I-293 (F.E. Everett Turnpike) Exits 6 & 7 Improvements (Manchester 16099)

Manchester, New Hampshire

PREPARED FOR



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NHDOT #16099

I-293 (F.E. Everett Turnpike), Exits 6&7 Improvements Manchester

Hillsborough County, New Hampshire

Environmental Assessment

Prepared for: U.S. Department of Transportation Federal Highway Administration & New Hampshire Department of Transportation



10 15/19 Date of Approval

Date of Approval

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For NH Department of Transportation

For Federal Highway Administration

The proposed project involves a 3.3-mile segment of Interstate 293 (I-293) beginning north of Exit 5 (Granite Street) and ending north of Exit 7 (Front Street). The purpose of the project is to address capacity, safety, and access-related deficiencies along a portion of I-293 (FE Everett Tumpike) in Manchester, New Hampshire.

Numerous alternatives were evaluated, and a preferred alternative has been selected that addresses project's purpose and need. The preferred alternative includes the following elements: widening the northbound and southbound barrels of I-293 from two to three lanes in each direction; reconstructing Exit 6 more or less in its existing location using a Single Point Urban Interchange (SPUI) configuration; and relocating Exit 7 approximately 0.5 mile north of its current location, constructing a full access interchange.

Impacts to the natural, cultural, and socio-economic environment were analyzed. Mitigation is proposed to offset unavoidable impacts associated with the project, where applicable.

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Acronyms

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AGQS	Ambient Groundwater Quality Standards
APE	Area of Potential Effect
BFW	Bankfull Width
BMPs	Best Management Practices
CAA	Clean Air Act
CAAA	1990 Clean Air Act Amendments
CCTV	Closed-Circuit Television
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
CLS	Conservation Land Stewardship
CNE	Common Noise Environments
СО	Carbon Dioxide
CRAM	Cultural Resource Agency Meetings
DASH	Downtown Area Shuttle
dBA	A-weighted Decibels
DDI	Diverging Diamond Interchange
DEI	Dimensional Effectiveness Index
DHV	Design Hour Volume
DMS	Dynamic Message Signs
DOE	Determination of Eligibility
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FONSI	Finding of No Significant Impact

GIS	Geographic Information System	
GMP	Groundwater Management Permit	
GMZ	Groundwater Management Zone	
GPS	Global Positioning System	
НСМ	Highway Capacity Manuals	
IPaC	Information for Planning and Consultation	
ITS	Intelligent Transportation System	
LCHIP	Land and Community Heritage Investment Program	
LCIP	Land Conservation Investment Program	
LEP	Limited English Proficiency	
LIDAR	Light Detection and Ranging	
LOS	Level of Service	
LRS	Limited Reuse Soils	
LWCF	Land and Water Conservation Fund	
MCC	Manchester Community College	
MOA	Memorandum of Agreement	
MOVES	Motor Vehicle Emissions Simulator	
MSAT	Mobile Source Air Toxics	
MTA	Manchester Transit Authority	
MU	Map Unit	
MVMT	Million Vehicle Miles Traveled	
NAAQS	National Ambient Air Quality	
NAC	Noise Abatement Criteria	
NB	Northbound	
NEPA	National Environmental Policy Act	
NHDES	NH Department of Environmental Services	
NHDHR	NH Division of Historical Resources	

NHDNCR	NH Department of Natural and Cultural Resources	SNHRPC	Southern NH Regional Planning Commission	
NHDOT	New Hampshire Department of	SPUI	Single Point Urban Interchange	
NHFG	NH Fish and Game Department	STIP	Statewide Transportation Improvement Program	
NHNHB	NH Natural Heritage Bureau	STPs	Standard Test Pits	
NHPA	National Historic Preservation Act	SWQPA	Shoreland Water Quality	
NHSHPO	New Hampshire State Historic Preservation Office	TAC	Technical Advisory Committee	
NLEB	Northern Long-eared Bat	TAZ	Trattic Analysis Zones	
NMFS	National Marine Fisheries Service	ТСР	Traffic Control Phasing	
NOAA National Oceanic and		TIP	Iransportation Improvement Program	
	Atmospheric Administration	TMC	Transportation Management	
NRAM	Natural Resource Agency	TN	Total Nitrogen	
	NH Office of Strategic Initiatives	TNM	Traffic Noise Model	
INKEF	Places	ТР	Total Phosphorus	
OSHA	Occupational Safety and Health	and Health TPH	Total Petroleum Hydrocarbons	
PAF	Project Area Form	TSM	Transportation Systems Management	
PCBs	Polychlorinated Biphenyls	TSMO	Transportation Systems	
PEM	Palustrine Emergent		Management and Operations	
PFAS	Per- and Polyfluoroalkyl Substances	TSS	Total Suspended Solids	
		ULSD	Ultra Low Sulfur Diesel	
PFHxS	Perfluorohexane sulfonic acid	USACE	US Army Corps of Engineers	
PFO	Palustrine Forested	USC	United States Code	
PM	Particulate Matter	USDOT	US Department of Transportation	
POP	Project Operations Plan	USEPA	US Environmental Protection	
PSS	Palustrine Scrub-Shrub			
ROW	Right-of-Way	USEVS		
RPR	Request for Project Review	USGS		
RSA	Revised Statutes Annotated	VMI	Vehicle Miles Traveled	
RWIS	Roadway Weather Information	VPD	Vehicles Per Day	
	Systems	WAP	Wildlife Action Plan	
SB	Southbound			
SIP	State Implementation Plan			
SGMP	Soil and Groundwater Management Plan			

Executive Summary

ES-1. Proposed Action

The I-293 (F.E. Everett Turnpike), Exits 6 & 7 Improvements Manchester Project (the "Project") is located in Manchester, Hillsborough County, New Hampshire. The Project encompasses a 3.3-mile segment of I-293 beginning north of Exit 5 (Granite Street) and ending north of Exit 7 (Front Street). The Proposed Action involves widening the northbound and southbound barrels of I-293 from two to three lanes in each direction; reconstructing Exit 6 more or less in its existing location using a Single Point Urban Interchange (SPUI) configuration; and relocating Exit 7 approximately 0.5 mile north of its current location, constructing a full access interchange. The Proposed Action includes reconstruction of five bridges, construction of two new bridges, installation of new drainage and stormwater treatment and management systems, construction of three sound walls, and construction of other related infrastructure such as signage and signals.

