA standards. Adherence with these standards would minimize sound exposure and ensure noise levels would not cause impairment and permanent damage for workers. Sensitive receptors are a considerable distance from each project area and noise impacts would be somewhat attenuated before reaching residences. This would result in a minor short-term adverse effect on noise levels during the construction period. Post construction, noise levels would return to preconstruction levels and reduce the possibility of emergency repair noise. Therefore, the Proposed Action would have a negligible long-term beneficial effect.

5.5.3 Transportation

5.5.3.1 Existing Conditions

Main Street is classified by the New Hampshire Department of Transportation as a minor arterial roadway and had an annual average daily traffic of 11,212 vehicles in 2019. South Broadway is classified as a principal arterial roadway with an annual average daily traffic of 19,042 vehicles in 2019 (NHDOT 2019) (see **Appendix A, Figure 16**).

The Greater Derry-Salem Cooperative Alliance for Regional Transportation provides transit service to the Town of Salem (CART 2020). Transit service consists of weekday on-demand shuttle service and a Monday, Wednesday, and Friday fixed bus route between 9:15 AM to 12:45 PM, known as the “Salem Shopping Shuttle.” The Salem Shopping Shuttle runs along South Broadway for part of its route.

Pedestrian facilities in the Main Street culvert project area consist of sidewalks on both sides of the road. The Salem Bike-Ped Corridor itself is a multiuse bicycle and pedestrian path that runs from the Salem town line on the north, through the project area adjacent to South Broadway, until it reaches the City of Methuen, Massachusetts to the south.

5.5.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, overtopping of Main Street and South Broadway would continue during flood events, hindering the mobility of vehicles, transit, pedestrians, and bicyclists using the roads. Overtopping could damage the roads leading to continued short-term closures for flood-related repairs. Flood events also have the potential to make the Salem Bike-Ped Corridor impassable for bicyclists and pedestrians because of flooding or flood-related repairs. Therefore, the No Action Alternative would have

a minor long-term adverse effect on transportation facilities in the project area through recurring short-duration flood events that affect Main Street, South Broadway, the Salem Bike-Ped Corridor, Salem Shopping Shuttle, and the sidewalks in the Main Street culvert project area.

Proposed Action

Under the Proposed Action, Main Street would likely require a temporary lane closure during culvert construction, resulting in a minor short-term adverse effect on traffic and transportation. The Proposed Action would have a negligible short-term adverse effect on South Broadway during construction as no lane closures are anticipated, but the construction work on the adjacent trail culvert might distract drivers.

Post-construction, the Proposed Action would reduce the overtopping of Main Street and South Broadway, which would reduce the potential for closures of the road, bicycle, and pedestrian facilities in the project areas. There would be a minor long-term beneficial effect from the reduction in road closures caused by flooding and flood-related repairs.

5.5.4 Public Services and Utilities

5.5.4.1 Existing Conditions

Electrical utilities in the project areas are provided by Liberty Utilities (NHPUC 2020). Electricity is delivered to the project area via elevated power lines. Natural gas service is provided by Unitil (NHPUC 2020). The wastewater and stormwater systems in the project areas are operated and maintained by the Town of Salem (Town of Salem 2020a). The water system in the project areas is operated and maintained by the Pennichuck Water Works, Inc. (NHPUC 2020).

Existing stormwater infrastructure in the Main Street culvert project area includes two stormwater lines, running east-west along Main Street, with outlets at the mouth of the Main Street culvert. A third stormwater line runs along 142 Main Street and connects to the existing culvert underground. Existing stormwater infrastructure in the vicinity of the Salem Bike-Ped Corridor culvert project area consists of a stormwater line running northwest to southeast along South Broadway, discharging at the inlet of the South Broadway culvert.

Both project areas are served by the Salem School District (Town of Salem 2020b). Schools in the vicinity of the project areas are shown in **Appendix A, Figure 16**. Salem High School is located about 0.5 miles east of the Main Street culvert project area at 206 Main Street. The Woodbury Middle school is located approximately 0.75 miles southeast of the Main Street culvert project area at 44 Geremonty Drive. Lancaster Elementary School is located approximately 0.4 miles north of the Main Street culvert project area at 54 Millville Street.

5.5.4.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, the existing culverts would not be replaced. Flood events could lead to sewage backups resulting in interior flooding of buildings, as occurred in April 2018 (NBC 2018). Therefore, the No Action Alternative would have a minor, recurring, short-term adverse effect on sewer utilities because they could occasionally become surcharged during floods. The electrical utility infrastructure in the project area is elevated and thus is not susceptible to flooding and not likely to be damaged. Flooding would also be unlikely to affect other buried utilities, such as natural gas and water

supply. Therefore, there would be no long-term adverse effect on electric, gas, or water supply utilities under the No Action Alternative.

Flood events could also result in the closure of Main street as a result of overtopping or flood-related repairs. These flood events and resulting road closures have the potential to limit access to schools if Main Street requires emergency repairs, causing a minor, recurring, short-term adverse effect on school access.

Proposed Action

Under the Proposed Action, the undersized culverts would be replaced. The newly installed culverts would reduce the risk of flooding and overtopping of Main Street, South Broadway, and the Salem Bike-Ped Corridor. Construction would have no effect on electrical, gas, sewer, or stormwater utilities. The reduction in overtopping would result in a minor long-term beneficial effect on sewer and stormwater systems because the reduction in flooding would mitigate against sewer backups.

The Proposed Action would temporarily close a roadway lane on Main Street while the Main Street culvert is being constructed. Because of the lane closure, there could be a minor short-term adverse effect on school access if the culvert is constructed at a time that school is in session. There would be a minor long-term beneficial effect on school access from the reduction in road closures caused by flooding and flood-related repairs.

5.5.5 Public Health and Safety

5.5.5.1 Existing Conditions

Police and fire stations in the vicinity of the project areas and drainage basin are shown in **Appendix A, Figure 16**. Both project areas are within the Salem Police Department coverage area. The Salem Police Department station is located approximately 0.5 miles southeast of the Salem Bike-Ped Corridor culvert at 9 Veterans Memorial Parkway. The Salem Fire Department provides emergency services and fire protection to the town. The closest fire station is located at 152 Main Street, approximately 300 feet east of the Main Street culvert project area.

The project areas are served by three general hospitals — Holy Family Hospital approximately 4.5 miles to the southeast (at 70 East Street in Methuen, Massachusetts), Lawrence General Hospital approximately 6 miles to the southeast (at 1 General Street in Lawrence, Massachusetts), and Parkland Medical Center approximately 8 miles to the northwest (at 1 Parkland Drive in Derry, New Hampshire) (Town of Salem 2020c). Access from all three hospitals to the project areas would likely require travel along South Broadway or Main Street for portions of the journey.

5.5.5.2 Potential Effects and Proposed Mitigation

No Action Alternative

There would be no construction activity under the No Action Alternative and, therefore no effect on emergency response from construction-related detours or lane closures. Emergency response times could be adversely affected during flood events that overtop the arterials preventing emergency vehicle access, particularly for the town fire station located at 152 Main Street near the existing Main Street culvert. There would be a minor, recurring, short-term adverse effect on emergency response from road closures caused by overtopping and repairs.

Proposed Action

The Proposed Action would temporarily close a lane while the Main Street culvert is being constructed. Because of the lane closure, there could be a minor short-term adverse effect on emergency response times while the culvert is being constructed. There would be no short-term adverse effect on South Broadway because the construction of the Salem Bike-Ped Corridor culvert would not require lane closures.

Post-construction, there would be a minor long-term beneficial effect on emergency services, particularly for the town fire station near the Main Street culvert, because road closures on Main Street and South Broadway would be reduced or eliminated.

5.5.6 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority or low-income populations. The EPA Environmental Justice Screening and Mapping Tool (EJ Screen) was used to evaluate the demographic characteristics of the project areas and drainage basin. The EJ Screen analysis is based on the U.S. Census Bureau 2013–2017 American Community Survey 5-year summary data at the Census Block Group level (EPA 2020c).

Minority or low-income populations are defined as meeting either or both of the following criteria:

- Census tract contains 50 percent or more minority persons or 25 percent or more low-income persons
- Percentage of minority or low-income persons in any census tract is more than 10-percent greater than the average of the surrounding county

5.5.6.1 Existing Conditions

The project areas and drainage basin intersect five Census Block Groups (**Appendix A, Figure 17**) (EPA 2020c). The Main Street culvert project area is in Census Block Group 330151004003 and 330151002004. The Salem Bike-Ped Corridor culvert project area is in Census Block Groups 330151004003 and 330151003012. The drainage basin is in Census Block Groups 330151002001, 330151002002, 330151004003, and 330151002004.

Summary demographic characteristics for the census Block Groups are provided in **Table 5-4**. One Block Group (ID# 330151003012) has a greater percentage of minorities when compared to the county (7 percent) and state average (9 percent). Three Block Groups (ID# 330151002001, 330151004003, and 330151002004) have a greater percentage of low-income residents when compared to the county average (14 percent). None of the Block Groups meet the criteria for an environmental justice population. Two neighborhoods that would qualify as low-income (based on information provided by the subrecipient) are in the 864-acre drainage basin and experience flood-related damages (see **Appendix A, Figure 3**). These neighborhoods are in census Block Group 330151004003, which also includes the construction areas for both project areas.

Table 5-4: Summary Demographic Characteristics of the Census Block Groups

Census Block Group	Total Population	Percent Minority (%)	Percent Low-Income (%)
330151002001	3,151	7	16
330151002002	1,768	3	6
330151004003	1,362	4	1
330151002004	1,316	3	20
330151003012	563	13	12
Total	8,160	5 (441)	14 (1,159)
Rockingham County	302,479	7	14
State of New Hampshire	1,331,848	9	21

Source: EPA 2020c

5.5.6.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, continued flooding would have the potential to flood the drainage basin, including the two low-income neighborhoods identified by the town in Block Group # 330151004003. Repeated flood events have the potential to damage homes and permanently displace residents from these neighborhoods, resulting in a moderate, recurring, long-term adverse effect. These neighborhoods are more susceptible to flood events than other neighborhoods in the project areas based on information provided by the subrecipient (see **Appendix A, Figure 3**). The effect of the No Action Alternative would be disproportionate and adverse to these low-income neighborhoods.

Proposed Action

Under the Proposed Action, the newly installed culverts would reduce the risk of flooding on residential neighborhoods and commercial properties in the drainage basin. There would be no short- or long-term adverse effects on low-income neighborhoods in Block Group 330151004003 (where the project areas are located) from potential traffic delays caused by construction, as there is no construction planned on South Broadway. There would be a moderate long-term beneficial effect on low-income neighborhoods, particularly in Block Group 330151004003, from the reduction or elimination of flooding and potential displacement of residents (see **Appendix A, Figure 3**). The effect of the Proposed Action would not be disproportionate and adverse.

5.5.7 Hazardous Materials

Hazardous materials and wastes are regulated under a variety of federal and state laws, including 40 C.F.R. 260, the Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. 6901 et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. 9601 et seq.), Solid Waste Act, the Toxic Substances Control Act, and the CAA of 1970 (42 U.S.C. 7401 et seq.). OSHA standards under the Occupational Safety and Health Act seek to minimize adverse impacts on worker health and safety (29 C.F.R. 1926). Evaluations of hazardous substances and wastes must consider whether any hazardous material would be generated by the proposed activity and/or already exists at or in the general vicinity of the site (40 C.F.R. 312.10). If hazardous materials are discovered, they must be handled by properly permitted entities per statutes listed in RSA 147-A, Hazardous Waste Management.

5.5.7.1 Existing Conditions

A 0.5-mile radius search of both project areas and drainage basin was completed using the NHDES One-Stop Data Mapper (NHDES 2020b). The search identified three facilities regulated by RCRA within the Main Street culvert project area, and none in the Salem Bike-Ped Corridor culvert project area. In addition to the sites regulated by RCRA, the NHDES search identified 50 open and closed remediation site cases within 0.5 miles of the Main Street culvert project area and 25 sites within 0.5 miles of the Salem Bike-Ped Corridor culvert project area. These sites include leaking underground storage tanks, on-premise-use fuel oil storage tanks, underground injection control wells, asbestos, and sites with nonpetroleum-related contamination (i.e., chlorinated solvents). There was one leaking underground storage tank case (Site Number 198908034) at the former “Salem Building Supply” located at 142-144 Main Street within the Main Street culvert project area. The NHDES lists the case status as closed on August 25, 1994 (NHDES 2020b). The site was remediated and is no longer a danger to the environment. No remediation sites were identified in the Salem Bike-Ped Corridor culvert project area.

5.5.7.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action Alternative, there would be no construction activities that would require storage or use of hazardous waste. The undersized culverts would remain, and storm events could lead to flooding in the project areas. Floodwaters could enter buildings, potentially spreading hazardous waste regulated under RCRA to areas outside of the buildings. Floodwaters also have the potential to spread contaminated materials from one of the nearby remediation sites. Therefore, there would be a moderate adverse effect as hazardous materials would have the potential to be introduced into the environment.

Proposed Action

Under the Proposed Action, construction activities could require the temporary storage and generation of hazardous materials or waste in both project areas. The subrecipient would be required to adhere to the BMPs and conditions specified in the CWA Section 401 and 404 permit approvals during all phases of construction to prevent the accidental release of hazardous waste (see Section 5.2.1). FEMA would also condition the grant so that any hazardous or contaminated materials discovered, generated, or used during project implementation would be disposed of and handled by the subrecipient in accordance with applicable federal, state, and local regulations.

Adherence to the BMPs would reduce short-term adverse effects from construction activity to a negligible level. There would be a negligible long-term beneficial effect because the Proposed Action would reduce the use of construction equipment needed for flood-related road repairs that could generate spills of lubricants and fuels. There would also be a reduction in the potential flooding of facilities regulated by RCRA and remediation sites in the drainage basin.

5.6 Cumulative Effects

This EA considers the overall cumulative impact of the Proposed Action and other actions that are related in terms of time or proximity. While consideration of cumulative effects are no longer required under regulation as of September 14, 2020, the cumulative effects text is retained in this document for the added unique perspective provided. Cumulative effects represent 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 effects can result from individually minor but collectively significant actions taking place over a period of time” (40 C.F.R. 1508.7 pre-2020). In the context of evaluating the scope of a proposed action, direct, indirect, and cumulative effects must be considered.

In addition to NEPA, other statutes require federal agencies to consider cumulative effects. These include the Clean Water Act Section 404(b)(1) guidelines, the regulations implementing the conformity provisions of the CAA, the regulations implementing Section 106 of the NHPA, and the regulations implementing Section 7 of the ESA.

The Proposed Action is part of an ongoing effort throughout the Policy-Porcupine Brook watershed to enlarge water crossings to pass the 50-year flood event and provide additional floodplain storage. The additional water crossings that were completed are described below and shown in **Figure 18 in Appendix A**.

- **Pleasant Street** – Completed in October of 2017, this project replaced an undersized 48-inch culvert with a larger concrete box culvert. The crossing is situated on Pleasant Street over the West Channel of Policy Brook (Town of Salem 2017).
- **Tuscan Village Floodplain Improvements** – Floodplain improvements were completed as part of a single large floodplain development project completed in 2019 by the Tuscan Village development. This project involves the realignment and redevelopment of up to approximately 135,000 square feet of wetlands and Policy Brook. This project modified the creek alignment into a curved pattern to slow down floodwaters and excavated and replanted wetlands around the banks. The Town of Salem also removed the culvert along South Broadway and replaced the old 48-inch culvert with a larger box culvert under Rockingham Park Boulevard (Town of Salem 2018).
- **South Broadway Roadway Culvert** – Completed in 2019, this project replaced the culvert directly to the east of the Salem Bike-Ped Corridor culvert beneath the road. The South Broadway culvert was replaced by a 5-foot by 12-foot precast concrete rigid frame box similar to what is proposed for the Salem Bike-Ped Corridor culvert. The box frame is approximately 76 feet long; see **Appendix B, Document 1**.
- **Cluff Crossing Road** – This project, completed in 2010, replaced the metal pipe arch structure with a precast concrete rigid frame structure. The project also involved a “full box” reconstruction of the adjacent roadway, including new pavement, drainage improvements, and guardrail replacement. The crossing is situated on Cluff Crossing Road between Kelly Road and Lancelot Court (Town of Salem 2009).

The projects were each designed as stand-alone improvements to reduce flooding within a defined area. However, the projects as a whole have cumulative effects on environmental resources throughout the Policy-Porcupine Brook watershed. Water quality, wetlands, floodplains, and wildlife and fish resources could be affected when considering all the projects as a whole. The two culverts included in the Proposed Action are at the upstream end of the suite of projects and are the final two projects proposed to address flooding issues in the watershed.

- **Water Quality** – Implementation of the Proposed Action would reduce soil erosion in the respective project areas. This would reduce the amount of sediment-laden runoff coming downstream in Policy Brook. The reduction in the roads overtopping up to the 50-year flood event would also reduce the amount of nonpoint source pollution entering and flowing downstream, including wetlands within the watershed. The projects that were constructed downstream would have no effect on water quality upstream in the Proposed Action project areas. Therefore, there would be a negligible long-term benefit to water quality throughout the Policy-Porcupine Brook watershed from the expected reduction in overtopping and erosion.
- **Floodplain** – Floodplain improvements and culverts were designed to reduce flooding in their localized areas up to the 50-year flood event. The South Broadway culvert is functionally dependent on the Salem Bike-Ped Corridor culvert to accommodate the 50-year flood event because of the proximity of the culverts to each other. The Proposed Action would otherwise have a negligible effect on how the floodwaters behave downstream. The downstream projects would reduce the backflow of floodwaters in their localized areas, resulting in a negligible beneficial effect at Pleasant Street, Tuscan Village, and Cluff Crossing Road where water crossing improvements were completed.
- **Wildlife and Fish** – The combination of enlarged culverts and naturalized areas of realigned stream channels throughout the Policy-Porcupine Brook watershed would provide better migration routes for fish and amphibian species, including SGCN species. Therefore, there would be a minor long-term benefit for wildlife and fish species in the watershed.

6.0 PERMITS AND PROJECT CONDITIONS

The subrecipient is responsible for obtaining all required federal, state, and local permits. While a good faith effort was made to identify all necessary permits for this EA, the following list may not include every approval or permit required for this project. Before, and no later than, submission of a project closeout package, the subrecipient shall provide FEMA with a copy of the required permit(s) from all pertinent regulatory agencies.

Additionally, FEMA would require the subrecipient to adhere to the following conditions during project implementation. Failure to comply with grant conditions may jeopardize federal funds.