The Federal Highway Administration (FHWA) is the lead federal agency for this Environmental Assessment (EA), which was developed pursuant to the National Environmental Policy Act (NEPA). FHWA must approve the modification of Exit 6 and the relocation of Exit 7, requiring a break in the existing Limited Access Right-of-Way of I-293, pursuant to 23 USC 111 and FHWA's policy entitled Policy on Access to the Interstate System, dated May 22, 2017, which requires federal approval of new or revised access points to the Interstate System. Additionally, FHWA funds may be applied to the construction of the Project.

More detail on the specific elements of the Proposed Action is provided in **Chapter 3**, Proposed Action and Alternatives. A summary is provided below.

Highway Widening

Project work on I-293 northbound and southbound would include widening the existing highway from two lanes to three lanes in each direction. This lane expansion would begin at the northern limit of Exit 5 (approximately 1,400 feet north of Granite Street) and continue northward, though the Exit 6 and Exit 7 interchanges, to a point approximately 1.3 miles north of the existing Exit 7 interchange.

Exit 6 Interchange

The Project proposes to replace the existing Exit 6 interchange with a SPUI, providing full north and southbound access to and from Goffstown Road and Amoskeag Street. The SPUI will be controlled by one signalized intersection, with the I-293 Exit 6 ramps beginning or ending at this signalized intersection. The SPUI would be elevated above the I-293 mainline. Right-turn movements exiting I-293 would be stop-controlled. The SPUI will be designed to accommodate pedestrians and bicyclists with sidewalks and crosswalks, and 5-foot wide roadway shoulders. Front Street would no longer have direct access to Exit 6 or Goffstown Road, but would instead function as a local roadway, with a connection to Eddy Road to the south. Two new bridges would be constructed: Goffstown Road/Amoskeag Street over I-293 (i.e., the SPUI), and Goffstown Road over Front Street.

Exit 7 Interchange

The Project would involve relocating the Exit 7 interchange approximately 0.5 mile to the north and would provide full on- and off-ramp access for both the northbound and southbound travel ways. A new roadway would be created from the interchange to Front Street to the east between the Manchester Community College and Country Club Drive. The new roadway would also connect the relocated interchange to Dunbarton Road to the west, following an alignment north of the Manchester Landfill.

ES-2. Reasonable Alternatives Considered

This EA evaluates one Build Alternative (the "Proposed Action," or the "Project") and the No-Build Alternative, as required by NEPA regulations. Chapter 4, Affected Environment and Environmental Consequences describes potential direct, indirect, and cumulative impacts of these two alternatives. During project development, many build alternatives were considered. The development of alternatives considered three segments of the highway corridor within the Study Area:

- > The "Southern Mainline Segment," including the highway from the southern limit of the Study Area to a point just south of the Eddy Road southbound slip ramp,
- connecting roads, and
- > The "Exit 7 Segment," including the area near the existing Exit 7, from the Black Brook Bridge and extending northward to the Project limits.

why they were rejected.

- Action.
- > Southern Mainline Segment Alternatives Either located closer to the Merrimack River to the east or the Cotton Duck Building/Amoskeag Millyard Historic District to the west:
- Skew Toward River
- Skew Toward Cotton Duck Building
- configurations:
- Diamond Interchange

- > The "Exit 6 Segment," from a point just south of the Eddy Road southbound slip ramp to about the Black Brook Bridge, including all on- and off-ramps and immediately
- The following alternatives were evaluated but ultimately rejected in favor of the Proposed Action. These alternatives are discussed in Chapter 3 of this EA, along with an explanation of

> No-Build Alternative – Serves as a basis for comparison of impacts with the Proposed

> Exit 6 Interchange Alternatives – North and southbound ramp intersection

- Diverging Diamond Interchange
- Offset Diamond Interchange
- Exit 7 Interchange Alternatives North and southbound ramp intersection configurations:
- Diamond Interchange (Existing Location)
- Relocated Interchange with Connection to Goffstown Road

ES-3. Environmental Impacts (Beneficial and Adverse)

This EA describes the environmental consequences analysis, or impacts analysis, which compares the probable consequences of the Proposed Action and the No-Build Alternative. Impacts, also known as "effects," may be direct, indirect, temporary, or permanent (see Chapter 4). Impacts may also be beneficial or adverse.

Transportation

Under the Proposed Action for the year 2035, the operational analysis results of the I-293 mainline and ramps show good operating conditions (LOS C or better) during the AM peak hour and acceptable operating conditions (LOS D or better) during the PM peak hour. All poor operating conditions (LOS E or LOS F) that would occur if the Proposed Action were not constructed (i.e., the No-Build Alternative), have been eliminated.

The results of the signalized intersection analyses show acceptable operating conditions (LOS D or better) for the AM and PM peak hour conditions. At unsignalized intersections, there would be substantial improvements in the operations for side street movements from Dunbarton Road onto Front Street, and from the existing Manchester Community College driveway onto Front Street. Both locations would improve from LOS F to LOS C or better.

The Manchester Transit Authority (MTA) has provided generally favorable feedback on the Proposed Action, acknowledging that additional coordination will be needed during final design to mitigate changes to Transit Route 11. Transit Route 11 accesses Front Street via the Amoskeag circle and provides service to Manchester Community College, the Hackett Hill neighborhood, and shopping centers to the north. The Proposed Action would eliminate access to Front Street from the Exit 6 area. The MTA is evaluating revisions to existing routing, as well as potentially expanding service with additional routes, to offset the changes. Other transit service enhancements, such as the addition of bus pull-outs will be evaluated during final design.

The Proposed Action would eliminate the current bike route between Front Street and Coolidge Avenue. However, Front Street and Eddy Road (which becomes McGregor Street) would be connected to West Bridge Street, with fewer intersections for bicyclists to cross, and more direct connection from Dunbarton Road to West Bridge Street. The Proposed Action would provide a more bicycle and pedestrian friendly corridor, with Front Street and Eddy Road serving as a local road rather than a part of the existing Exit 6 interchange.

Air Quality

The air quality analysis demonstrates that the Proposed Action would comply with the 1990 Clean Air Act Amendments and the New Hampshire State Implementation Plan. A microscale analysis also demonstrates that carbon monoxide concentrations for the Proposed Action are below the National Ambient Air Quality Standards for carbon monoxide.