1. Comply with the conditions of General Permit NAE-2018-02204 issued by the USACE for construction of the Salem Bike-Ped Corridor culvert under Section 404 of the Clean Water Act (CWA); obtain and comply with the conditions of the CWA 404 permit for construction of the Main Street culvert.
2. Comply with the conditions of the Wetlands and Non-Site Specific Permit No. 2018-01022 issued by the NHDES for construction of the Salem Bike-Ped Corridor culvert under Section 401 of the CWA; coordinate with NHDES to confirm the proposed water diversion structure for the Salem Bike-Ped corridor culvert is covered under Non-Site Specific Permit No. 2018-01022; and obtain and comply with the conditions of the CWA 401 permit for construction of the Main Street culvert.
3. Before construction begins, the subrecipient shall obtain a National Pollution Discharge Elimination System permit from the EPA under Section 402 of the CWA. The subrecipient must provide FEMA with a copy of the permit or documentation from the EPA that the permit is not required before, and no later than, submission of a project closeout package.
4. Obtain a local certificate that demonstrates no rise of base flood elevation anywhere within the community pursuant to 44 C.F.R. 60.3 and comply with Town of Salem Floodplain Development Ordinance (Article VII § 490-705) in accordance with 44 C.F.R. 9.11(d)(6).
5. Following construction of the Proposed Action, apply for a Letter of Map Revision (LOMR) in compliance with 44 C.F.R. 65.6.
6. Comply with the Town of Salem Wetlands Conservation Ordinance (Article VII § 490-706) for work within and adjacent to wetlands.
7. Manage any state-listed invasive plants using the NHDAMF “Control of Invasive Plants” guidelines in accordance with New Hampshire Code of Administrative Rules Chapter Agr 3800.
8. If a Bald Eagle nest is discovered within 660 feet of construction activity, work must stop, and the subrecipient must coordinate with FEMA and USFWS New England Field Office to avoid, minimize, or mitigate adverse effects.
9. Prior to project implementation, the subrecipient shall work with FEMA, NH HSEM, the SHPO and participating Tribe(s) to design an interpretive panel to educate the public on historic properties within the local community, state, or region. Once approved, the subrecipient shall be responsible for the manufacture, installation and maintenance of the panel.
10. In the event of the discovery of archaeological deposits (e.g., Native American pottery, stone tools, old house foundations, old bottles), the subrecipient and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The subrecipient shall secure all archaeological discoveries and restrict access to

discovery sites. The subrecipient shall immediately report the archaeological discovery to HSEM and FEMA.

11. In the event of the discovery of human remains, the subrecipient shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The subrecipient and their contractor shall secure all human remains discoveries and restrict access to discovery sites. The subrecipient and their contractor shall follow the provisions of applicable state laws and statutes, including New Hampshire Revised Statutes 227-C:8-a Discovery of Remains and Notification of Authorities. Violation of state law will jeopardize FEMA funding for this project. The subrecipient shall inform the Office of the Chief Medical Examiner, the State Archaeologist, HSEM, and FEMA. FEMA will consult with the SHPO and Tribes, if remains are of tribal origin. Work in sensitive areas may not resume until consultation is completed and appropriate measures are taken to ensure that the project is in compliance with the NHPA.
12. Adhere to the BMPs and conditions to prevent the accidental release of hazardous waste during construction in accordance with the permits issued for the project under Section 401 and 404 of the CWA. Any hazardous or contaminated materials discovered, generated, or used during project implementation must be disposed of and handled by the subrecipient in accordance with applicable federal, state, and local regulations.

7.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

The National Environmental Policy Act, implementing regulations, and FEMA procedures stress the importance of engagement with partner agencies, applicants, and the public to the extent practicable while preparing an environmental assessment. To solicit input on the project and its potential impacts, FEMA distributed an EA scoping checklist to the following agencies on June 29, 2020:

- U.S. Army Corps of Engineers, New England District
- U.S. Department of Housing and Urban Development, Region 1 Environmental Office
- U.S. Fish and Wildlife Service, New England Field Office
- New Hampshire Department of Environmental Services
- New Hampshire Department of Natural and Cultural Resources
- New Hampshire Division of Historical Resources
- New Hampshire Fish and Game Department
- New Hampshire Homeland Security and Emergency Management
- New Hampshire Office of Strategic Initiatives, Floodplain Management Program
- Rockingham County Conservation District

Following distribution of the scoping checklist, FEMA received correspondence from three state agencies. The correspondence is summarized in **Table 7-1**.

Table 7-1: Correspondence Summary

From	Date	Subject
NHNHB	June 15, 2020	Email from NHNHB regarding the search results for state-listed species in the project areas. The agency identified the spotted turtle as occurring in the Town of Salem.
NHDHR	July 5, 2020	Email from NHDHR regarding the development of mitigation measures for project effects on cultural resources.
OSI	July 13, 2020	Email from OSI regarding floodplain impacts and regulatory requirements pursuant to the Town of Salem floodplain development ordinance.

The draft EA was available for agency and public review and comment for a period of 30 days from January 15, 2021 to February 15, 2021. A public notice of the availability of the draft EA for review was published in the *Eagle Tribune* and on the Town of Salem website. A hard copy of the draft EA was available for review at the Engineering Department in Salem Town Hall located at 33 Geremonty Drive, Salem, NH 03079. An electronic copy was available for review on the town website at <https://www.townofsalemnh.org/engineering-projects>.

FEMA sent notification regarding the availability of the draft EA for review and comment to the following agencies:

- U.S. Army Corps of Engineers, New England District
- U.S. Department of Housing and Urban Development, Region 1 Environmental Office
- U.S. Fish and Wildlife Service, New England Field Office
- New Hampshire Department of Environmental Services
- New Hampshire Department of Natural and Cultural Resources
- New Hampshire Fish and Game Department
- New Hampshire Homeland Security and Emergency Management
- New Hampshire Office of Strategic Initiatives, Floodplain Management Program
- Rockingham County Conservation District

No substantive comments were received during the public review period and therefore the draft EA and FONSI will be adopted as final.

8.0 LIST OF PREPARERS

CDM Smith:

- Brandon Webb (Environmental Planner)
- Alex Kessel (Environmental Planner)
- Malena Foster (GIS)
- Alan Hachey (Environmental Task Leader)
- Kate Stenberg, PhD (Senior QA/QC review)

FEMA:

- David Robbins (Regional Environmental Officer)
- Mary Shanks (Deputy Regional Environmental Officer)
- Eric Kuns (Senior Environmental Specialist)
- Kim Demuro (Historic Preservation Specialist)
- Kathleen Philp (Historic Preservation Specialist)
- Tommy Kennedy (PDM Project Manager)
- Nulise Francois (HMA Specialist)

9.0 REFERENCES

- Advisory Council on Historic Preservation (ACHP). 2020. Letter from the Advisory Council on Historic Preservation to the Federal Emergency Management Agency, September 22, 2020.
- Council on Environmental Quality (CEQ). 2016. “Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews.” Accessed August 4, 2020, https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf.
- Environmental Protection Agency (EPA). 2020a. “EPA Green Book. Data current as of May 31, 2020.” Accessed June 30, 2020, <https://www3.epa.gov/airquality/greenbook/anc1.html>.
- _____. 2020b. “How’s My Waterway.” Accessed July 7, 2020, <https://mywaterway.epa.gov/>.
- _____. 2020c. “EJSCREEN EPA’s Environmental Justice Screening and Mapping Tool (Version 2019).” Accessed August 10, 2020, <https://ejscreen.epa.gov/mapper/>.
- _____. 2016. “Emissions Standards Reference Guide: All EPA Emissions Standards.” Accessed August 12, 2020, <https://www.epa.gov/emission-standards-reference-guide/all-epa-emission-standards>.
- _____. 1974. “EPA Identifies Noise Levels Affecting Health and Welfare.” Accessed July 29, 2020, <https://archive.epa.gov/epa/aboutepa/epa-identifies-noise-levels-affecting-health-and-welfare.html>.
- Federal Emergency Management Agency (FEMA). 2019. *Programmatic Agreement Among the Federal Emergency Management Agency, the New Hampshire State Historic Preservation Officer, and the New Hampshire Homeland Security & Emergency Management*.
- _____. 2020a. Letter from the Federal Emergency Management Agency to the Advisory Council on Historic Preservation, dated September 2, 2020.
- _____. 2020b. Letter from the Federal Emergency Management Agency to the Aroostook Band of Micmacs, dated September 2, 2020.
- _____. 2020c. Letter from the Federal Emergency Management Agency to the Boston & Maine Railroad Historical Society, dated September 2, 2020.
- _____. 2020d. Letter from the Federal Emergency Management Agency to the Mashpee Wampanoag Tribe, dated September 2, 2020.
- _____. 2020e. Letter from the Federal Emergency Management Agency to the New Hampshire Department of Historic Resources, dated September 2, 2020.
- _____. 2020f. Letter from the Federal Emergency Management Agency to the New Hampshire Department of Safety, Homeland Security and Emergency Management, dated October 8, 2020.
- _____. 2020g. Letter from the Federal Emergency Management Agency to the Penobscot Nation, dated September 2, 2020.
- _____. 2020h. Letter from the Federal Emergency Management Agency to the Salem Historical Society, dated September 3, 2020.

- _____. 2020i. Letter from the Federal Emergency Management Agency to the Town of Salem, dated October 8, 2020.
- _____. 2020j. Letter from the Federal Emergency Management Agency to the Town of Salem Historic District Commission, dated September 3, 2020.
- _____. 2020k. Letter from the Federal Emergency Management Agency to the Wampanoag Tribe of Gay Head (Aquinnah), dated September 2, 2020.
- Federal Highway Administration (FHWA). 2006. "Construction Noise Handbook." Accessed August 7, 2020, https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.
- Greater Derry-Salem Cooperative Alliance for Regional Transportation (CART). 2020. "Services." Accessed July 21, 2020, <http://cart-rides.org/services/>.
- Massachusetts Division of Fisheries and Wildlife (MDFW). 2020. "The Northern Long-Eared Bat." Accessed July 12, 2020, <https://www.mass.gov/service-details/the-northern-long-eared-bat>.
- National Oceanic and Atmospheric Administration (NOAA). 2020. "Monthly Climate Normal West Hampstead, NH." Accessed July 22, 2020, <https://w2.weather.gov/climate/xmacis.php?wfo=gyx>.
- National Park Service (NPS). 2020. National Register of Historic Places. <https://www.nps.gov/subjects/nationalregister/index.htm>.
- Natural Resources Conservation Service (NRCS). 2020. "Web Soil Survey." Accessed July 27, 2020, <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- NBC Boston (NBC). 2018. "Salem, NH Scrambles for Solutions to Sewer Flooding." Accessed August 5, 2020, <https://www.nbcboston.com/news/local/salem-nh-scrambles-for-solutions-to-sewer-flooding/54054/>.
- New Hampshire Department of Agriculture, Markets, and Food (NHDAMF). 2020. "Control of Invasive Plants." Accessed July 15, 2020, <https://www.agriculture.nh.gov/publications-forms/documents/control-invasive-species-numbers.pdf>.
- _____. 2017. "Prohibited Invasive Plant Species Rules." Accessed August 5, 2020, <https://www.agriculture.nh.gov/publications-forms/documents/prohibited-invasive-species.pdf>.
- _____. 2013. "Picking our Battles: An Invasive Plant Control Strategy for Salem, NH." Accessed August 5, 2020, <https://wildlife.state.nh.us/invasives/documents/Salem.pdf>.
- _____. 2011. "New Hampshire Guide to Upland Invasive Species." Accessed August 12, 2020, <https://www.agriculture.nh.gov/publications-forms/documents/upland-invasive-species.pdf>.
- New Hampshire Department of Environmental Services (NHDES). 2020a. "Watershed 305(b) Assessment Summary Report: Lower Spickett River." Accessed August 11, 2020, http://www2.des.state.nh.us/onestoppub/SWQA/010700061102_2018.pdf.
- _____. 2020b. "New Hampshire One Stop Data Mapper." Accessed August 3, 2020. <http://nhdesonestop.sr.unh.edu/html5viewer/>.
- _____. 2017. "New Hampshire Greenhouse Gas Emissions Inventory." Accessed July 22, 2020, <https://www.des.nh.gov/organization/divisions/air/tsb/tps/climate/ghg-emissions.htm>.

New Hampshire Department of Safety, Homeland Security and Emergency Management (HSEM). 2020. Letter from the New Hampshire Department of Safety, Homeland Security and Emergency Management, dated October 8, 2020.

New Hampshire Department of Historic Resources (NHDHR). 2020a. Enhanced Mapping & Management Information Tool. <https://emmit.dncr.nh.gov/Login.aspx?showDisc=false>.

_____. 2020b. Letter from the New Hampshire Department of Historic Resources to the Federal Emergency Management Agency, September 3, 2020.

New Hampshire Department of Transportation (NHDOT). 2019. "Transportation Data Management System." Accessed July 28, 2020, <https://nhdot.ms2soft.com/tcds/tsearch.asp?loc=Nhdot&mod=>.

New Hampshire Division of Historical Resources (NHDHR). 2020. "Enhanced Mapping & Management Information Tool (EMMIT)." Accessed June 23, 2020, <https://www.nh.gov/nhdhr/emmit/index.htm>.

New Hampshire Fish and Game Department (NHFG). 2020a. "Endangered and Threatened Wildlife of NH" Accessed July 12, 2020, <https://wildlife.state.nh.us/nongame/endangered-list.html>.

_____. 2020b. "Spotted Turtle (*Clemmys guttata*)" Accessed July 13, 2020, <https://www.wildlife.state.nh.us/wildlife/profiles/spotted-turtle.html>.

_____. 2015. "Wildlife Action Plan." Accessed July 22, 2020, <https://www.wildlife.state.nh.us/wildlife/wap.html>.

New Hampshire Natural Heritage Bureau (NHNHB). 2020a. "Natural Heritage Bureau: About Us." Accessed July 12, 2020, <https://www.nh.gov/nhdfi/about-us/natural-heritage-bureau.htm>.

_____. 2020b. "NH Natural Heritage Bureau NHB Datacheck Results Letter" Dated June 15, 2020.

_____. 2020c. "Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns." Accessed July 13, 2020, <https://www.nh.gov/nhdfi/documents/town-lists.pdf>.

New Hampshire Public Utilities Commission (NHPUC). 2020. "Utilities by City/Town." Accessed August 19, 2020, <https://www.puc.nh.gov/consumer/communitieserved.pdf>.

Occupational Safety and Health Administration (OSHA). 2020. "Occupational Noise Exposure." Accessed July 29, 2020, <https://www.osha.gov/SLTC/noisehearingconservation/construction.html#standards>.

Town of Salem, New Hampshire (Town of Salem). 2020a. "Utilities." Accessed July 30, 2020, <https://www.townofsaalemnh.org/utilities>.

_____. 2020b. "About the Salem School District." Accessed July 29, 2020, <https://sau57.org/ssd/about>.

_____. 2020c. "Emergency Medical Services." Accessed July 29, 2020, <https://www.townofsaalemnh.org/fire-department/pages/emergency-medical-services>.

_____. 2019a. "Zoning Map, 2019." Accessed July 29, 2020, <https://www.townofsaalemnh.org/sites/g/files/vyhlf3761/f/uploads/zoning2019.pdf>.

- _____. 2019b. “Memorandum of Understanding.” Accessed July 22, 2020, <https://www.townofsaalemnh.org/planning-board/files/tuscan-village-memorandum-of-understanding-5-24-19>.
- _____. 2018. “Tuscan Village Floodplain Improvements.” Accessed July 29, 2020, https://www.townofsaalemnh.org/sites/g/files/vyhli3761/f/uploads/tuscan_village_floodplain-approved_9-13-18.pdf.
- _____. 2017. “Hydrologic and Hydraulic Analysis Report, Tuscan Village Floodplain Improvements.” Accessed July 22, 2020, https://www.townofsaalemnh.org/sites/saalemnh/files/uploads/tighe_bond_hh_study-9-12-17.pdf.
- _____. 2009. “Cluff Crossing Rd Bridge Replacement (Bridge #094/060).” Accessed July 30, 2020, <https://www.townofsaalemnh.org/engineering-projects/pages/cluff-crossing-rd-bridge-replacement-bridge-094060>.
- United States Department of Agriculture (USDA). 2020. “Pest Tracker – New Hampshire.” Accessed July 14, 2020, <https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/pest-tracker/states/new+hampshire>.
- United States Fish and Wildlife Service (USFWS). 2020. “Birds of Conservation Concern.” Accessed July 24, 2020, <https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>.
- United States Geological Survey (USGS). 2020. “New Hampshire Geologic Map.” Accessed July 28, 2020, <https://mrdata.usgs.gov/geology/state/state.php?state=NH>.
- _____. 2018. “Salem Depot Quadrangle, New Hampshire – Massachusetts, 7.5-Minute Series.” Accessed July 17, 2020, <https://ngmdb.usgs.gov/topoview/viewer/#11/42.7883/-71.2779>.
- Ward, M. A. 2020. “The Principal Greenhouse Gases and Their Sources.” Accessed July 28, 2020, <https://www.neefusa.org/weather-and-climate/climate-change/principal-greenhouse-gases-and-their-sources>.

Appendix A Maps and Figures

*Final Environmental Assessment
Main Street and South Broadway Flood Control Project, Salem, NH*

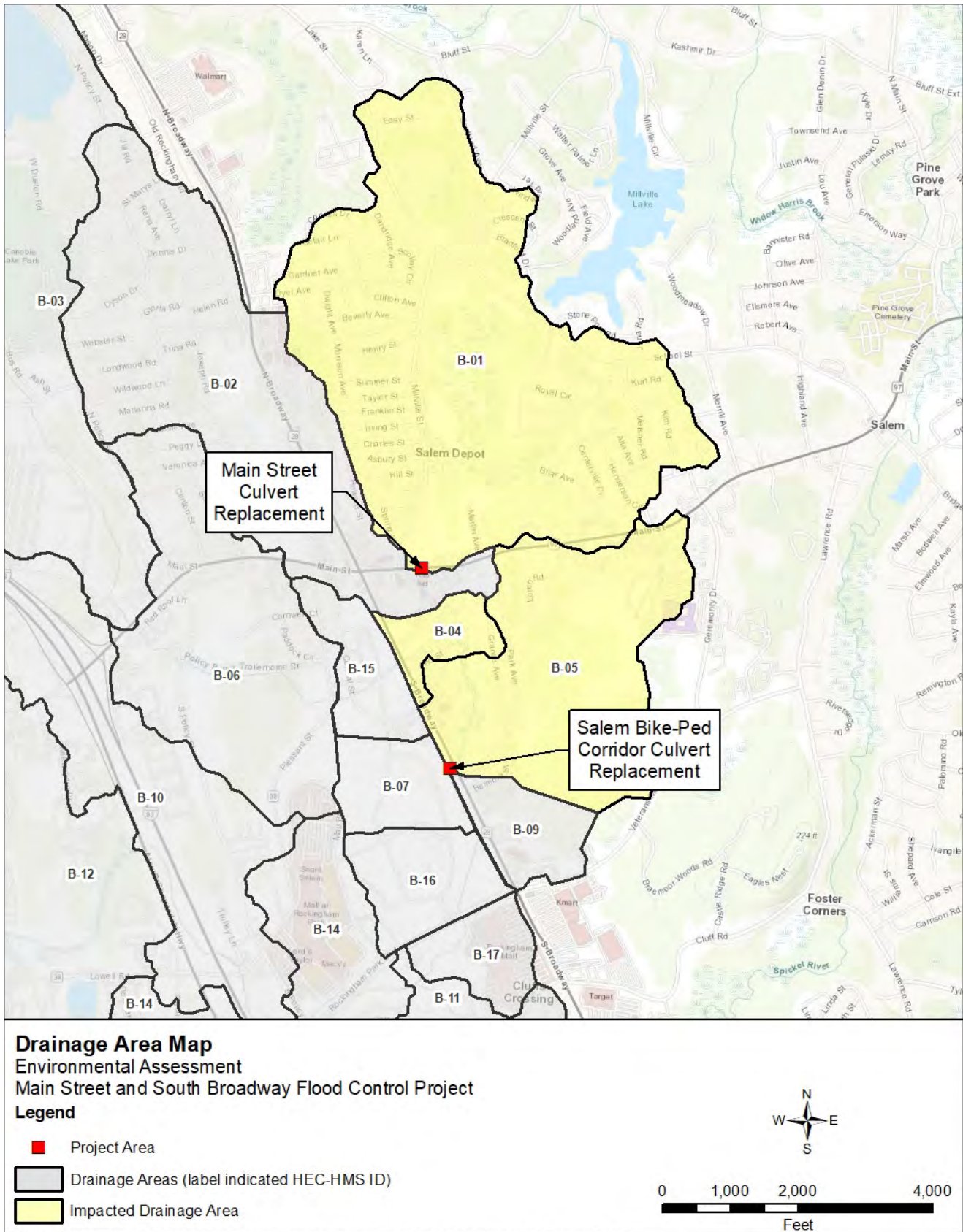
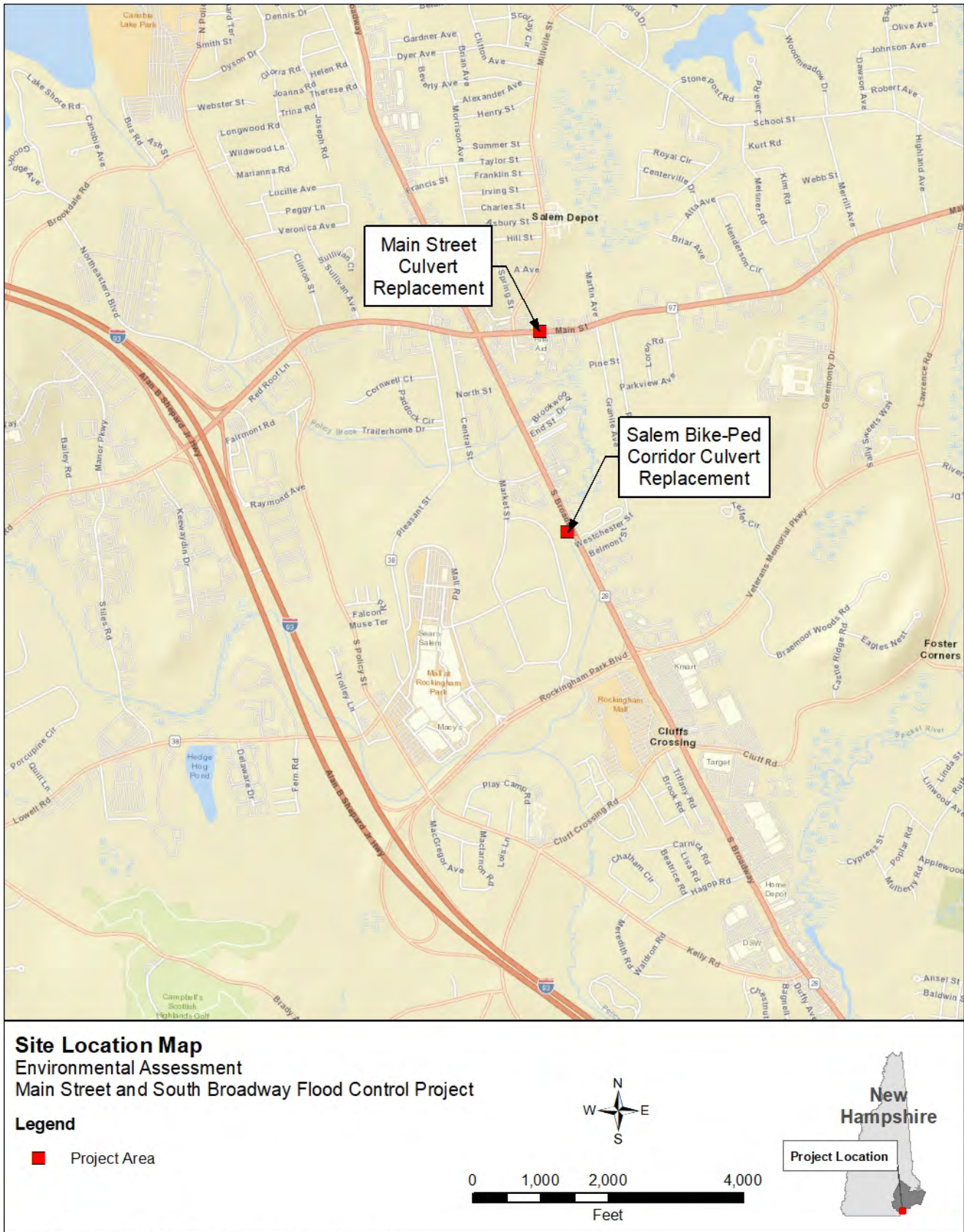


Figure 1: Impacted Drainage Basin

*Final Environmental Assessment
Main Street and South Broadway Flood Control Project, Salem, NH*



Sources: Project Areas: CDM Smith, 2020; Basemap: ESRI World Street Map.