The Proposed Action is a project with Low Potential Mobile Source Air Toxics (MSAT) effects, which includes projects that serve to improve the operations of the highway without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. This includes minor widening projects and projects where the design year traffic is projected to be less than 140,000 vehicles per day. I-293 is expected to serve approximately 59,000 vehicles per day in the year 2035, well below the 140,000 vehicles per dav threshold.

Noise Environment

There would be no changes to other noise sources besides I-293. Permanent noise impacts are locations where, under the Proposed Action, highway noise levels would approach or exceed the Noise Abatement Criteria (NAC). Design-year noise levels approach or exceed the NAC at several locations, including:

- > Residences on McGregor Street

- Residences on Stark Lane south of Stark Way >
- Residential community on Country Club Drive

The feasibility and reasonableness of sound walls is evaluated according to NHDOT criteria in the Noise Policy. Based on the studies completed so far, the NHDOT is committed to the construction of feasible and reasonable noise abatement measures (such as sound walls).

Farmland Soils

A small amount of permanent impact would occur to farmland soils. However, since the Study Area is located within an urbanized area as identified by the US Census Bureau, the Project is exempt from Farmland Protection Policy Act requirements.

Groundwater Resources

The Proposed Action would result in minimal potential for impacts to groundwater resources or existing water supplies. The Proposed Action would increase the amount of pavement overlying the mapped stratified-drift deposits that exist mostly near the Exit 7 interchange and in the northerly section of the Project. The majority of new pavement associated with the proposed Exit 7 interchange and the widened mainline north of the Exit 7 interchange

- > Residential community on Riverfront Drive
- > Residences on Coolidge Avenue near Amoskeag Street
- Residences on Front Street between existing Exits 6 and 7

would overlay mapped stratified-drift deposits with a small amount overlaying mapped till deposits as well.

Water Quality

The Proposed Action would add impervious area within the watersheds of the Merrimack River and Black Brook that could potentially cause adverse water quality impacts due to the added stormwater runoff, if left untreated. A stormwater system consisting of various stormwater treatment best management practices (BMPs) has been included in the preliminary design, as discussed below under ES-4. Mitigation. In total, the Proposed Action would add about 33.9 acres of new roadway area, with most of this new pavement (30.5 acres) draining to the Merrimack River and the remaining 3.4 acres of pavement area draining to Black Brook.

Floodplains and Floodways

The Proposed Action would result in direct impacts to the 100-year floodplain; however, there would be no impacts within the regulatory floodway. New construction and substantial reconstruction would permanently impact floodplains through the addition or reduction of fill materials. Floodplain areas of the Merrimack River and Black Brook would be directly impacted to varying degrees. Permanent impacts would have a negligible effect on the base flood elevations in the Study Area. The Merrimack River permanent floodplain impacts would be minor in the context of the volume of the Merrimack River. Floodplain impacts to Black Brook would also be considered minor in the context of its relative floodplain size, limiting possible effects to the base flood elevation to a minimum.

Wetlands and Surface Waters

The Proposed Action would result in permanent wetland and vernal pool impacts, including impacts within bank of the Merrimack River and the bed and banks of Black Brook. The preliminary estimate of total wetland impacts is 3.3 acres, of which approximately 0.2 acre is impact to vernal pools. Additionally, approximately 0.4 acre of impact is within perennial and intermittent streams.

The Proposed Action would impact a total of approximately 8,939 square feet (2,003 linear feet) within the banks of the Merrimack River, and approximately 12,636 square feet (425 linear feet) of total impacts within the bed and bank of Black Brook.

Wildlife and Habitat

The Proposed Action would be constructed primarily in developed and previously disturbed areas where important wildlife habitat is lacking; therefore, the Project would have only minor impacts on wildlife overall. However, the proposed Exit 7 Interchange West Connector from I-293 to Dunbarton Road would bisect the southern portion of undeveloped forest associated with the Hackett Hill habitat block. This connector road would reduce forest habitat near Hackett Hill, cause some habitat fragmentation, and impact certain vernal pools and potential vernal pools located adjacent to the proposed connector road.

Fisheries

The Proposed Action avoids direct impacts to the bed of the Merrimack River, which limits the potential for fisheries impacts. In addition, in consultation with NOAA-National Marine Fisheries Service, it was determined that no direct permanent impacts to Essential Fish Habitat for Atlantic Salmon would occur.

Threatened and Endangered Species

A population of licorice goldenrod (Solidago odora spp. odora) is anticipated to be permanently impacted by the Proposed Action. A known occurrence of this species north of the Manchester Landfill and south of the Eversource ROW near Dunbarton Road was observed during the plant surveys conducted in August 2016. No other state-listed plants or wildlife would be impacted.

The US Fish and Wildlife Service determined on October 9, 2018 that the Proposed Action is "likely to adversely affect" federally-threatened northern long-eared bat (Myotis septerionalis), but any resulting incidental take of the northern long-eared bat is not prohibited by the final Endangered Species Act Section 4(d) rule. Correspondence received from the USFWS dated April 9, 2019, confirmed that the Proposed Action is in compliance under the Section 4(d) rule per the Streamlined Consultation Form, and no further consultation is required at this time. The Proposed Action is not anticipated to negatively impact other Federally-listed plants or wildlife.

Parks, Recreation, and Conserved Areas

The Proposed Action would not result in direct, permanent impacts to parks, recreation, conservation lands, including those subject to Section 4(f) or Section 6(f) protections. The Proposed Action does not require acquisition of any such property.

Cultural Resources

Pursuant to Section 106 of the National Historic Preservation Act, based on the Proposed Action and the known locations of highly sensitive archaeological sites, a determination was made that the Project would result in an Adverse Effect to archaeological resources. The Section 106 Consultation also determined that the Project would have No Adverse Effect on the Amoskeag Millyard Historic District, the individually eligible Amoskeag School, or the Langlois House.

Hazardous Materials and Contamination

A total of four active NH Department of Environmental Services (NHDES) case sites are located either within or abutting the Project, including the Manchester Landfill. Groundwater at the Manchester Landfill has been impacted by leachate; the primary contaminants include metals, volatile organic compounds, and per- and polyfluoroalkyl substances. Construction activities within known sites with Groundwater Management Zones and Groundwater Management Plans will be addressed per NHDES regulations. The Proposed Action will not

hinder active assessment and remediation of known sites. Roadside Limited Reuse Soils may be encountered in all topsoil within the limits of the existing ROW. Soils and groundwater generated during construction would be managed in accordance with a Project-specific Soil and Groundwater Management Plan to ensure proper handling, management, and disposal procedures for soil and groundwater.

Visual and Aesthetic Resources

Under the Proposed Action, new construction and substantial reconstruction would occur to the Exit 6 and Exit 7 interchanges, causing noticeable changes to visual resources, viewers, or visual guality. In general, views from the highway would be affected by additional pavement, highway widening, construction of the Exit 6 and 7 interchanges, installation of sound walls, and loss of natural vegetation buffers. The alterations of views would occur between the highway, the reconfigured and relocated Exits 6 and 7, and existing urban development. Views toward the highway would be affected by the installation of sound walls, increased elevation of the Exit 6 interchange, construction of the relocated Exit 7 interchange, removal of trees, and addition of pavement for new or existing roadways.

Environmental Justice

The Proposed Action provides a permanent benefit by improving traffic conditions within the City of Manchester and surrounding municipalities. While minority and low-income populations are present in the Study Area, the Proposed Action, with implementation of mitigation measures, is not anticipated to result in substantial adverse effects. Therefore, it would not cause a disproportionately high and adverse impact on any minority or low-income populations as defined by Executive Order 12898.

Socio-Economic Conditions

The Proposed Action would require both complete and partial acquisition of private properties, resulting in the displacement of business and households, or conversion of portions of properties to transportation use. These impacts include six complete property acquisitions (three commercial and three residential) totaling 2.6 acres. Additionally, 69 properties would have some type of partial acquisition, either through fee acquisition or via an easement, totaling approximately 35.5 acres.

Construction

All construction-related impacts are temporary impacts, since construction would be of a limited duration. Construction is expected to occur in phases over a period of approximately five years. The following is a brief summary of construction-related impacts:

> Construction activities would result in temporary road closures and potentially increased truck traffic throughout the Study Area. There would be temporary road closures and diversions along roadways in the Study Area including along Eddy Road during reconstruction of the southbound on-ramp to I-293. At times, these road closures may increase traffic volumes on other nearby roads.

- to adversely affect people nearby.
- dust. Emissions from construction equipment may result in elevated ambient of time.
- > A moderate amount of construction debris would be generated during construction.
- > Temporary visual impacts would occur during the construction period. Viewers would see minor visual changes throughout the duration of construction as different phases begin or end. Construction equipment, vehicles, raw materials, fencing, and temporary traffic detours would be removed from the area once construction is complete.
- > Construction activities would temporarily increase employment, earnings, and construction materials purchasing throughout the duration of the Project. These beneficial impacts are short-term, coincidental with the actual phasing and construction of the Proposed Action.

Indirect Effects and Cumulative Impacts

The cumulative impacts on social and cultural resources include impacts to cultural or historic properties, socioeconomics, and changes in land use. The indirect and cumulative adverse impacts on natural resources include increased impervious surfaces, potential wetland and wildlife impacts, habitat fragmentation and a reduction in forested lands. Through sound, integrated long-range planning and stewardship by all entities, impacts on resources would be diminished.

The Proposed Action aligns with the goals of Smart Growth opportunities identified in the City of Manchester's Master Plan. The Proposed Action was designed to improve existing traffic conditions throughout the I-293 corridor and adjacent commuter communities, alleviating current congestion issues and accommodating for future traffic growth potential. It is not anticipated that the Proposed Action would induce rapid expansion and growth in an area previously undeveloped or rural, but may facilitate the development of City-owned land at the planned Hackett Hill area and other parcels in the area.

ES-4. Mitigation

This EA identifies recommended mitigation measures when adverse impacts are unavoidable, where applicable. Mitigation measures for each natural, cultural, or social resource is provided in **Chapter 4**. The following summarizes mitigation measures for the resources where adverse impacts would be unavoidable.

> Construction would introduce new sources of noise and vibration that have the potential

- > Temporary air quality impacts could occur from construction activities such as grading, hauling, excavating and blasting operations, which may release or suspended fugitive
 - concentrations within the immediate vicinity of construction operations for short periods

> Temporary wetland and stream impacts would occur within Black Brook during the proposed bridge replacement work. Additionally, temporary indirect impacts may occur to one vernal pool since construction work would be nearby.

Transportation

The Proposed Action has a beneficial effect on traffic operations and safety; therefore, mitigation is not required. Construction activities, however, may require temporary traffic detours resulting in increased delays. To mitigate these impacts, the NHDOT plans to construct the northern portion of the Project, including the new Exit 7 interchange and associated roadways, first. Traffic control would be needed during construction, and a comprehensive Traffic Control Phasing Plan will be prepared during the final design phase of the Project. The planned phased construction of the Proposed Action, coupled with adequate signage and traffic management, is not projected to substantially disrupt traffic flow as a result of detours or re-routing on I-293 or the adjacent roadways.

Air Quality

Although no significant adverse impacts are anticipated during construction, various measures can be taken to reduce pollutant emissions, including dust control, idling restrictions, proper maintenance of all motor vehicles, machinery, and equipment, and other BMPs.

Noise Environment

Sound walls have been proposed where determined feasible according to NHDOT criteria in the Noise Policy. To mitigate traffic noise, the Proposed Action includes construction of three sound walls at locations adjacent to I-293 where abatement is warranted. According to the noise analysis results, sound walls would be feasible and reasonable to construct at the following areas:

- > Along the east side of I-293, north of Exit 6, adjacent to Riverfront Drive and Stark Lane;
- Along the west side of I-293, north of Exit 6, adjacent to a portion of Front Street between Omega Street and Amoskeag Street; and
- > Along the east side of I-293, extending north from the relocated Exit 7 interchange, in the vicinity of Country Club Drive.

A final decision on the installation of sound walls will be made during the final design process, following the completion of public involvement.

Water Quality

As many as fourteen stormwater treatment BMPs are included in the preliminary design to treat stormwater runoff from approximately 85 percent of the total pavement area, including existing pavement area. This proposed stormwater treatment would result in substantial mitigation and a net water quality benefit to receiving waters, since the pollutant loads under the Proposed Action are estimated to be less than that estimated under existing conditions, even with the additional pavement area included in the Proposed Action.