Figure 2: Site Location

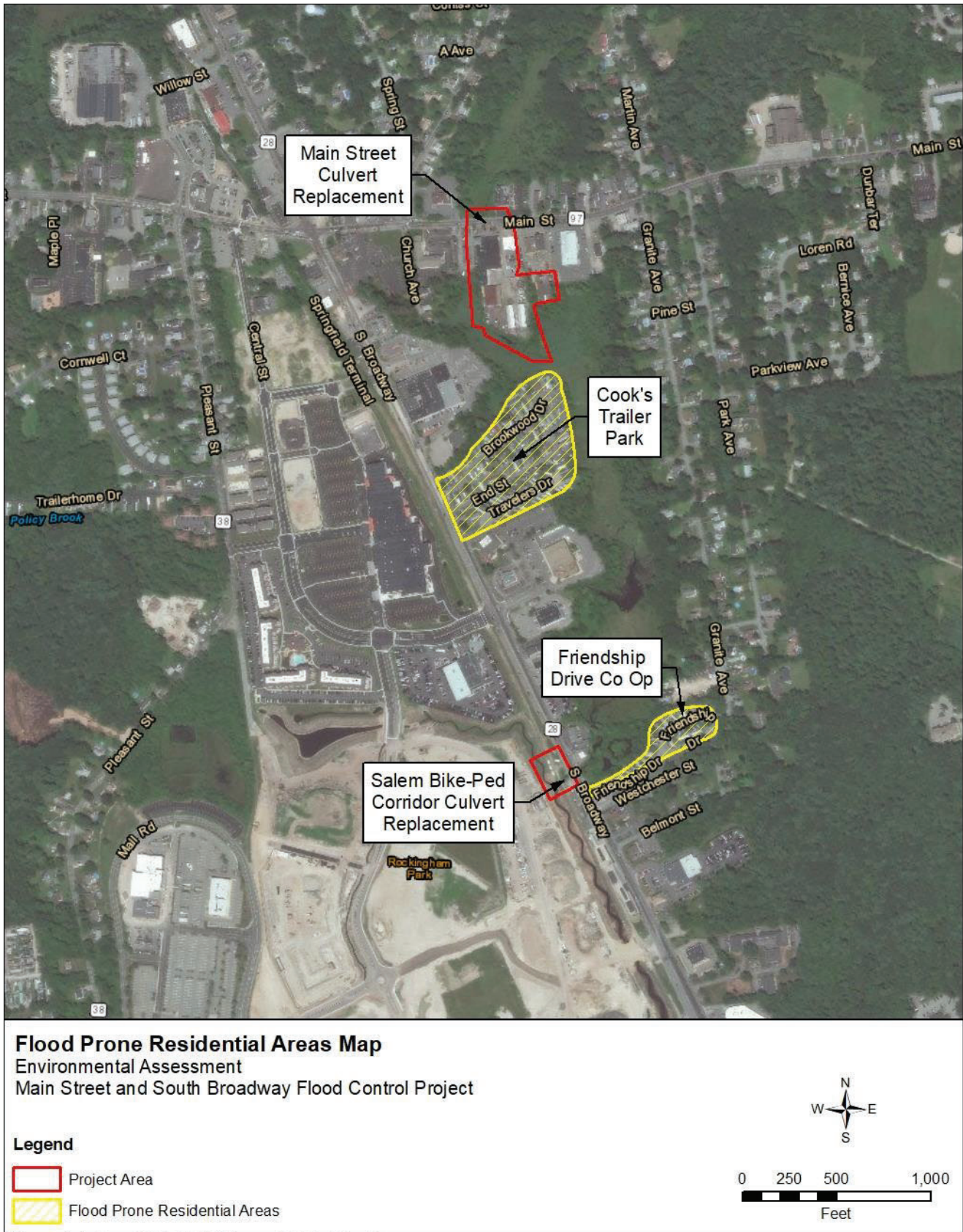


Figure 3: Flood Prone Residential Areas

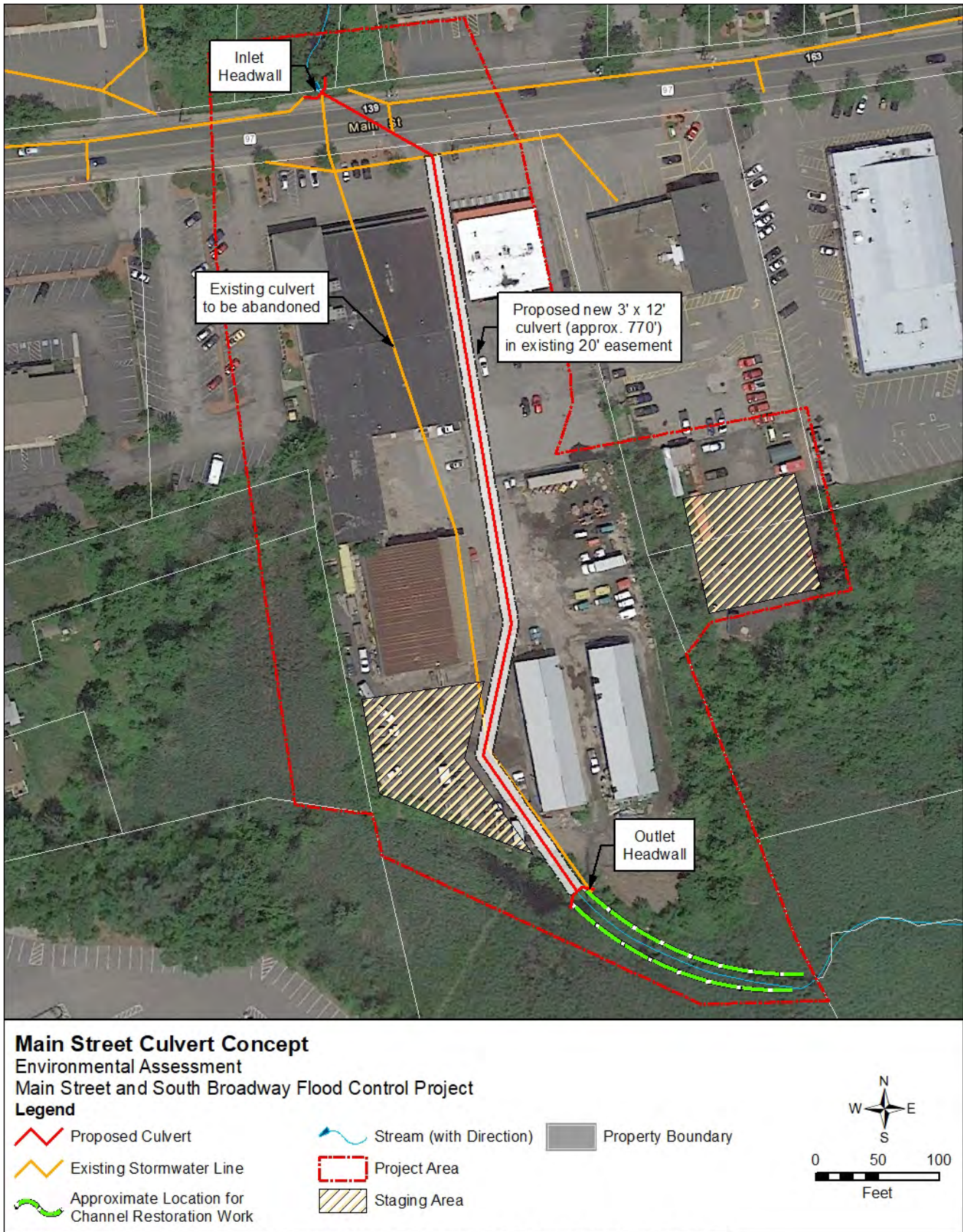


Figure 4: Main Street Culvert Concept

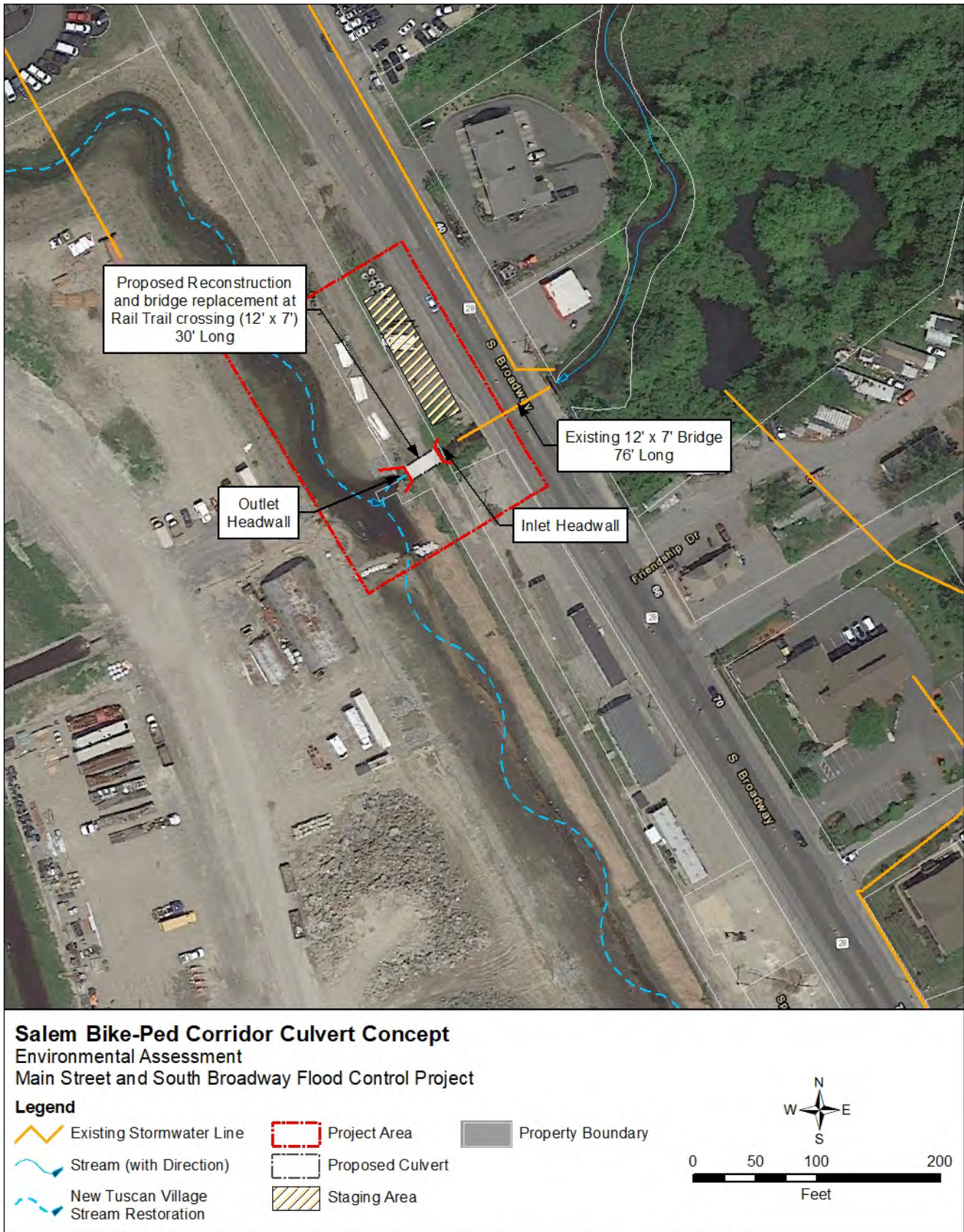
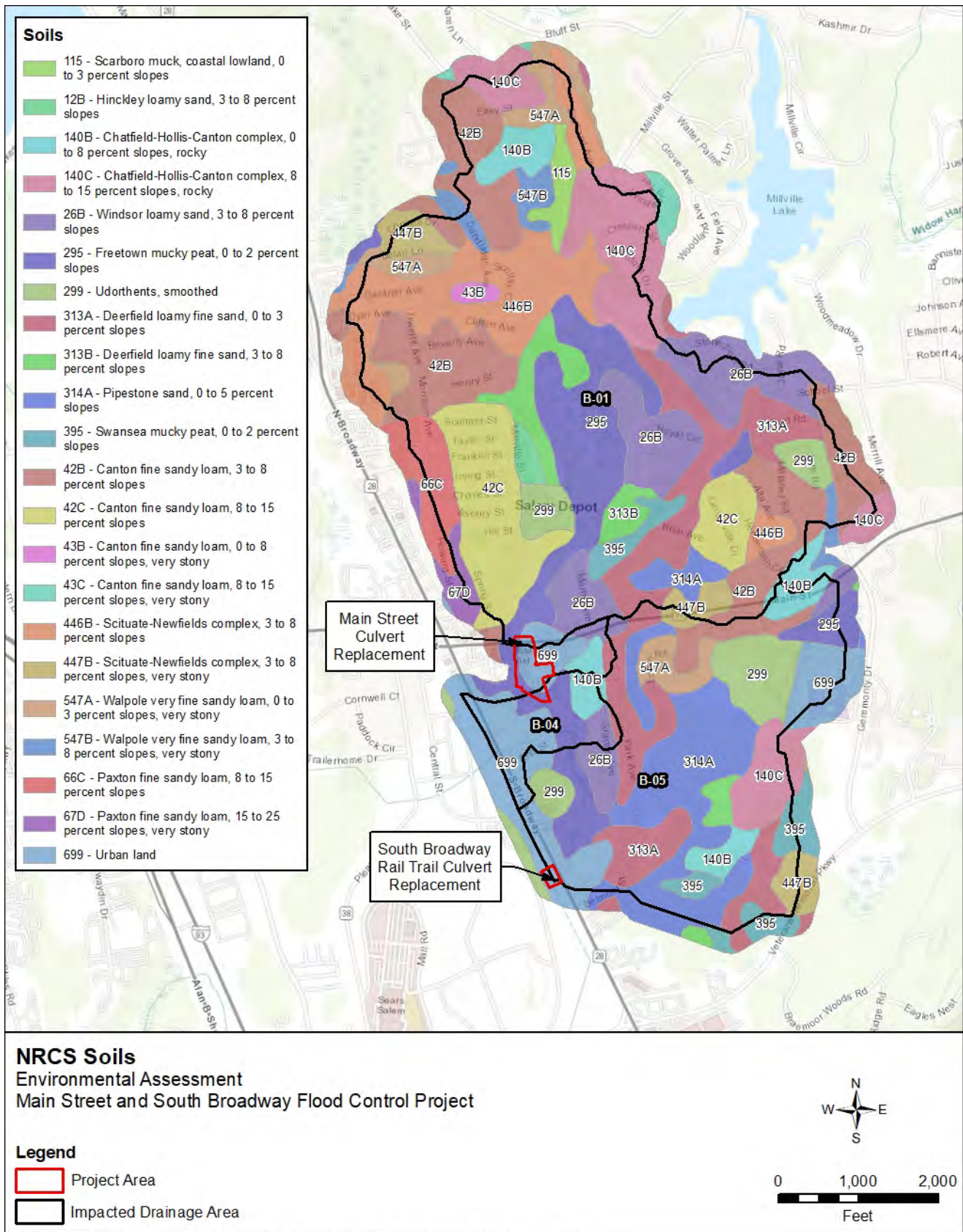
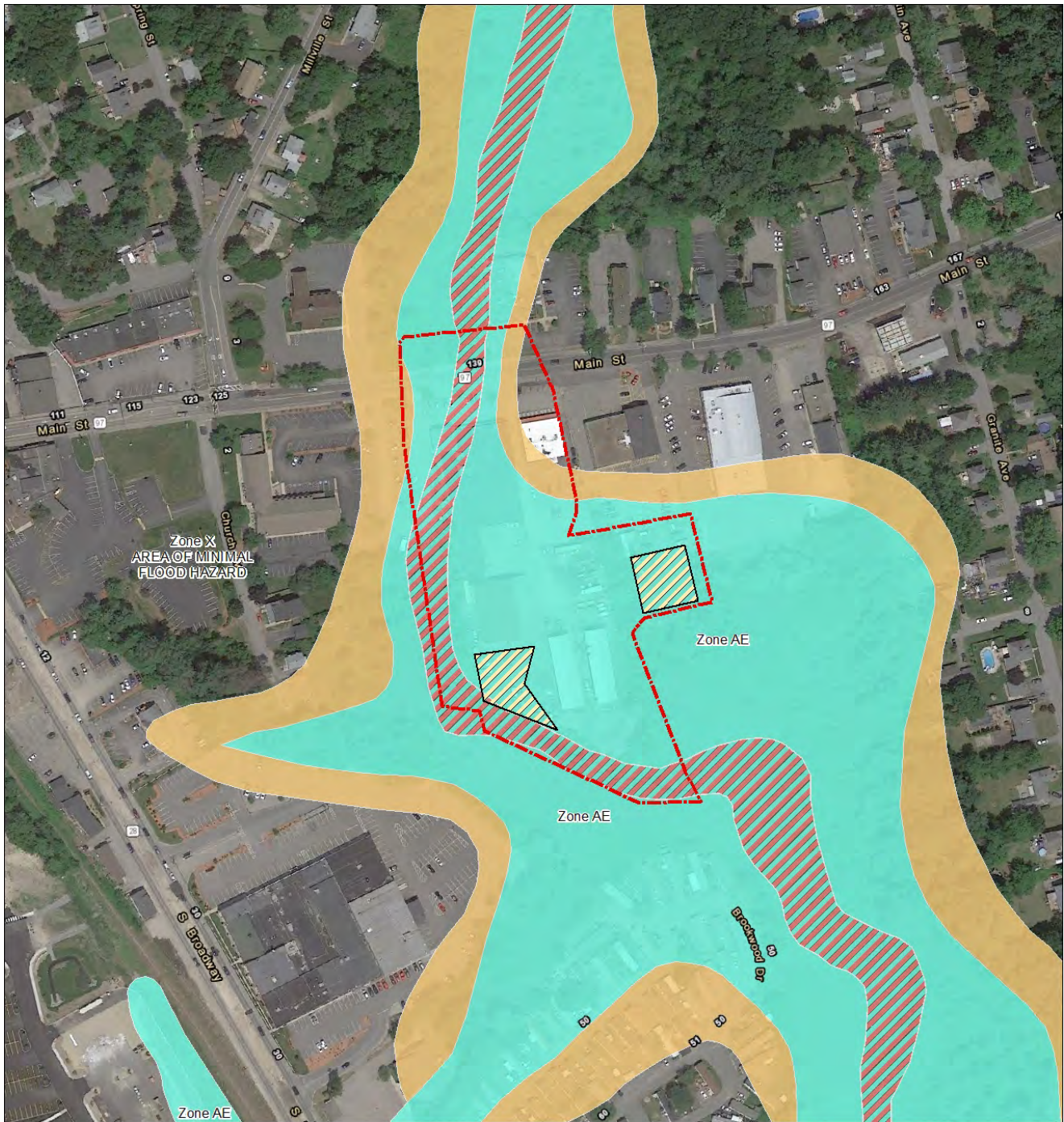


Figure 5: Salem Bike-Ped Corridor Culvert Concept

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Main Street and South Broadway Flood Control Project, Salem, NH*



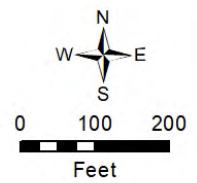


Main Street Floodplain Map: FIRM Panel #33015C0561E (May 17, 2005)

Environmental Assessment
Main Street and South Broadway Flood Control Project

Legend

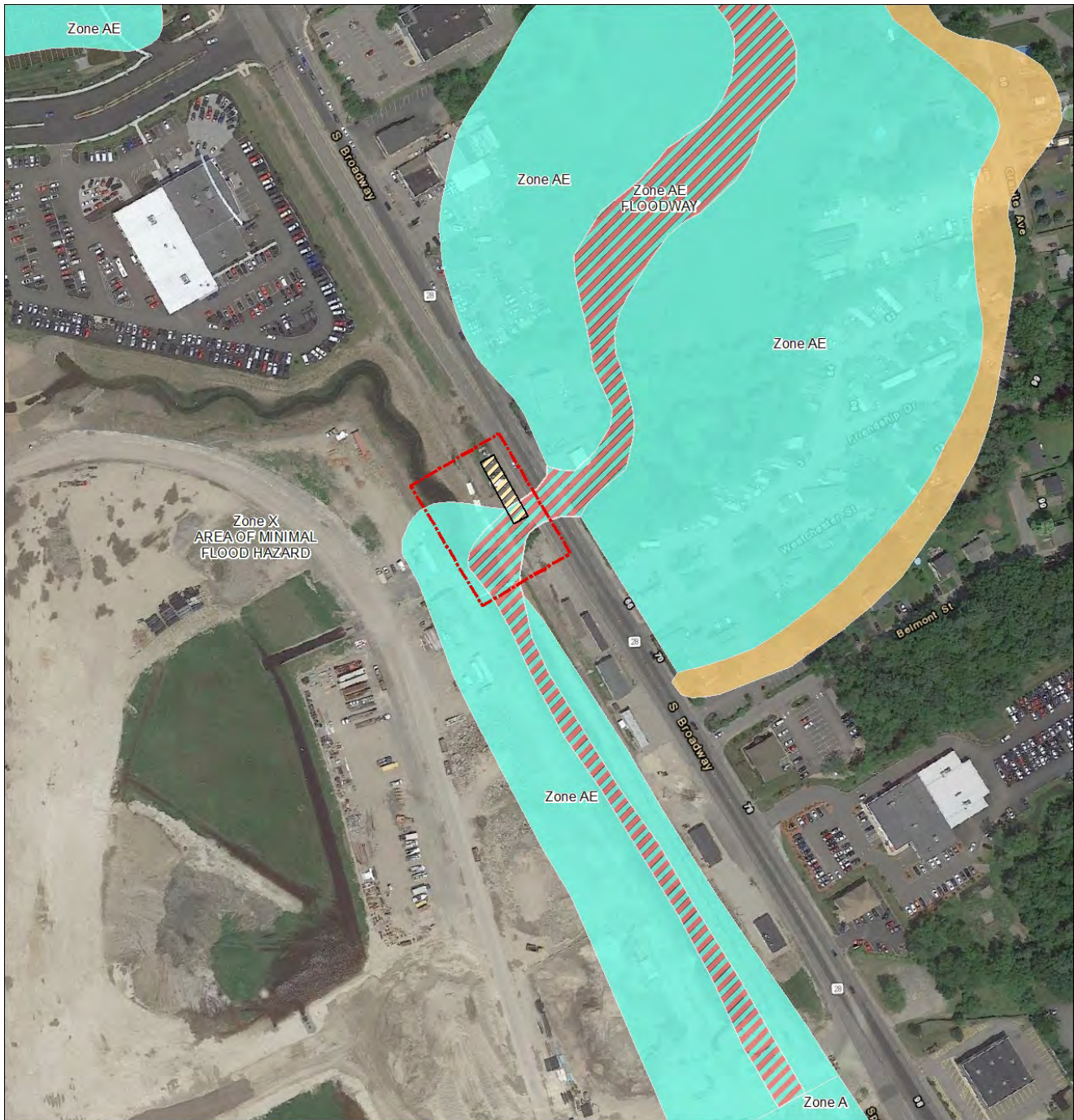
Project	Flood Hazard Zone	0.2% Annual Chance Flood Hazard
Staging	1% Annual Chance Flood	Area of Minimal Flood Hazard
Regulatory Floodway		



Sources: Project Areas: Digitized by CDM Smith, 2020; Flood Zones: FEMA, 2018; Basemap: Google Earth Pro, 2019/06/22.

Figure 7: Main Street Floodplain Areas







*Final Environmental Assessment
Main Street and South Broadway Flood Control Project, Salem, NH*

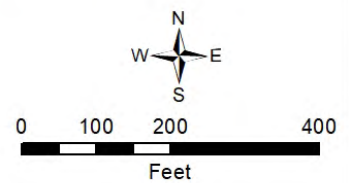


South Broadway Rail Trail Floodplain Map: FIRM Panel #33015C0563E (May 17, 2005)

Environmental Assessment
Main Street and South Broadway Flood Control Project

Legend

	Project Area	Flood Hazard Zone		0.2% Annual Chance Flood Hazard
	Staging Area			Area of Minimal Flood Hazard
				



Sources: Project Areas: Digitized by CDM Smith, 2020; Flood Zone: FEMA, 2018; Basemap: Google Earth Pro, 2019/06/22.

Figure 8: South Broadway Floodplain Areas

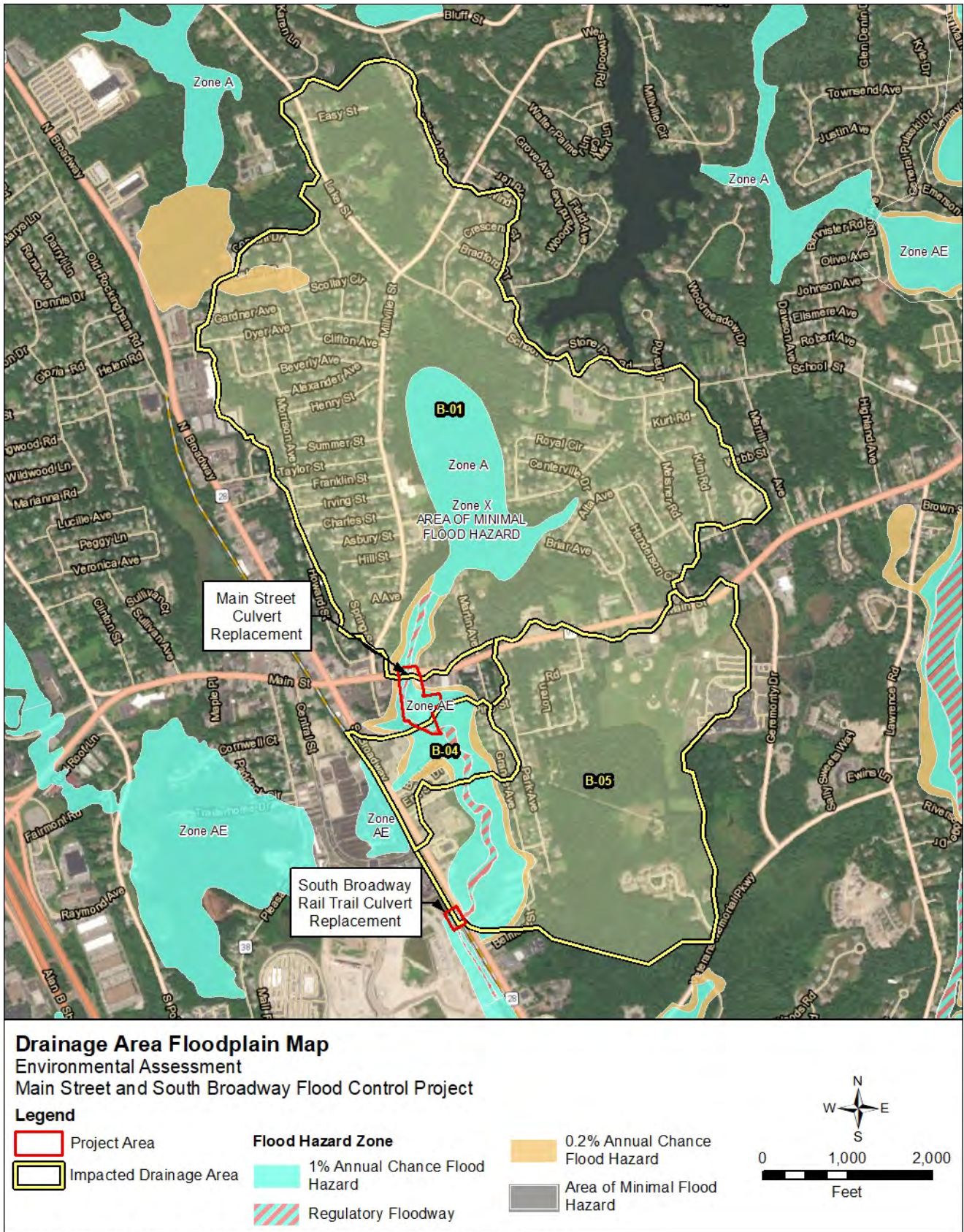


Figure 9: Drainage Basin Floodplain

*Final Environmental Assessment
Main Street and South Broadway Flood Control Project, Salem, NH*