The Project is subject to the US Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System Construction General Permit since more than one acre of land

would be disturbed at any time. A Notice of Intent and Stormwater Pollution Prevention Plan will be developed prior to initiating construction that will outline the erosion control and any dewatering measures to be used during construction.

Floodplains and Floodways

considered during final design.

Wetlands and Surface Waters

Mitigation for the wetland impacts will be determined in accordance with the NHDES Wetlands Bureau Administrative Rules, Env-Wt 801.03, regarding compensatory mitigation. Mitigation for direct and secondary vernal pool impacts would be determined in accordance with US Army Corps of Engineers (USACE) mitigation rules as outlined in New England District Compensatory Mitigation Guidance. In addition to the proposed mitigation, a number of BMPs would limit the potential for indirect impacts to surface waters and wetlands.

Threatened and Endangered Species

Plant surveys for clasping milkweed, downy false foxglove, wild lupine, and licorice goldenrod would be conducted prior to construction. If a threatened, endangered, or rare plant species is encountered during construction that was not documented prior to construction, the plant population would be relocated.

Cultural Resources

The Adverse Effect Memo signed by FHWA, NHDOT, and NH Division of Historical Resources (NHDHR) on August 13, 2019 determined that the Proposed Action would have No Adverse Effect on the Amoskeag Millyard Historic District. To ensure No Adverse Effect, NHDOT will coordinate with FHWA, NHDHR, and the owner of a property known as the Cotton Duck Building to move the Valve House within the Historic District, and retain its association and spatial awareness to the Cotton Duck Building.

Following notification of the Adverse Effect to the Advisory Council on Historic Preservation (ACHP), the details of an Archaeological Discovery Plan would be outlined in a Memorandum of Agreement among FHWA, NHDOT, and NHDHR, and any Consulting Parties that may be identified. Other mitigation measures may include development of further archaeological context/reporting and educational outreach.

Hazardous Materials and Contamination

The abatement of any hazardous materials would be performed in accordance with appropriate regulations to ensure that there would be no adverse effect such as releases or misdirected wastes. Dewatering of any groundwater impacted by oil or hazardous materials will be conducted in accordance with applicable federal and state regulations (including

During construction, appropriate sedimentation and erosion control BMPs would be implemented. Reasonable mitigation to create or restore floodplain storage could be

NHDES rules and Groundwater Management Plans) and coordinated with NHDES and the City of Manchester.

Visual and Aesthetic Resources

Mitigation measures and best practices for the Proposed Action which could lessen visual impacts would be evaluated during final design.

Socio-Economic Conditions

All property acquisitions would be completed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 which establishes the minimum standards for the acquisition of properties for federally-funded programs and projects.

Construction

The Proposed Action incorporates mitigation measures to minimize or eliminate construction-related impacts to nearby natural, cultural, and social resources, and are discussed in the resource-specific sections of this EA. As needed, mitigation measures would be incorporated into the contract documents.

ES-5. Issues and Areas of Controversy

Public outreach efforts in support of the Project began in February 2016, including public workshops and meetings and publication of periodic newsletters. Key activities throughout the planning process included outreach, coordination, and other activities to engage the public and resource agency partners during the NEPA process. In general, the Project has been well received and supported by stakeholders. However, because the Proposed Action involves broad transportation system changes in a primarily developed and urbanized area, issues of concern have been brought to attention, either by the public or regulatory agencies, throughout project development. The following summary describes issues or areas of controversy, which have been considered and addressed to the extent possible.

- Balancing impacts to Amoskeag Millyard Historic District versus the Merrimack River. Several physical constraints limited the planning and development of alternatives in the southern portion of the I-293 mainline. The expansion of the highway to six lanes must fit between the existing piers of the West Bridge Street Bridge. Additionally, as an interstate highway, the new six-lane section must maintain the minimum radius allowed for a 55-mph design speed as it maneuvers between the Merrimack River to the east and the Amoskeag Millyard Historic District to the west. Given the existing site constraints, it was critical to design the Proposed Action while minimizing impacts to both the river and historic Millyard.
- Reconfiguration of Front Street. The Proposed Action would convert Exit 6 into a SPUI, creating benefits such as a more compact layout, requiring less ROW, and providing greater efficiency. However, Front Street would be reconfigured and, by eliminating the existing direct access to Goffstown Road and Amoskeag Street, would become a local

access road. Local abutters would experience infrastructure changes and loose the existing direct access to I-293. An emergency access road, constructed on the north side of Goffstown Road between the Front Street/Eddy Road bridge and the Coolidge Avenue intersection, would allow emergency vehicles to continue to access Front Street/Eddy Road across the Amoskeag Bridge from the fire station located on the east side of Manchester.

ES-6. Federal Actions Required for the Project

The FHWA is the lead federal agency for the Project due to proposed interchange modifications to an interstate highway. However, NHDOT will serve as the permit applicant for the permits and reviews listed below. Federal requirements to construct the Proposed Action include six permits or approvals from various agencies including: USACE; US Fish and Wildlife Service (USFWS); ACHP; National Oceanic and Atmospheric Agency (NOAA) - National Marine Fisheries Service (NMFS); USEPA; and US Department of Transportation (USDOT). These permits and approvals are outlined in the following table.

Table ES-1 Required Federal Permits, Approvals, or Certifications

Regulation/Jurisdiction	Issuing Agency/Program	Name of Filing	
Interstate System Access Agreement, 23 USC 111	USDOT/FHWA	Interchange Modification Report	
Clean Water Act, Section 404	USACE	Individual Permit	
Clean Water Act, 33 USC 1251 et seq.	USEPA	National Pollutant Discharge Elimination System Construction General Permit	
National Historic Preservation Act, Section 106	ACHP	Section 106 Consultation	
Magnuson-Stevens Fishery Conservation and Management Act	NOAA - NMFS	Essential Fish Habitat Assessment	
Endangered Species Act	USFWS	Section 4(d) Rule	

> Relocation of Exit 7, facilitating access to Hackett Hill. The new Exit 7 Interchange West Connector to Dunbarton Road would allow for a future connection to the Hackett Hill area, which would support the City of Manchester's Hackett Hill Master Plan for future development opportunities. This area is among the last remaining block of unfragmented habitat in the City. In addition, the Manchester Cedar Swamp Preserve is immediately adjacent to Hackett Hill. With the City in support of the Exit 7 relocation, opening access to future development opportunities, and natural resource agencies' concern over the encroachment of development, this element of the Proposed Action has been carefully considered but raises the potential for indirect and cumulative impacts.

Within the Study Area, the Turnpike coincides with I-293 and consists of an urban, four-lane, median-divided, limited access highway. The I-293 interchanges at Exits 6 and 7 in Manchester, New Hampshire currently have many operational deficiencies. These deficiencies include:

- > The reverse curve along the I-293 mainline segment south of Exit 6 > Vehicle queuing at the Exit 6 northbound off-ramp that backs onto the I-293 northbound
- mainline
- >
- > Exit 6 southbound on-ramp and off-ramp short and conflicting weaving movements
- Substandard acceleration length at the southbound Exit 6 on-ramp from Eddy Road
- > Substandard acceleration length at the Exit 6 northbound on-ramp
- > Lack of northbound on-ramp and southbound off-ramp at Exit 7

provided in this document.

The reconfiguration of the I-293 Exit 6 and 7 interchanges have long been identified as areas in Manchester in need of improvement for the sake of traveler safety along I-293, and to allow continued economic growth within the city. The need for improved transportation infrastructure was discussed in the City of Manchester's Master Plan, dated December 2009, as a key element of the city's future.

NHDOT, working with a consultant team, completed an initial I-293 Exits 6 and 7 Transportation Planning Study in December 2013, which included the identification of roadway deficiencies and the establishment of conceptual project alternatives to address these deficiencies. NHDOT continued work in late 2015, which included preliminary engineering and detailed studies of environmental resources in the Study Area as part of the NEPA phase. During this phase, NHDOT developed and refined the alternatives that were established during the 2013 Planning Study, refining and evaluating the alternatives to arrive at a Proposed Action.

During the development of this EA, three public informational and nine Technical Advisory Committee (TAC) meetings were held to date to gain public and municipalities' input and involve the public with the analysis of the proposed alternatives. Additionally, a website for the project has been maintained throughout the project's development (http://www.293 planningstudy.com/). Because this project will require the acquisition of new right-of-way (ROW), a public hearing in accordance with NH Revised Statutes Annotated (RSA) 230:14 and the federal Surface Transportation and Uniform Relocation Assistance Act of 1987 will be held on October 30, 2019 prior to final approval of the project.

Introduction

New Hampshire Department of Transportation (NHDOT) and the US Department of Transportation (USDOT) Federal Highway Administration (FHWA) have prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as amended (42 United States Code [USC] 4332(2)(c)); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); FHWA guidance regarding Environmental Impact and Related Procedures (23 CFR 771.119); the National Historic Preservation Act of 1966, as amended; and Section 4(f) of the US Department of Transportation Act (23 CFR 774). This EA evaluates one Build Alternative (the "Proposed Action," or the "Project") and the No-Build Alternative, as required by CEQ, and describes potential direct, indirect, and cumulative impacts of these two alternatives. Other alternatives considered during the project planning process are also identified and briefly discussed. In addition, the EA identifies recommended mitigation measures where applicable.

1.1 Background

The F.E. Everett Turnpike (Turnpike) is a north-south toll highway in central-southern New Hampshire which serves as a major transportation corridor linking the state capitol of Concord to the residential, industrial, and commercial centers in Manchester, Nashua, and north-central Massachusetts. The Turnpike connects other regional highways including I-93, I-293, US 3, and NH 101 and serves as a major route for commuters and commercial activity. The Turnpike is part of the National Highway System, reflecting its significance as an important transportation link in the state and regional system.

Confusing maneuvers and vehicle congestion at Exit 6's Amoskeag Circle

To correct these deficiencies, consideration must be given to site constraints including the surrounding urbanized landscape and limited land availability. Descriptions of the I-293 deficiencies, site constraints, and environmental evaluation of the Proposed Action are

1.2 Study Area

The Study Area (see Figures 1.1-1 and 1.1-2) for the project was defined to encompass a general area where new or improved roadway infrastructure may be located, including reasonable alternatives. This Study Area was largely based on the extent of the alternatives developed during the 2013 Planning Study and was used to guide the collection of environmental data.

The Study Area extends approximately 3.3 miles from a point just north of the Exit 5 interchange and runs north along I-293 to a point just south of the Hackett Hill Road underpass. The eastern boundary limits are the Merrimack River, and the western boundary limits encompass Main Street, Coolidge Avenue, Omega Street, Front Street, Dunbarton Road, and Straw Road from its intersection with Goffstown Road to its intersection with Dunbarton Road. From Dunbarton Road, the Study Area runs east along an Eversource ROW), following the ROW as it turns north along I-293. The Study Area includes nine existing bridges along I-293: the two West Bridge Street bridges, two bridges carrying portions of the Exit 6 interchange over I-293, two bridges carrying the northbound and southbound barrels of I-293 over Black Brook, a bridge over Stark Lane, and two bridges carrying the northbound and southbound barrels of I-293 over Front Street.

Notable landmarks within or near the Study Area include portions of the Amoskeag Millyard Historic District, the Amoskeag Dam, Blodget Park, the Manchester Landfill, and the Manchester Community College (MCC). A large portion of the Study Area is composed of urbanized land, particularly within the southwest and eastern portions of the Study Area. The Study Area includes a portion of the Merrimack River, which flows from north to south. In addition, two perennial streams, Black Brook and Milestone Brook, are located within the Study Area.

The Project Footprint consists of the Proposed Action limits of disturbance and includes all areas that would be disturbed during construction. As discussed in Chapter 3, the Proposed Action also requires acquisition of new ROW, which are property rights that extend beyond the Project Footprint.

1.3 The National Environmental Policy Act

This EA has been prepared pursuant to NEPA, a comprehensive federal law that applies to federal agencies and the actions they fund or approve and is the primary environmental statute applicable to the Project. NEPA requires that federal agencies consider the environmental consequences of any major action. In practice, a project is required to meet NEPA guidelines when a federal agency provides any portion of the financing or regulatory approvals for the project.

FHWA must approve the modification of Exit 6 and Exit 7 pursuant to 23 USC 111, which requires federal approval of new or revised access points to the Interstate System. This



FIGURE 1.1-1

Source: VHB, NHGRANIT, USGS, ArcGIS Online



Stream City Park Land

Conservation/Public Land

Town/City Boundary

Study Area

approval, in turn, triggers review under NEPA.¹ Additionally, FHWA funds may be applied to the construction of the Project, although those funds are not yet allocated.