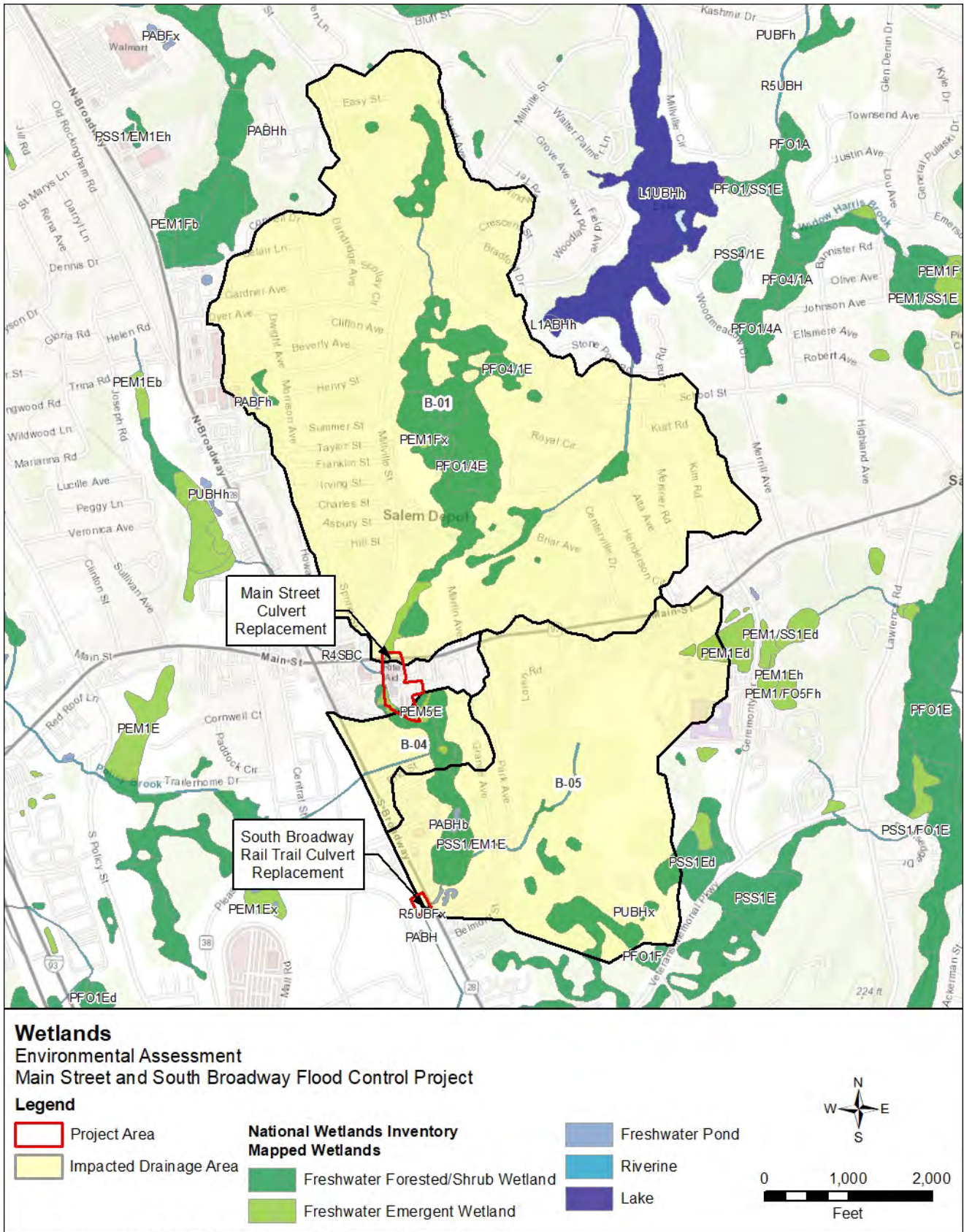


Figure 10: NWI Wetlands

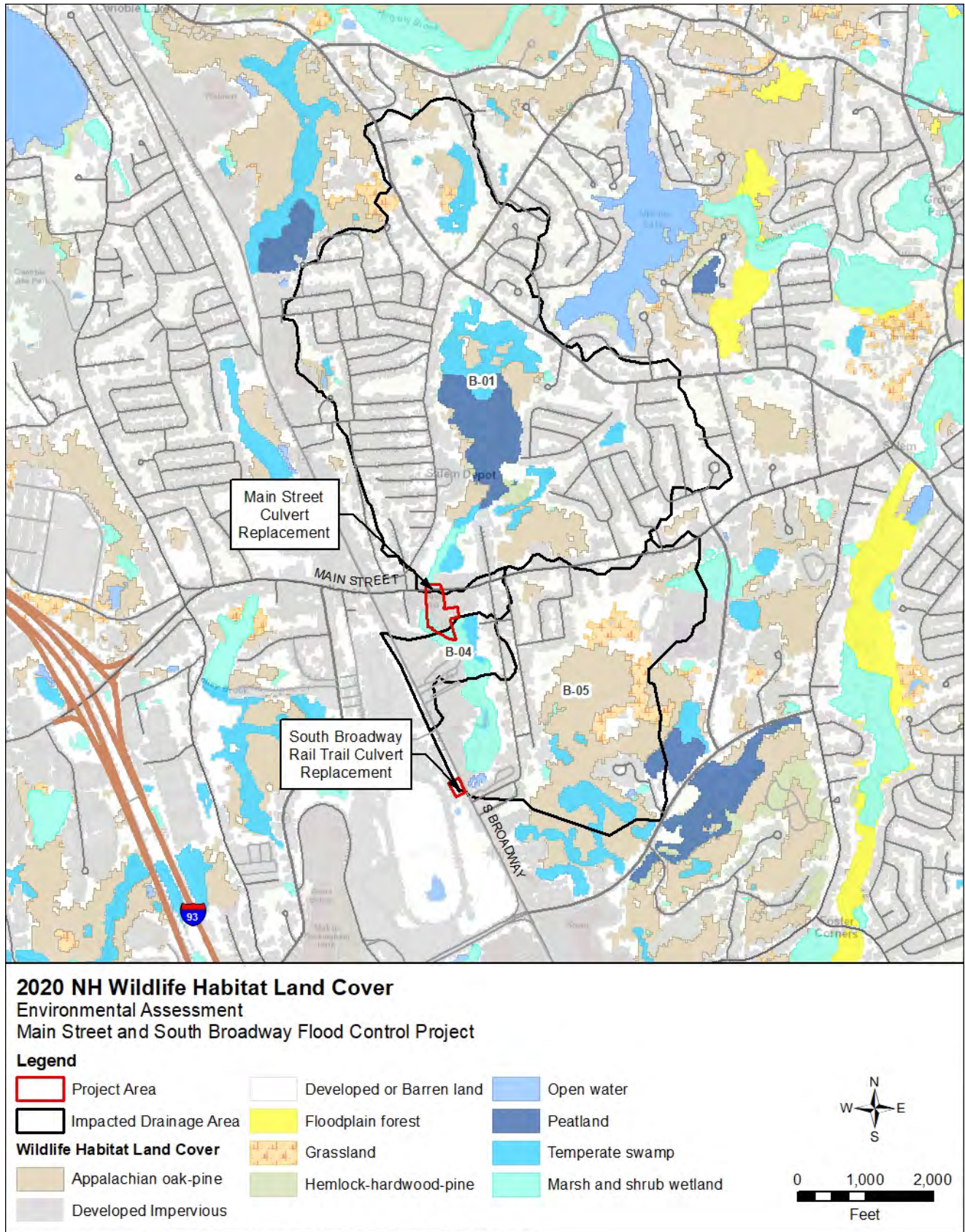


Figure 11: 2020 New Hampshire Wildlife Land Cover

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Main Street and South Broadway Flood Control Project, Salem, NH*

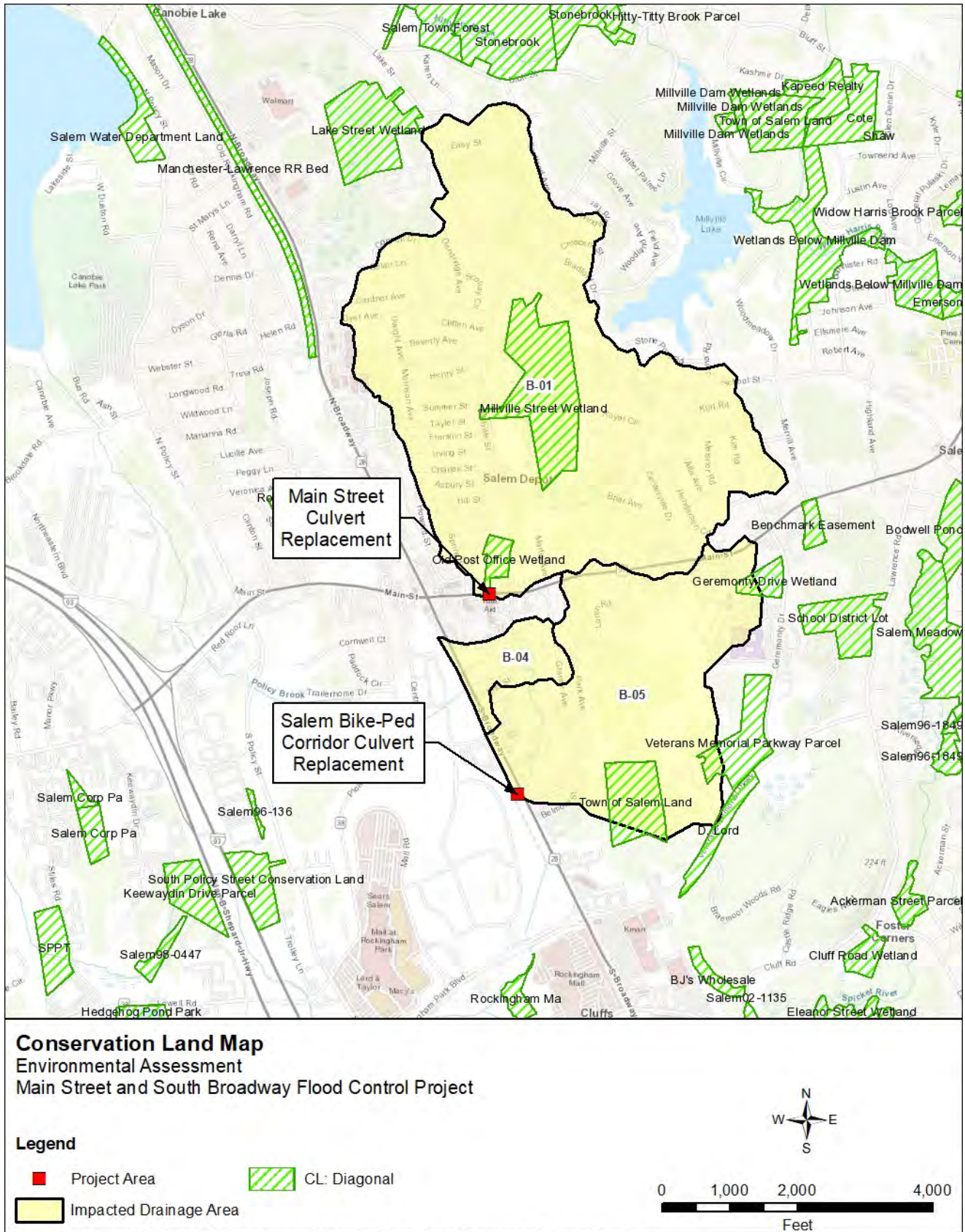



Figure 12: Conservation Land



Area of Potential Effect - Main Street Culvert
Environmental Assessment
Main Street and South Broadway Flood Control Project

Legend

 Area of Potential Effects



0 100 200
Feet

Sources: Project Areas: CDM Smith, 2020; Basemap: Google Earth Pro, 2019/06/22.

Figure 13: Area of Potential Effect – Main Street Culvert

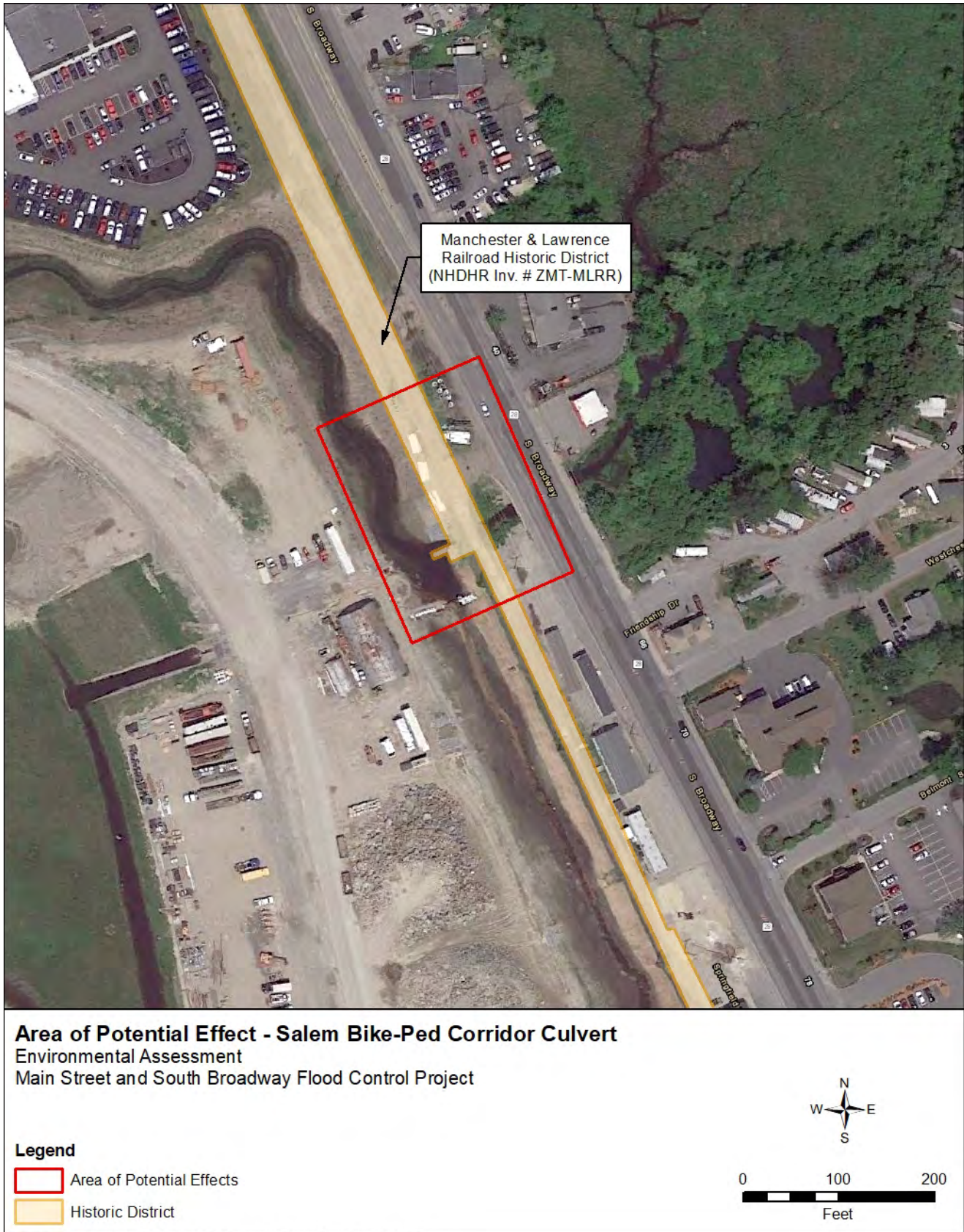


Figure 14: Area of Potential Effect – Salem Bike-Ped Corridor Culvert

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Main Street and South Broadway Flood Control Project, Salem, NH*

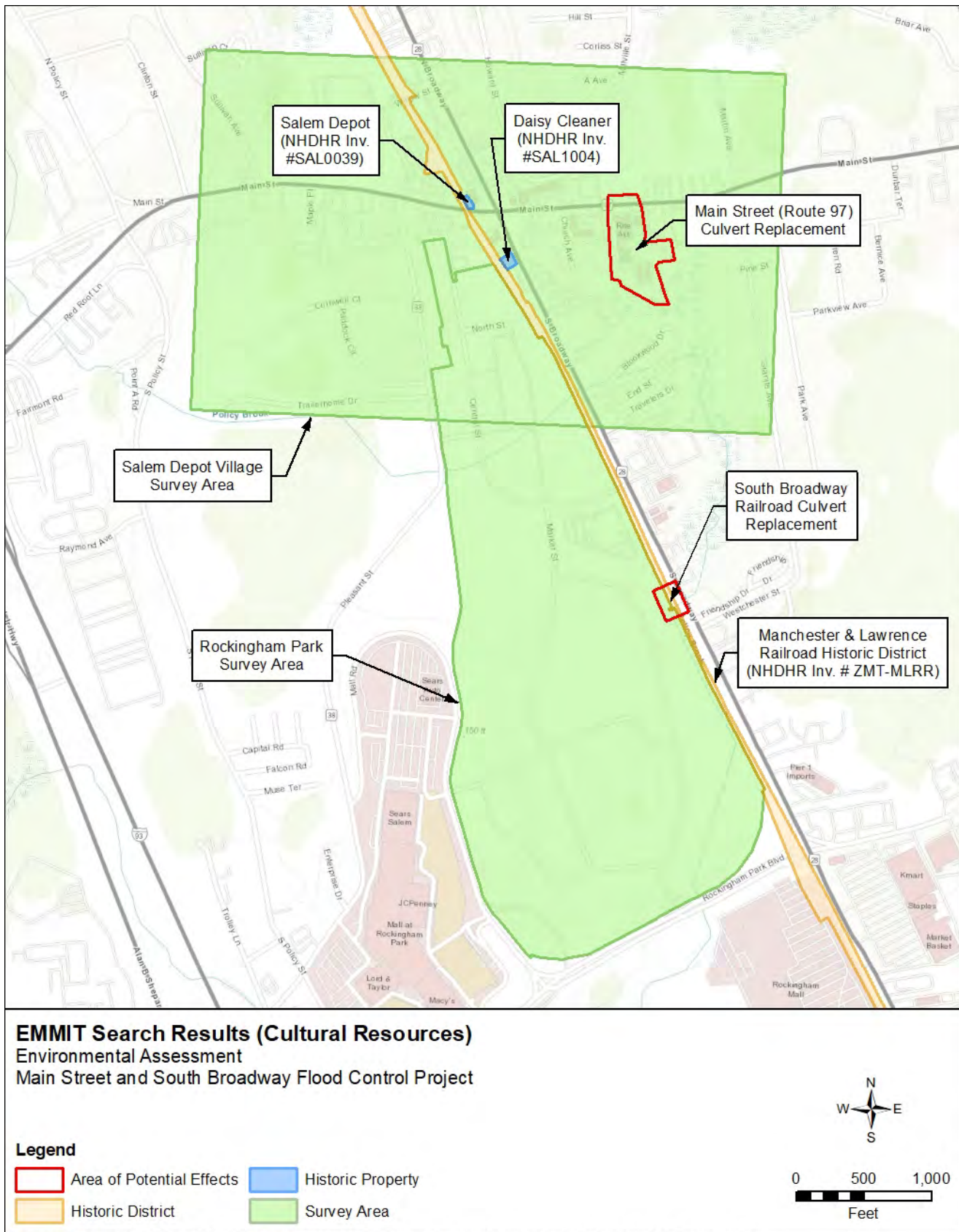


Figure 15: EMMIT Search Results (Cultural Resources)

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Main Street and South Broadway Flood Control Project, Salem, NH*

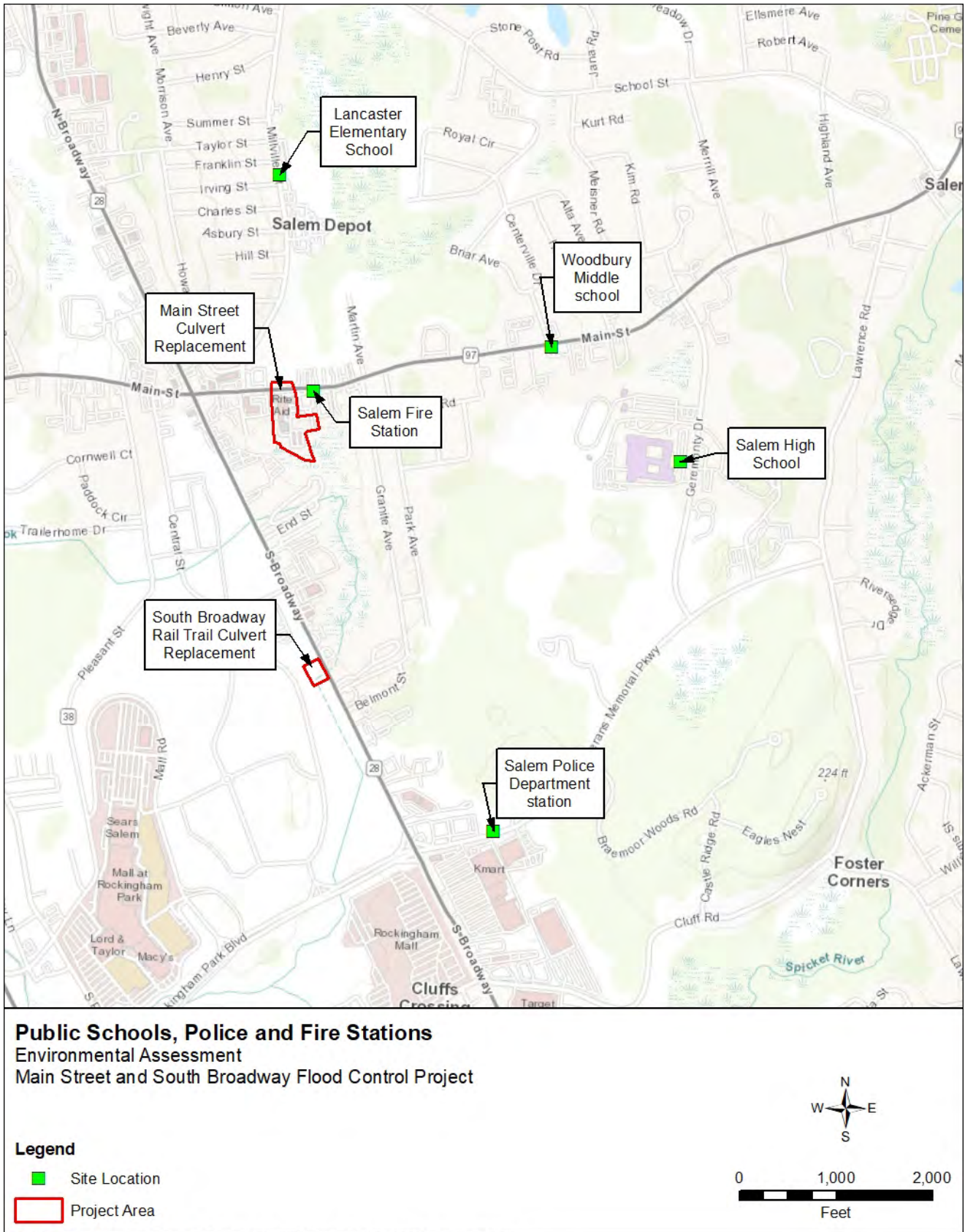


Figure 16: Public Schools, Police, and Fire Stations

*Final Environmental Assessment
Main Street and South Broadway Flood Control Project, Salem, NH*