The main provision of NEPA requires an Environmental Impact Statement (EIS) to be written for all major federal actions which have a significant impact on the environment. Where it is uncertain whether an action may have a significant effect, NEPA allows preparation of an EA to determine whether preparation of an EIS is warranted. FHWA, in cooperation with NHDOT, has determined that an EA is the appropriate level of analysis for the I-293 Improvements Project.

The EA is intended to be a concise public document to aid in decision making, to identify the Proposed Action and its alternatives, including the "No-Build Alternative," and to disclose the environmental consequences of the Proposed Action. Generally, an EA is a broadly scoped document which examines a full range of potential environmental, cultural and social impacts. This EA contains information on everything from natural resources, (e.g., wetlands, water quality, farmlands, rare species) to the social and human environment, (e.g., air quality, noise, visual impacts, socio-economics) to cultural resources (historical buildings and places, archeological resources).

If the EA determines that no significant effects on the environment would result from the Proposed Action, then FHWA would issue a Finding of No Significant Impact (FONSI). The FONSI would explain why the Proposed Action would not have a significant effect on the human or natural environment and would include the EA or a summary of the EA that supports the determination.

Alternatively, if FHWA determines that the Proposed Action is likely to have a significant impact on the environment, the preparation of an EIS would be required prior to federal approval of the Project. In that case, the EA would assist in the development of the EIS scope.

Purpose and Need

2.1 Project Purpose

- locations within the Study Area;
- commercial goods and services through the corridor; and
- of Manchester and Goffstown.

2.2 Project Need

A Transportation Feasibility Study completed in 2013 identified several issues and needs associated with the existing I-293 mainline segments and ramps, discussed below.

The Purpose and Need statement is fundamental to the analysis of a project under NEPA, the Clean Water Act (Section 404), and other environmental regulations. The Purpose and Need statement establishes the basis for the development of alternatives and is used to compare the effectiveness of the various Build Alternatives against the No-Build Alternative. A description of the Purpose and Need of the proposed Project is provided below.

The Project Purpose is to address capacity, safety, and access related deficiencies along a portion of I-293 (FE Everett Turnpike) in Manchester, New Hampshire, beginning north of Exit 5 (Granite Street) and ending north of Exit 7 (Front Street) by:

> Correcting geometric and safety deficiencies while reducing congestion at problem

> Accommodating future traffic growth related to commute trips and the transportation of

> Improving access to the highway consistent with the long-term vision of the communities

Per FHWA policy, all requests for new or revised access points on completed Interstate highways must closely adhere to the planning and environmental review processes as required in 23 CFR Parts 450 and 771. The FHWA approval constitutes a Federal action and, as such, requires that the transportation planning, conformity, congestion management process, and NEPA procedures be followed, and their requirements satisfied (Federal Highway Administration, Policy on Access to the Interstate System, May 22, 2017).

2.2.1 Geometric and Safety Deficiencies

Among the geometric and safety deficiencies within the Study Area are the following:

- > The existing reverse curves in the mainline segment of the highway south of Exit 6, in combination with traffic entering and exiting the highway at Exit 6, create congestion and unsafe vehicle operations. The sight line for northbound traffic decelerating and exiting at Exit 6 is poor due to the highway's curvature and vegetation on the riverbank, especially during the weekday evening peak hours when traffic from the off-ramp queues back onto the I-293 mainline.
- > The existing Exit 6 northbound on-ramp taper for merging traffic is substandard. Northbound ramp traffic entering must rapidly accelerate to mainline speed often using the shoulder to merge with through traffic. The southbound on-ramp and off-ramp are configured such that traffic must weave when entering or exiting the highway. The existing weaving geometry is substandard, which hinders traffic operations and safety. Exiting southbound traffic often decelerate in the through-traffic lane to exit onto the 25-mph ramp. The southbound off-ramp is short, resulting in the existing traffic often queuing back into the weaving section with the southbound on-ramp traffic. The southbound on-ramp is steep and traffic often stops while attempting to safely merge onto the mainline through traffic. The congestion within this weave section of I-293, especially in the morning peak hour, often affects the safe operations of through traffic.
- > To the south, the short southbound on-ramp from Eddy Road is operationally similar to the northbound on-ramp. The acceleration area for traffic merging into the southbound mainline is substandard. The on-ramp traffic must accelerate rapidly, often using the shoulder to merge with through traffic. The southbound on-ramp merges with I-293 on the outside of a sharp curve creating additional conflict between the through traffic and the entering ramp traffic.
- > Exit 7 is currently a partial interchange, which provides connectivity for motorists only via a southbound on-ramp and northbound off-ramp. Motorists to and from Front Street are currently unable to exit I-293 South or enter I-293 North at Exit 7.
- > The northbound Exit 7 off-ramp is substandard including the deceleration area for exiting traffic and the intersection layout with Front Street. Left-turning traffic from the un-signalized northbound off-ramp onto Front Street often creates gueues backing onto I-293 during peak hour conditions resulting in an unsafe operating condition.

2.2.2 Accommodating Future Growth

Traffic volumes measured during weekday periods in August of 2015 range from approximately 56,400 vehicles per day to 60,500 vehicles per day. This volume is expected to increase by approximately 1 percent per year, and traffic operations, already poor in a number of locations within the Study Area, are expected to continue to deteriorate. Capacity analyses performed for the existing I-293 mainline segments and ramps under a future year 2035 traffic volume forecast show substantial degradation in traffic operations. By the future year 2035, many of the freeway segments and ramp junctions are expected to degrade to unacceptable Level of Service (LOS) E or F.

2.2.3 Regional Highway Access and Compatibility with the Communities' Vision

Access to the highway is currently poor due to the congestion and safety issues discussed above. Additionally, the location of Exit 7 and its configuration as a partial interchange further constrain access. During the public process associated with the 2013 Transportation Feasibility Study, many local citizens and public officials emphasized the need for improved access to allow for economic benefits within a broader regional context.

Improvements to Exit 6 would allow for better connectivity between downtown Manchester and points north and south. Downtown Manchester serves as a regional employment and financial services hub within New Hampshire. Due to the availability of existing office and light industrial/research and development space, it has the capacity to increase the workforce. Easier access to and from the downtown area may accelerate existing economic development trends, leading to higher employment rates within the region.