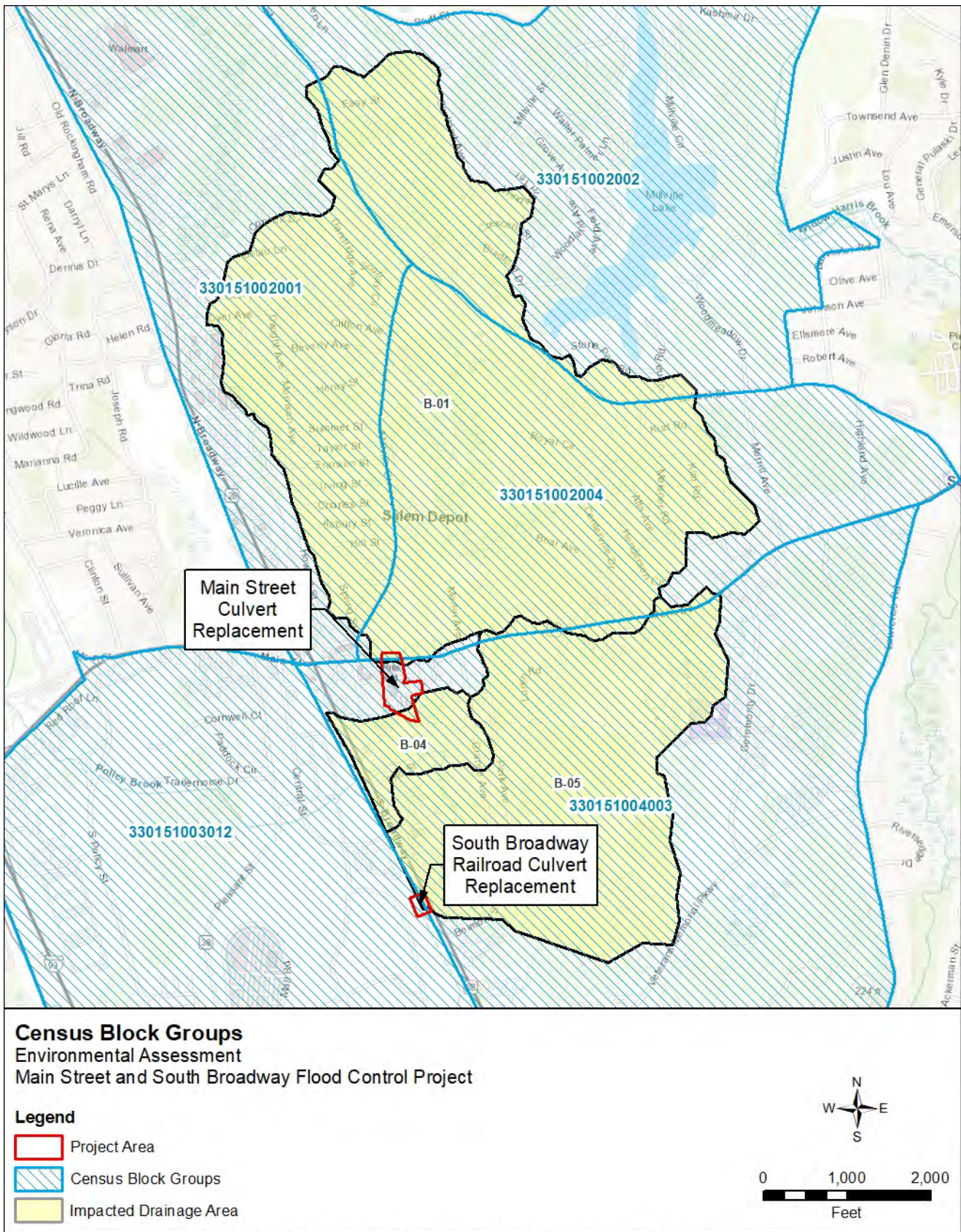


Figure 17: Census Block Groups

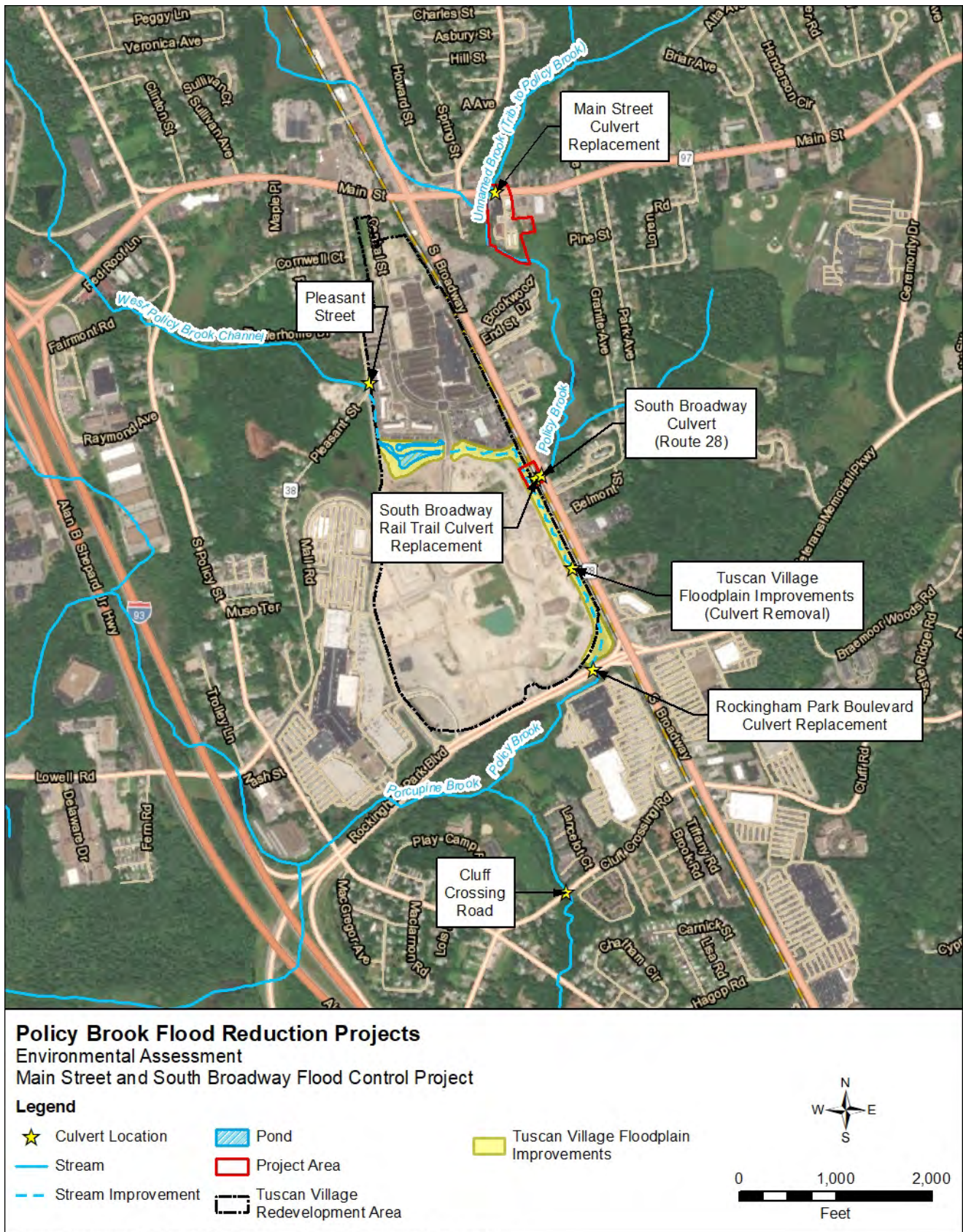
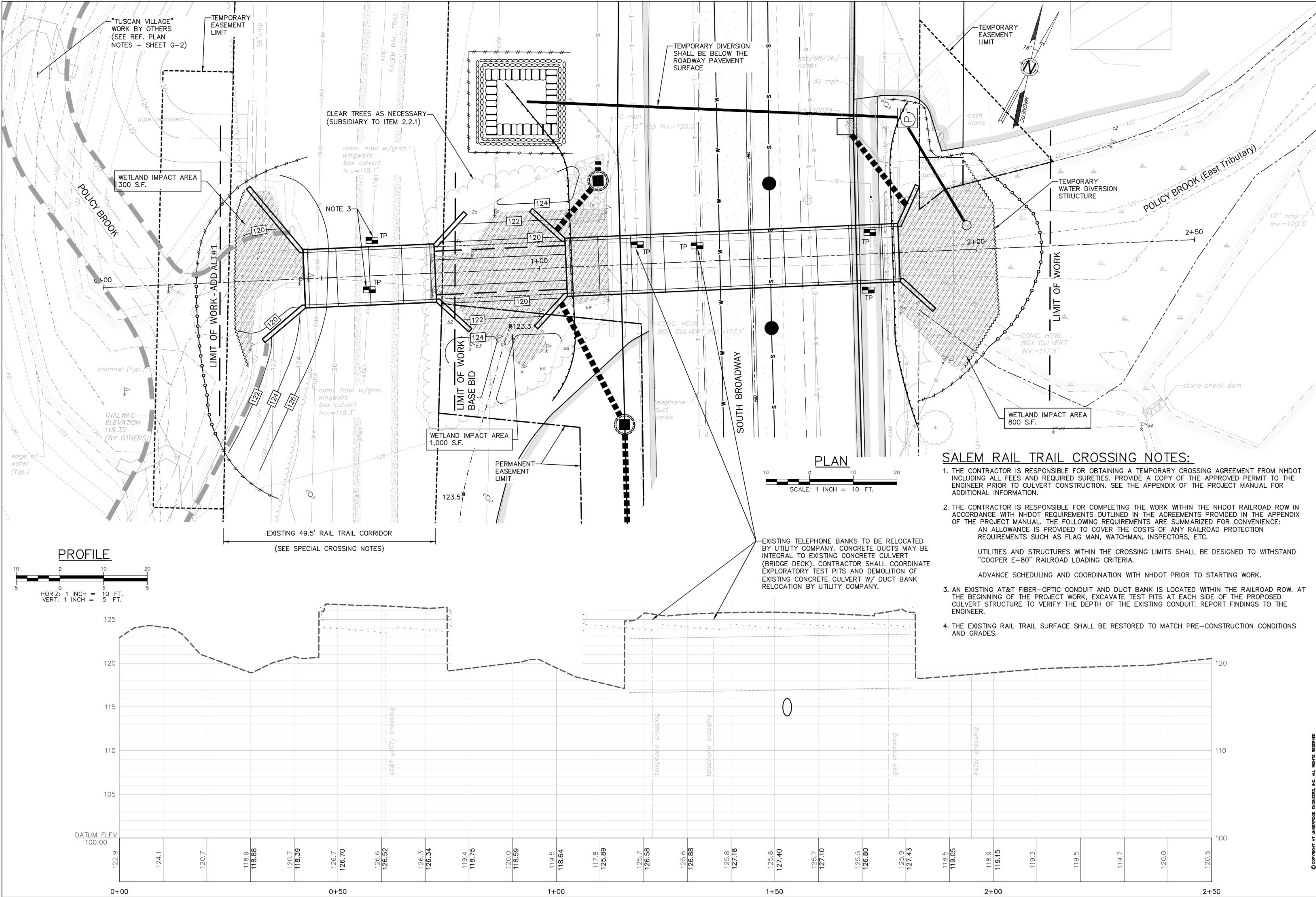




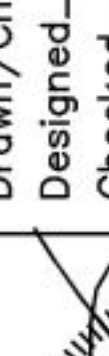
Figure 18: Policy Brook Flood Reduction Projects

Appendix B Documents

Document 1

**South Broadway Sewer, Water, and Bridge Improvement
Plans**



DWG NO C1		SHEET 24 OF 56	
BRIDGE IMPROVEMENT SOUTH BROADWAY SEWER, WATER & BRIDGE IMPROVEMENTS TOWN OF SALEM, NH			
		25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	
			
Drawn/Chk. RMG		Checked EBN	
Designed		Checked	
Approved		Date: 1/9/2018	
Book No.		Project No. 2126	
Dwg. ID 2126_Base.Bridge		Scale AS SHOWN	
REVISIONS		APP'D	
NO.		NO.	
ISSUE FOR		APPROVAL	
Date 1/8/18		By GSM	
CONSTRUCTION		By GSM	
Date 1/9/18		By GSM	
RECORD DRAWING		By	
Date		By	

1. EXCAVATION SHALL BE CONDUCTED IN ACCORDANCE WITH SECTION 02223 OF THE SPECIFICATIONS. PREPARATION OF THE BEARING SURFACE SHOULD INCLUDE THE REMOVAL OF ANY LOOSE OR DISTURBED MATERIAL PRIOR TO PLACING THE RECOMMENDED STRUCTURAL FILL. IN COLD WEATHER CONDITIONS, BEARING SURFACES SHOULD NOT BE ALLOWED TO FREEZE. IN THE EVENT THAT FROST PENETRATION OCCURS, THE AFFECTED SOILS SHALL BE REMOVED AND REPLACED WITH STRUCTURAL FILL TO THE FULL DEPTH OF DISTURBANCE. THE LATERAL LIMITS OF REMOVAL WILL BE DEFINED BY A 1H:1V LINE TO REQUIRED DEPTH.
2. PROTRUDING COBBLES AND BOULDERS ENCOUNTERED AT THE FINAL EXCAVATION LEVEL SHALL BE EITHER REMOVED OR SPLIT TO PROVIDE A LEVEL SURFACE.
3. DEWATERING WITHIN THE EXCAVATION MAY BE REQUIRED. DEWATERING SHALL BE CONTINUOUS UNTIL THE STRUCTURE IS BACKFILLED TO THE ELEVATION OF THE SURROUNDING WATER TABLE.
4. EXCAVATION TO FINAL GRADE AND CONTROL OF WATER WITHIN EXCAVATION SHALL BE CONDUCTED IN SUCH A MANNER AS TO PREVENT DISTURBANCE OF THE BEARING SOIL. PUMPING AND/OR DIVERSION AREAS SHALL BE LOCATED OUTSIDE THE STRUCTURE SUPPORT LIMITS AND PROPERLY FILTERED TO PREVENT THE PUMPING OF FINES.
5. GROUNDWATER SHALL BE PRE-DRAINED TO AT LEAST ONE FOOT BELOW THE ANTICIPATED EXCAVATION BOTTOM, PRIOR TO REMOVING THE LAST FEW FEET OF MATERIAL. LOCATE ANY SUMP AREAS OR PERIMETER DRAINAGE TRENCHES OUTSIDE THE LIMITS OF THE PROPOSED CULVERT. PROPERLY FILTER PUMPING AREAS TO MINIMIZE THE LOSS OF FINES.
6. ANY FOUNDATION MATERIALS WEAKENED AS A RESULT OF INSUFFICIENT CARE TAKEN IN MAINTAINING A DEWATERED CONDITION SHALL BE REMOVED AND REPLACED WITH STRUCTURAL FILL AT THE EXPENSE OF THE CONTRACTOR.
7. PLACEMENT OF STRUCTURAL FILL SHALL BE COMPLETED IN THE DRY.

1. DESIGN OF CULVERT (ROADWAY): HS-25 (HL-93).
2. DESIGN OF CULVERT (RAIL TRAIL): COOPER E-80.

1. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SEVENTEENTH EDITION, 2002 BY AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, WITH INTERIMS.
2. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2010, WITH CURRENT ADDITIONS AND MODIFICATIONS BY STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION.

CONCRETE: CONCRETE DESIGN STRESSES ARE TO BE BASED UPON A 28 DAY COMPRESSIVE STRENGTH OF:
 $F'_c = 5,000$ PSI FOR PRECAST CONCRETE BOX CULVERT.
 $F'_c = 3,000$ PSI FOR ALL OTHER CONCRETE.

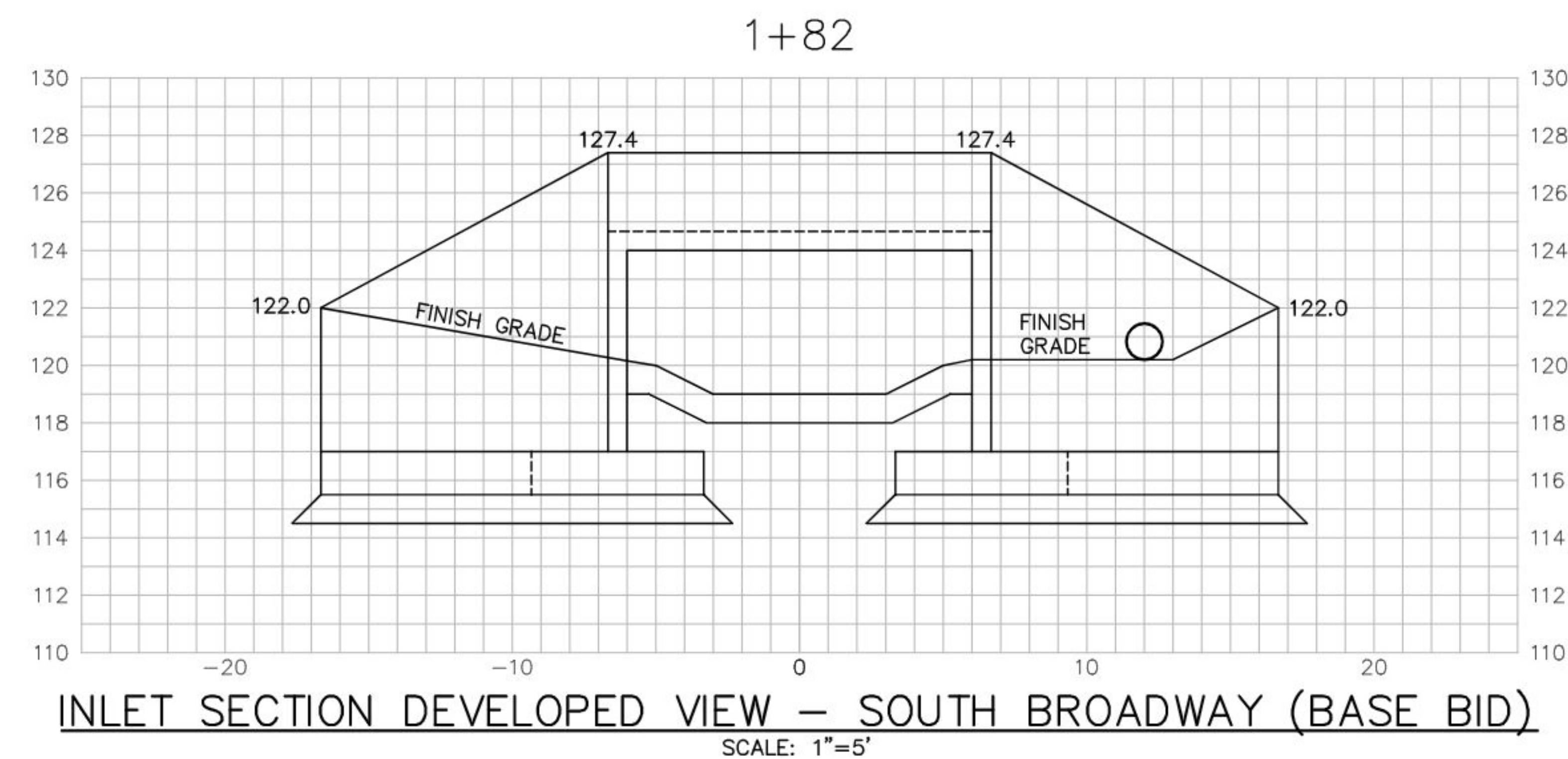
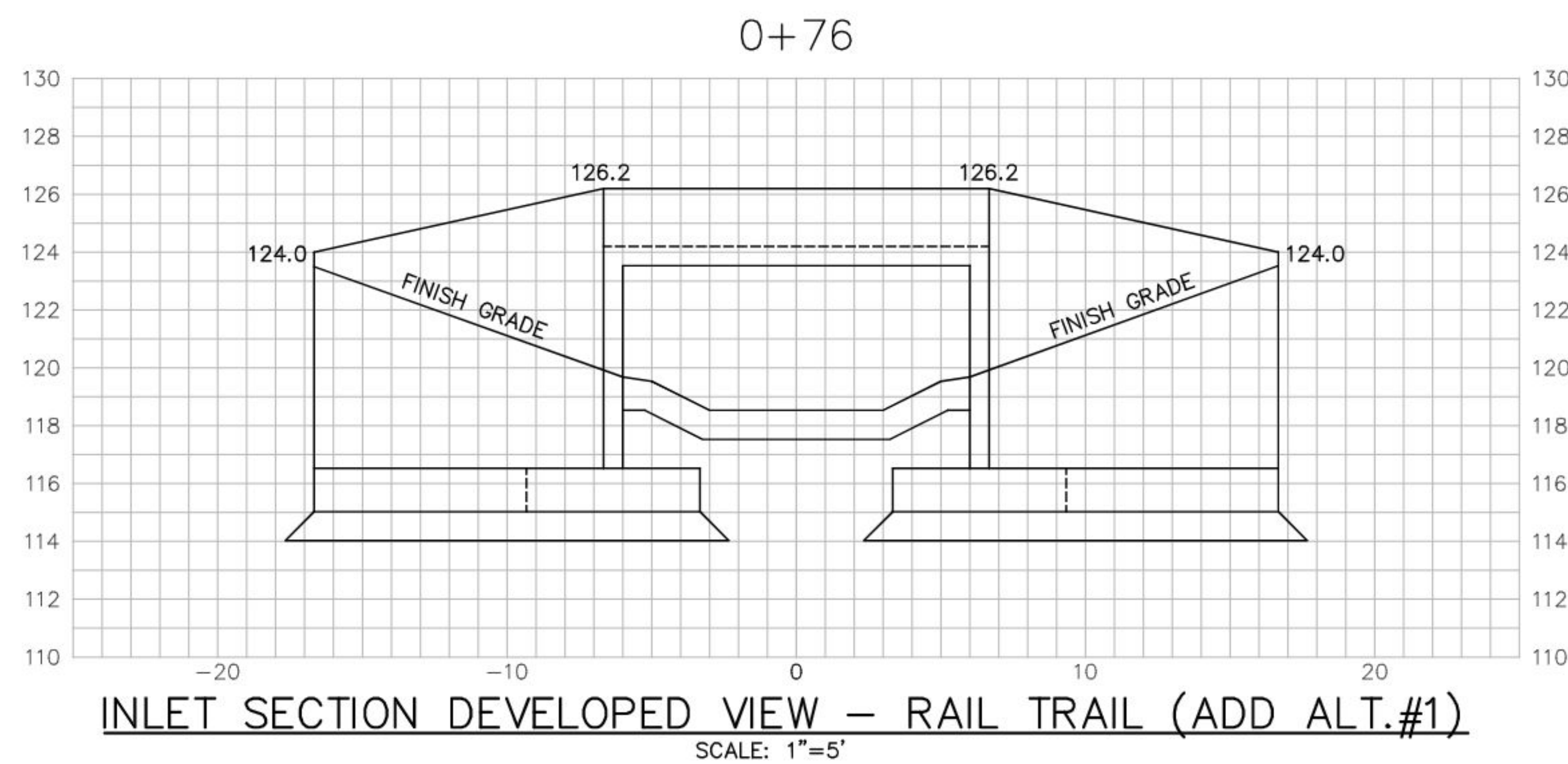
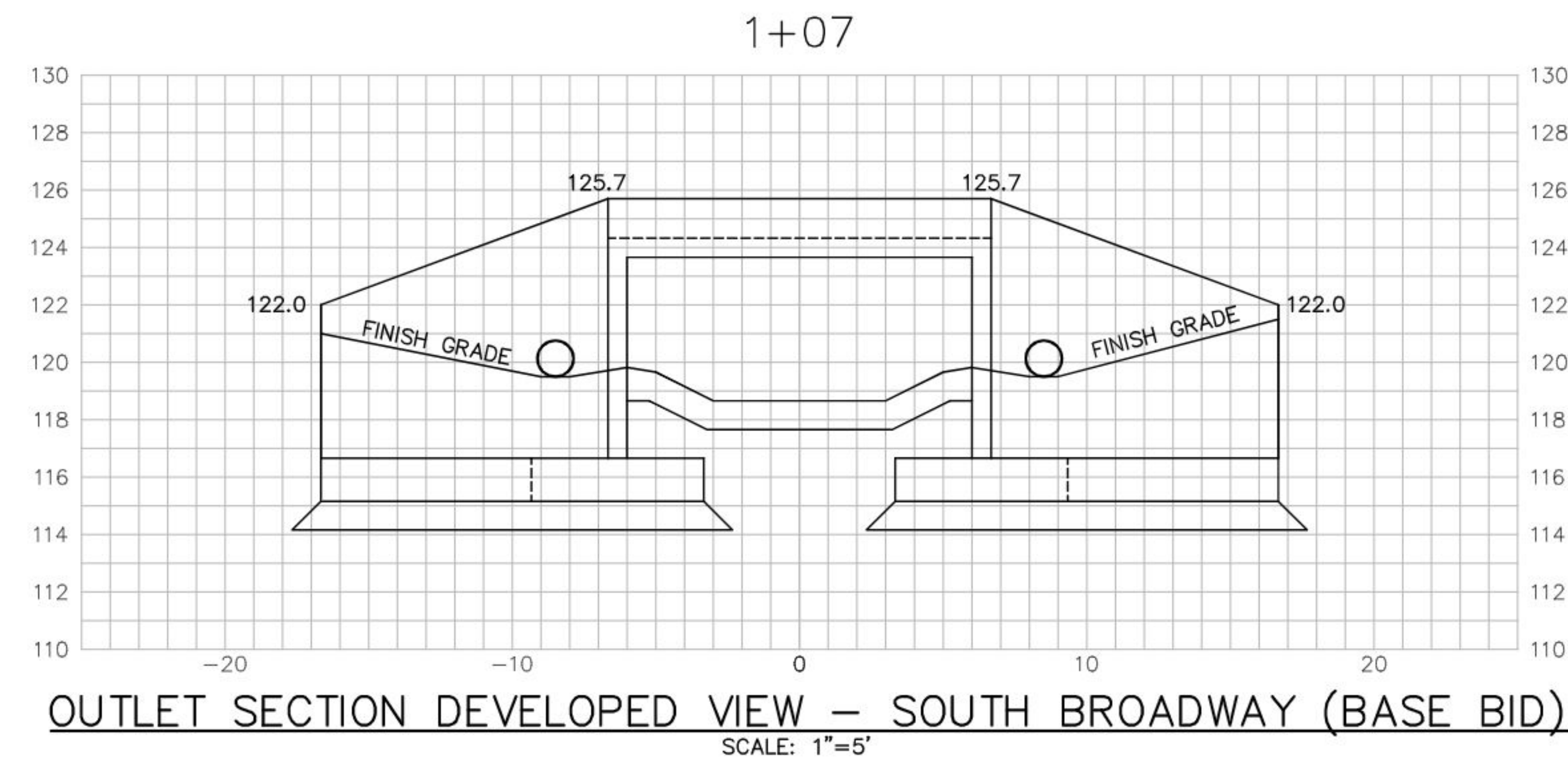
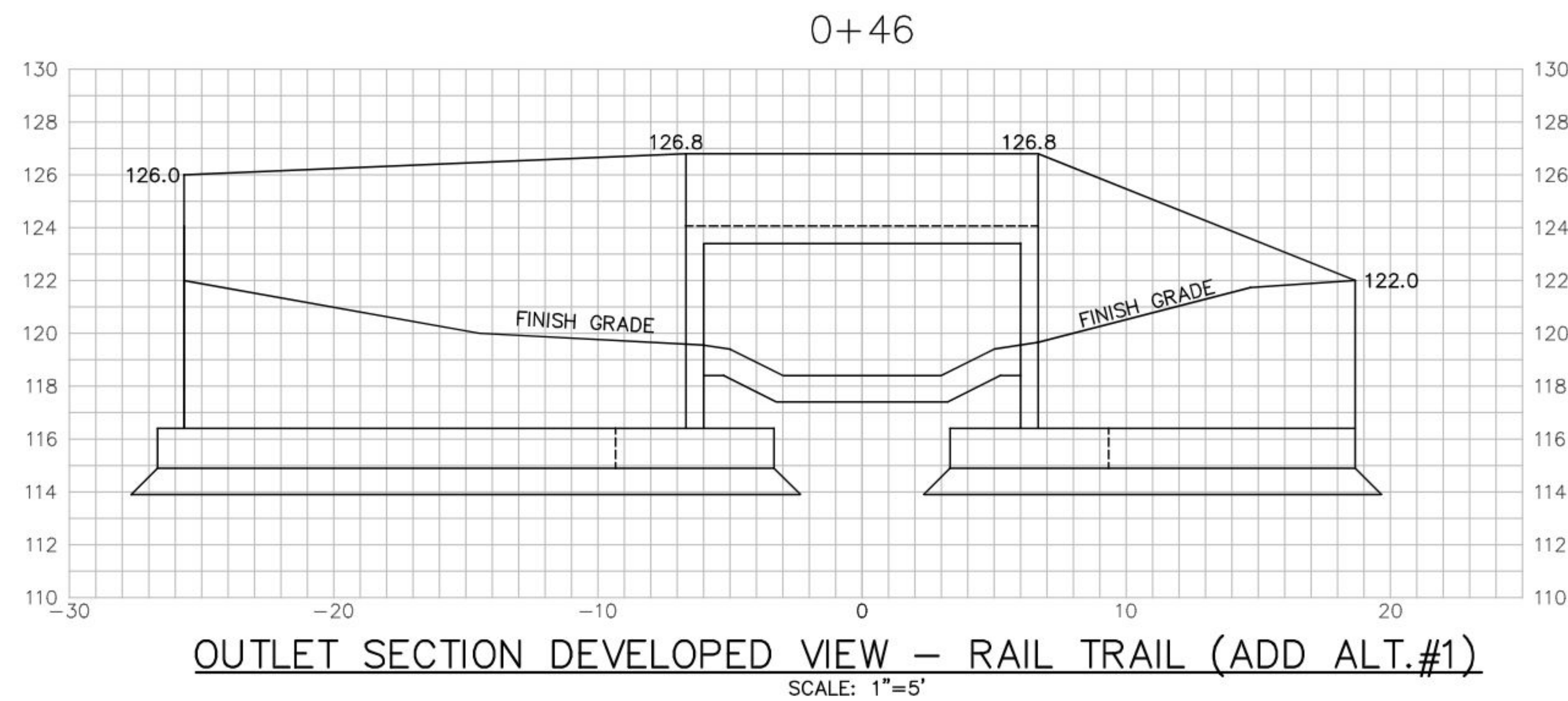
AASHTO M31 (ASTM-A615), GRADE 60.




1.	DESIGN FROST DEPTH	4.5 FT
2.	NET ALLOWABLE FOUNDATION BEARING PRESSURE	6.0 KSF
3.	SEISMIC SOIL SITE CLASS (IBC 2012)	C
4.	BASE FRICTION FACTOR	0.40
5.	TOTAL UNIT WEIGHT OF BACKFILL	130 PCF
6.	ACTIVE LATERAL EARTH PRESSURE COEFFICIENT	0.3
7.	PASSIVE LATERAL EARTH PRESSURE COEFFICIENT	3.3
8.	AT REST LATERAL EARTH PRESSURE COEFFICIENT	0.5
9.	REFER TO GEOTECHNICAL REPORT INCLUDED IN THE APPENDIX OF THE PROJECT MANUAL.	

1. DRAINAGE AREA: 1,841 AC.
2. ROUGH WATERWAY OPENING: 50 SF
3. REFER TO HYDRAULIC SUMMARY TABLE UNDER BRIDGE CONSTRUCTION NOTES ON SHEET G-2.

1. A COFFERDAM AND WATER DIVERSION STRUCTURE IN ACCORDANCE WITH SECTION 02370 OF THE SPECIFICATIONS IS REQUIRED. DEWATER THE EXCAVATION AREA AND SUPPORT EMBANKMENTS TO MAINTAIN TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT THE PROPOSED METHOD OF COFFERDAM AND WATER DIVERSION CONSTRUCTION IN ACCORDANCE WITH THE SPECIFICATIONS FOR REVIEW AND APPROVAL PRIOR TO THE START OF CONSTRUCTION. ALL COSTS ASSOCIATED WITH THE DESIGN, INSTALLATION, DEWATERING, MAINTENANCE, AND REMOVAL OF THE COFFERDAM AND WATER DIVERSION STRUCTURE WILL BE SUBSIDIARY TO ITEM 2.5.

1. PRECAST CONCRETE RIGID FRAME CULVERT (CONCRETE CLASS AAA), SHALL CONSIST OF UNITS TOTALING AN OUT-TO-OUT DIMENSION OF 76'-3" ALONG THE CENTERLINE, WITH A 12' WIDE NORMAL OPENING FOR THE BASE BID (ADD ALTH OUT-TO-OUT DIMENSION IS 30 LF). SHOP DRAWINGS SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL OF ALL PRECAST COMPONENTS, INLET AND OUTLET HEADWALLS, WINGWALLS, AND ALL ASSOCIATED WORK INCLUDING NATIVE STONE FILL SHALL BE SUBSIDIARY TO ITEM 2.2.1 (SEE QUANTITY SUMMARY TABLE, SHEET C-3).
2. BARRIER MEMBRANE SHALL BE APPLIED TO ALL JOINTS AND SHALL EXTEND A MINIMUM OF 1' TO EITHER SIDE OF THE JOINT. COSTS SHALL BE INCLUDED UNDER ITEM 2.2.1.
3. COSTS FOR ALL MECHANICAL SPLICERS SHALL BE INCLUDED UNDER PRECAST CONCRETE ITEM 2.2.1.
4. PRECAST WINGWALLS SHALL BE ATTACHED TO THE CULVERT ONLY, AND SHALL NOT BE MECHANICALLY ATTACHED TO THE HEADWALLS.
5. CULVERT WALL THICKNESS, WINGWALL, AND FOOTING SIZED DEPICTED ON THESE PLANS ARE CONCEPTUAL. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A FINAL CULVERT, WINGWALL AND FOOTING, DESIGN STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW HAMPSHIRE.
6. WATER LEVEL MAY VARY FROM THAT WHICH IS SHOWN.
7. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4".
8. THE CONTRACTOR IS REQUIRED TO PLACE ALL CONCRETE IN THE DRY.
9. JOINTS BETWEEN PRECAST UNITS SHALL BE WATERTIGHT.
10. GALVANIZED STEEL ANGLES AND BOLTS SHALL BE USED TO DRAW CULVERT SECTIONS TOGETHER. THESE HARDWARE ASSEMBLIES SHALL BE ATTACHED TO THE OUTSIDE SURFACE OF THE CULVERT SECTIONS AND SHALL BE LEFT IN PLACE (COSTS INCLUDED IN ITEM 2.2.1).
11. SEE SPECIFICATION SECTION 02435 FOR ADDITIONAL REQUIREMENTS.



DWG NO C2		SHEET 25 OF 56	
BRIDGE REPLACEMENT SOUTH BROADWAY SEWER, WATER & BRIDGE IMPROVEMENTS TOWN OF SALEM, NH			
 UNDERWOOD engineers		25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	
			
Drawn/Chk. RMS Designed. EBN Checked. — Approved. — Date. 1/9/2018 Book No. — Project No. 2126 Div. ID 2126_base.bridge		Scale. AS SHOWN REVISIONS No. APP'D	
ISSUE FOR APPROVAL Date 1/8/18 By GSM		CONSTRUCTION Date 1/8/18 By GSM	
RECORD DRAWING Date — By —		APP'D	



1
C-3

TYPICAL CULVERT SECTION

SCALE: 1"=2'

SPECIAL FILL — STREAM BED MATERIAL
WHEN THERE IS INSUFFICIENT NATIVE STREAMBED MATERIAL AVAILABLE ON SITE, SPECIAL FILL CONSISTING OF SANDY GRAVELLY SOIL WITH 4"–6" COBBLES SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING GRADATION:

SIEVE	PERCENT PASSING
6"	100
#4	15–30
#200	0–12*

* PERCENT PASSING THE #4 SIEVE

- NOTES:**
- CAST DOG HOUSE OPENING IN FOUNDATION WALL TO DIMENSIONS SHOWN. PROVIDE REINFORCING DOWELS FOR CLOSURE POUR AS REQUIRED.
 - CONTRACTOR SHALL SUPPLY NECESSARY FORM WORK, TOOLS MATERIALS AND LABOR FOR THE CAST-IN-PLACE FIELD CLOSURE POUR. CONCRETE SHALL BE 5,000 PSI CLASS A



2
C-3

SPECIAL CULVERT SECTION AT SEWER & WATER CROSSING

SCALE: 1"=3'



3
C-3

TYPICAL WINGWALL SECTION

NOT TO SCALE

- NOTES:**
- WINGWALLS MAY BE PRECAST PER THE CULVERT MANUFACTURER'S DESIGN OR FORMED AND CAST IN PLACE. WHETHER PRECAST OR CAST IN PLACE THE CONTRACTOR SHALL SUBMIT DESIGN DRAWINGS STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN NEW HAMPSHIRE FOR APPROVAL BY THE OWNER.

Drawn/Chk. RMG
Designed. EBN
Checked. —
Approved. 1/9/2018
Date. —
Book No. —
Project No. 2126
Dwg. ID 2126_Base.Bridge
Scale. AS SHOWN



UNDERWOOD
engineers

25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

BRIDGE REPLACEMENT
SOUTH BROADWAY SEWER, WATER &
BRIDGE IMPROVEMENTS
TOWN OF SALEM, NH

DWG NO
C3

SHEET
26 OF 56

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OFFSITE DRIVEWAY IMPROVEMENT SUMMARY (SEE EASEMENT PLAN IN PROJECT MANUAL)

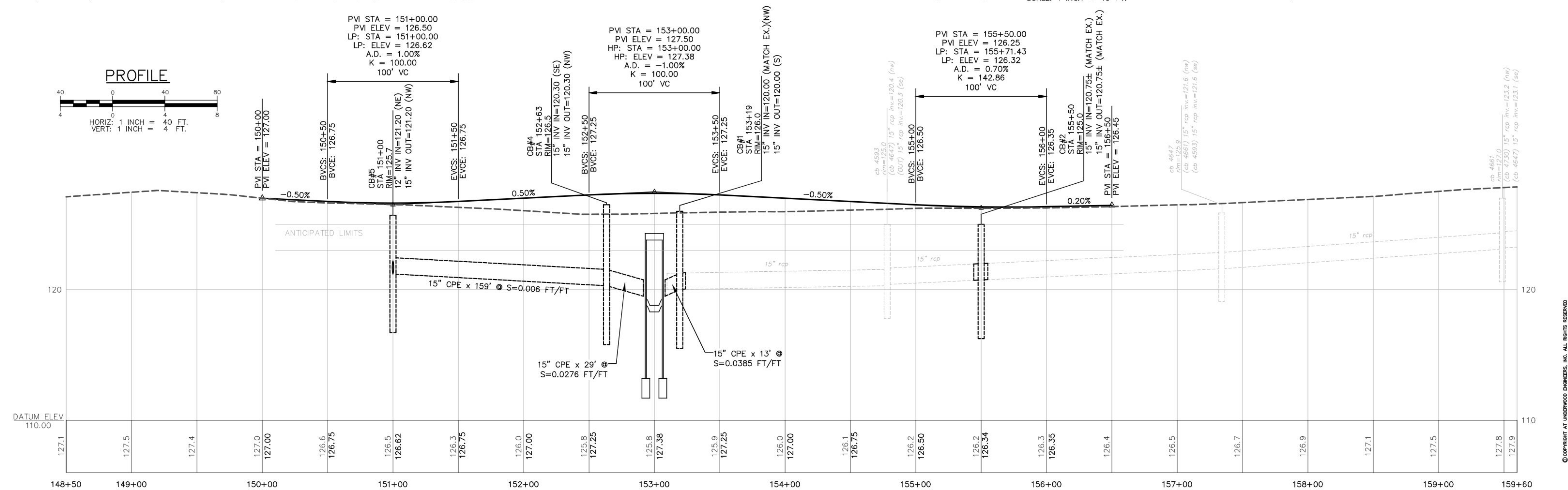
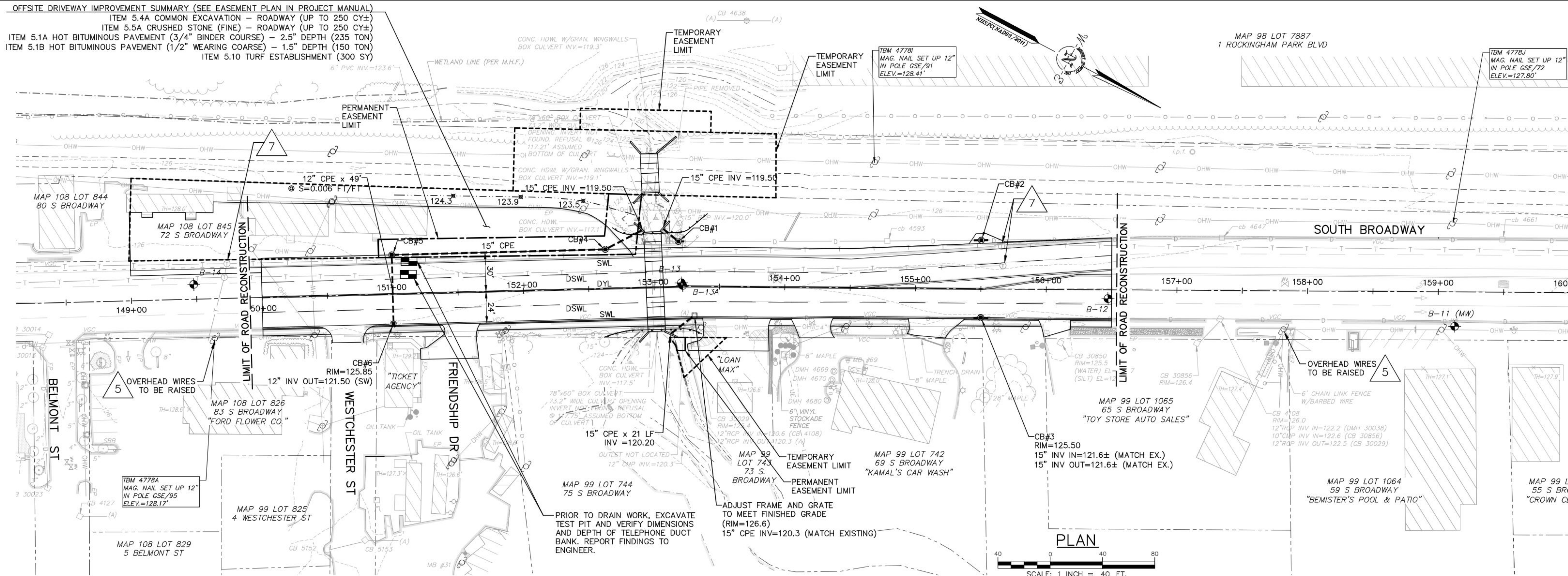
ITEM 5.4A COMMON EXCAVATION - ROADWAY (UP TO 250 CY±)




ITEM 5.5A CRUSHED STONE (FINE) - ROADWAY (UP TO 250 CY±)

ITEM 5.1A HOT BITUMINOUS PAVEMENT (3/4" BINDER COURSE) - 2.5" DEPTH (235 TON)

ITEM 5.1B HOT BITUMINOUS PAVEMENT (1/2" WEARING COARSE) - 1.5" DEPTH (150 TON)

ITEM 5.10 TURF ESTABLISHMENT (300 SY)



DWG NO	SOUTH BROADWAY ROADWAY PLAN & PROFILE			 UNDERWOOD engineers	 	Drawn/Chk.—RMG	Δ
	R1	SOUTH BROADWAY SEWER, WATER & BRIDGE IMPROVEMENTS				Designed EBN	Δ
SHEET	TOWN OF SALEM, NH			25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733		Checked —	Δ
	27 OF 56					Approved —	Δ
						Date 1/9/2018	Δ
						Book No. —	Δ
						Project No. 2128	Δ
						Dwg. ID 2128base	Δ
						Scale AS SHOWN	Δ
							NO.
							REVISIONS
							APP'D

Document 2

Floodplain and Wetland 8-Step

EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT EXECUTIVE ORDER 11990 WETLANDS PROTECTION 8-STEP ANALYSIS (44 CFR PART 9)

TITLE: Main Street and South Broadway Flood Control Project

LOCATION: Town of Salem, NH

- Main Street Culvert: 42.78217, -71.22609 to 42.78048, -71.22554
- Salem Bike-Ped Corridor Culvert: 42.774051, -71.224228

PROPOSED ACTION: Culvert replacements at two stream crossings

DESCRIPTION OF PROJECT: The Proposed Action would replace culverts at two stream crossings that currently restrict flow in the east tributary of Policy Brook in the Town of Salem, New Hampshire. The purpose of the project is to reduce flooding in the area and subsequently minimize road closures and damage to infrastructure and property. Flooding causes Main Street and South Broadway—two major roads in the town—to become impassable during overtopping events, which leads to recurring emergency flood-related repairs, as well as flood-related damage and displacements in the larger drainage basin.

The proposed upstream replacement is located in the vicinity of 142 Main Street. The Proposed Action would replace a twin oval, corrugated metal pipe system with a single 3-foot by 12-foot box culvert that would convey stream flows up to the 50-year storm event. The new box culvert inlet would be installed in the same location as the current inlet with the new inlet and headwalls at 90-degree angles. From the inlet, the culvert would run approximately 100 feet to the southeast and then turn south for approximately 660 feet between commercial buildings and end at the southern wetland. There would be up to 400 linear feet of channel restoration at the outlet. The majority of the existing culverts would be filled and abandoned in place. The remaining sections would be removed to construct the new culvert and within the town's right of way. There may be a segment of precast structure or stone box under the commercial property that would be sealed off with brick and mortar.

The proposed downstream culvert replacement is in the vicinity of 73 South Broadway under the Salem Bike-Ped Corridor (rail-trail). At this location, the Proposed Action would replace an existing 5-foot by 5-foot granite culvert with a 30-foot-long 5-foot by 12-foot box culvert designed to convey stream flows up to the 50-year storm event. The inlet would have two 10-foot-long headwalls angled at 45 degrees on each side of the culvert to assist in conveying water through the new culvert. The outlet would have a 19-foot-long headwall angled at 52.5 degrees to the north of the brook and a 12-foot-long headwall angled at 38 degrees to the south of the brook.

The Proposed Action is part of a watershed-wide effort to ensure flow conveyance of the 50-year flood event in the Policy-Porcupine Brook watershed. The two projects are part of a group of seven culvert enlargement and floodplain restoration projects in the Town of Salem, which were identified through hydrologic and hydraulic studies. Five of the projects were constructed over the last 11 years. The culvert under South Broadway, 30 feet east and adjacent to the rail-trail, was replaced in 2019 as part of this group of projects. The road elevation of South Broadway was also raised approximately one foot at that time to further reduce the risk of overtopping.

Although the upsized culvert and increase in the road elevation of South Broadway provides additional protection from overtopping, the ability of the road culvert to pass the 50-year flood event is dependent on the upsizing of the Salem Bike-Ped Corridor culvert because of their proximity. The inlet of the Salem Bike-Ped Corridor culvert would be raised to 126.2 feet National Geodetic Vertical Datum of 1929 (NGVD29) to accommodate the 50-year flood event, and the outlet would be raised to 126.8 feet

NGVD29. With the elevation increase and the additional widening of the culvert, the elevation of the 50-year flood event at South Broadway would be reduced from 127.0 to 126.1 feet NGVD29.

STEP 1 Determine whether the proposed action is located in the 100-year floodplain (500-year floodplain for critical actions) and/or within a designated wetland.

The project area for the Proposed Action appears on two Flood Insurance Rate Maps (FIRMs). The Main Street culvert appears on FIRM panel number 33015C0561E, dated May 17, 2005, and is located within Zone AE and a regulatory floodway. The Salem Bike-Ped Corridor culvert appears on FIRM panel number 33015C0563E, dated May 17, 2005, within Zone AE and the regulatory floodway.

Portions of the Main Street culvert project area are within wetlands mapped by the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI). The NWI classifies wetlands in the Main Street Culvert project area as palustrine, emergent, seasonally flooded/saturated wetlands dominated by common reed (*Phragmites australis*) (PEM5E) and palustrine, scrub-shrub, broad-leaved deciduous, emergent, persistent, seasonally flooded/saturated wetlands (PSS1/EM1E). The NWI does not identify any wetlands in the Salem Bike-Ped Corridor project area. However, the subrecipient conducted a wetland delineation and identified wetlands at the inlet and outlet of the existing culvert in 2018.

STEP 2 Notify the public at the earliest possible time of the intent to carry out an action in a floodplain and involve the affected and interested public in the decision-making process.

An initial public notice was posted in the *Eagle Tribune* on June 19, 2020.

STEP 3 Identify and evaluate practicable alternatives to locating the proposed action in a floodplain (including alternatives sites, actions, and the "No action" option). If a practicable alternative exists outside the floodplain, FEMA must locate the action at the alternative site.

No Action Alternative – Under the No Action Alternative, the undersized culverts would not be replaced. The culverts would continue to cause water to overtop Main Street during the 10-year flood event and greater. South Broadway and the Salem Bike-Ped Corridor would still be at risk of overtopping at the 50-year flood event, despite the upsizing of the road culvert. Floodwaters would not pass through the rail-trail culvert, thus backing up through the road culvert and subsequently overtopping the road because of their proximity. Both roads would continue to be impassable during overtopping events and would continue to require repairs from flood damage that could result in additional road closures. Nearby residential and commercial areas would also continue to experience floods and flood-related damage and displacements. The No Action alternative does not meet the purpose and need of the project; therefore, it is not a practicable alternative.

Practicable alternatives outside the floodplain – There are no practicable alternatives outside the floodplain. The culverts are functionally dependent on their location in the stream channel and associated floodplains. It is not practicable to move the two roads and the mixed-used pedestrian path (Main Street, South Broadway, and Salem Bike-Ped Corridor) out of the regulatory floodway and floodplain.

STEP 4 Identify the potential direct and indirect impacts associated with the occupancy or modification of floodplains and/or wetlands and the potential direct and indirect support of floodplain and/or wetland development that could result from the proposed action. 44 CFR Part 9.10.

Implementation of the Proposed Action would result in short-term adverse impacts on wetlands, the regulatory floodway, and the 100-year floodplain as a result of in-water work, including excavation, dredging, and temporary water diversion and dewatering:

- Construction activities would require the permanent removal of vegetation in wetlands and the floodway in both project areas, and for the stream channel restoration in the Main Street culvert project area.
- Construction activities have the potential to spread invasive plant species in wetland and floodplain areas.
- Construction activities would generate additional noise in the project areas, potentially impacting fish and wildlife species that use the wetlands and floodplain areas as habitat.
- If construction occurs inside the nesting season, there could be a short-term adverse effect on migratory birds that use the wetlands or floodplains for habitat.
- Temporary dewatering could potentially result in the loss of individual aquatic organisms and temporarily block stream migration for fish.
- Construction activities could cause an accidental release of hazardous waste during the construction period.

In the long-term, construction of the Main Street culvert would disturb an area of approximately 1,000 square feet at the inlet and 8,000 square feet of wetland and stream channel at and downstream of the outlet. Portions of these areas contain floodplains and wetlands, which may result in a permanent loss of these resources with no compensatory mitigation. The impacts would be caused by the installation of headwalls and for the channel restoration. Construction of the Salem-Bike Ped Corridor culvert could cause up to 1,300 square feet of permanent impacts to wetlands with no compensatory mitigation. Once construction is complete, the permanent loss of wetland habitat may affect fish and wildlife and water quality.

STEP 5 Minimize the potential adverse impacts and support to/within floodplains to be identified under Step 4, restore and preserve the natural and beneficial values served by floodplains.

The Proposed Action is functionally dependent on its location in the floodplain and wetlands (44 CFR 9.11(d)(1)(i)) and, being the only practicable alternative, potential impacts will be minimized (44 CFR 9.11(d)(5)). FEMA will require the following conditions to avoid and minimize potential adverse impacts identified in Step 4:

- The subrecipient must obtain a local certificate that demonstrates no rise in the base flood elevation anywhere within the community (44 CFR 60.3 and 44 CFR 9.11(d)(4)).
- Following the construction of the Proposed Action, the subrecipient must apply for a Letter of Map Revision in accordance with 44 CFR 65.6.
- The subrecipient must obtain a local floodplain permit for the Proposed Action demonstrating consistency with the Town of Salem Floodplain Development Ordinance (Article VII § 490-705) in accordance with 44 CFR 9.11(d)(6).

- The subrecipient must obtain and comply with Section 404 and 401 permits from the U.S. Army Corps of Engineers and the New Hampshire Department of Environmental Services, respectively, to comply with the Clean Water Act. These permits would include conditions to avoid, minimize, and mitigate for impacts on water quality and wetlands, including but are not limited to:
 - Siltation and erosion control measures (e.g., silt fences)
 - Turbidity control
 - Site restoration measures (e.g., replanting exposed soils with native vegetation)
 - Minimizing work within the water
 - Accidental release of hazardous waste
- The subrecipient must comply with the Town of Salem Wetlands Conservation Ordinance (Article VII § 490-706) for work within and adjacent to wetlands.
- The subrecipient must manage any state-listed invasive plants present in the project area using the New Hampshire Department of Agriculture, Markets, and Foods “Control of Invasive Plants” guidelines in accordance with New Hampshire Code of Administrative Rules Chapter Agr 3800.

The Proposed Action would restore and preserve the natural and beneficial values of the floodplain and wetlands in the long-term by reducing flooding and overtopping of the roads and restoring part of a stream channel. A reduction in flooding and overtopping would reduce the risk of pollutants (such as road salts) from entering the floodplain and wetlands in the project areas and drainage basin. The improved flow capacity of the new culverts could reduce erosion of the road and trail embankments, thus reducing sedimentation of the wetlands. The restored channel downstream of the Main Street culvert would allow for greater flow conveyance during flood events. The larger culverts would reduce debris blockage and provide a larger passage for fish species. Disturbed areas would be replanted with native vegetation. The Proposed Action would reduce the use of construction equipment needed for flood-related road repairs that could generate spills of lubricants and fuels. There would also be a reduction in the potential flooding of facilities regulated by state and federal hazardous materials laws in the project areas and drainage basin.

STEP 6 Reevaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards or impacts on wetlands, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain and wetland resources and second, if alternatives preliminarily rejected at Step 3 are practicable in light of the information gained in Steps 4 and 5. FEMA shall not act in a floodplain unless it is the only practicable location.

The Proposed Action remains practicable because the minimization measures described in Step 5 effectively address adverse impacts to the floodplain and wetlands, and proper sizing of the culverts would improve the flooding problem. The alternatives eliminated in Step 3 remain impracticable because (a) the No Action does not improve the flooding problem (it does not meet the purpose and need for the project), and (b) the action outside the floodplain (i.e., relocate roads, homes, and businesses) is prohibitively expensive and is not practicable.

STEP 7 Prepare and provide the public with a finding and public explanation of any final decision that the floodplain is the only practicable alternative.

The final public notice will be included as part of the environmental assessment public notice.

STEP 8 Review the implementation and post-implementation phases of the proposed action to ensure that the requirements stated in 44 CFR 9.11 are fully implemented.

The FEMA project grant will be conditioned for the subrecipient to secure federal, state, and local permits for work in both the floodplain and wetlands. Compliance with all federal, state, and local permits will be determined as part of the grant closeout process. Full detail of the conditions placed on the grant can be found in the Record of Environmental Consideration.