Similarly, relocation of Exit 7 could enhance accessibility to existing and potential job generation areas. For example, the Hackett Hill Master Plan² calls for a total build-out of over one million square feet of office and research and development space on land owned by Manchester. And, the improved highway facilities at Exit 6 and, to a lesser extent, Exit 7 could provide a better link between I-293 and industrial-zoned land in the Town of Goffstown. This improved access may accelerate development opportunities and increase the tax base for both communities.

A master plan for Phase I of the City of Manchester's proposed development at Hackett Hill, also known as the "Northwest Business Park, Hackett Hill," was issued in 2009. (City of Manchester, Planning Board and Planning and Community Development Department. 2009. Master Plan for the City of Manchester, New Hampshire. Accessed from https://www.manchesternh.gov/pcd/cip/MasterPlan.pdf. Accessed

on January 16, 2019.)

3.1.1 Highway Widening

To safely accommodate existing and future traffic levels in the Study Area, I-293 would be expanded from two to three lanes in each direction. This highway widening would begin just north of Exit 5 and extend approximately 3.3 miles to the north.

Interstate 293 consists of two 12-foot travel lanes in both the northbound and southbound directions. The existing shoulder widths vary along the Study Area. South of Exit 6 there are 8-foot outside shoulders and 2-foot inside shoulders. Between Exits 6 and 7 there are 10-foot outside shoulders and 2-foot inside shoulders. North of Exit 7 there are 8-foot outside shoulders and 12-foot inside shoulders.

The proposed I-293 widening would provide three lanes in each direction; 12-foot inside shoulders and 10-foot outside shoulders would be constructed (12 feet in areas of barrier or guardrail). NHDOT standard deceleration and acceleration lanes would be constructed at all ramp locations. On the south end of this project, the project ties into the north side of Exit 5. At Exit 5 the northbound on ramp becomes the third lane, and southbound the third lane is dropped as an 'exit only' lane. At the north end of the proposed I-293 project, the third lane would be added/dropped to match into the existing two-lane section.

South of the I-293 interchange with NH 101, the F.E. Everett turnpike is generally a three-lane section but has three segments of two-lane highway in Nashua, Bedford and Merrimack. The NHDOT is proposing to widen those remaining three sections of two-lane highway to three lanes under project 13761, which is entering the final design stage. Except for the two-lane section between Exit 5 and the 293/101 interchange, the completion of this project and the F.E. Everett project will provide a nearly continuous three lane north-south corridor from Manchester to the Massachusetts state line.

A typical section showing the exist **Figure 3.1-2**.

Within the "Southern Mainline Segment," south of Exit 6, the Proposed Action follows an alignment that minimizes impacts to the Merrimack River and its 100-year floodplain while minimizing impacts to the American Cotton Duck and Stark Mills Cotton Storehouse buildings (also collectively known as the "Cotton Duck Building") and the Amoskeag Millyard Historic District. This alignment, known as the "5-foot Offset Alignment," shifts the I-293 widening primarily to the west such that the new highway would be approximately 5 feet from the Cotton Duck Building. This would allow the ongoing commercial operations that currently exist in the building to remain, including the existing loading dock at the southern end of the building. The parking operations along the east side of the building would no longer be feasible. Though the I-293 widening would eliminate circulation around the building, emergency personnel would still have access to all sides of the building.

3.1.2 Exit 6 Reconstruction - Single Point Urban Interchange

The Proposed Action would reconstruct Exit 6 as a SPUI. The proposed SPUI at Exit 6 would be similar to the one constructed at the I-293 Exit 5 Interchange with Granite Street in 2008. However, unlike the Exit 5 SPUI where I-293 passes over the interchange, I-293 would pass

3

Proposed Action and Alternatives

3.1 Description of the Proposed Action

Based on an extensive engineering analysis and public involvement process beginning in 2012, the NHDOT proposes to reconstruct I-293 within the Study Area, including these three main elements:

- Highway Widening. Widen the northbound and southbound barrels of I-293 from two to three lanes in each direction.
- > **Exit 6 Interchange**. Reconstruct Exit 6 more or less in its existing location using a Single Point Urban Interchange (SPUI) configuration.
- > **Exit 7 Interchange**. Relocate Exit 7 approximately 0.5 mile north of its current location, constructing a full access interchange.

This highway reconstruction is proposed to include reconstruction of five bridges, construction of two new bridges, installation of new drainage and stormwater treatment and management systems, construction of three sound walls, and construction of other related infrastructure such as signage and signals.

More detail on the specific elements of the Proposed Action is provided in **Figure 3.1-1** (see **Appendix A** for aerials of preliminary design plans) and described below.

A typical section showing the existing and proposed highway cross-section is shown in



Town/City Boundary

----- Proposed ROW

Proposed Action





- - Proposed ROW

Town/City Boundary







Existing and Proposed Typical Highway Cross-Sections Environmental Assessment

below the Exit 6 SPUI interchange. The SPUI intersection would be controlled by a single traffic signal at the center of the interchange to direct traffic along Goffstown Road and Amoskeag Street, as well as all turns to and from the highway ramps. The major advantages of a SPUI-type interchange are a more compact layout, requiring less ROW, and providing greater efficiency by allowing the left turns to operate concurrently through its one signal, as opposed to the two signals of a traditional diamond interchange design.

There are three other design components that would assist in managing efficient traffic flow:

- access road.
- southbound Eddy Road traffic.
- Street with Amoskeag Street are also retained.

In addition to the interchange design, a gated emergency access road connection would be constructed on the north side of Goffstown Road between the Front Street/Eddy Road bridge and the Coolidge Avenue intersection. This access would allow emergency vehicles to continue to access Front Street/Eddy Road across the Amoskeag Bridge from the Fire Station located on the east side of Manchester.

3.1.3 Exit 7 - Relocated Interchange with East-West Connector Road

The Exit 7 existing interchange is a partial interchange, only supporting connectivity for motorists traveling to and from the south on I-293. There are no ramps to provide connectivity to the north. The Proposed Action would relocate the Exit 7 interchange approximately 0.5 mile north of its current location and construct a new fully directional interchange on I-293 just north of MCC and adjacent to the Manchester Landfill. The northbound on and off-ramps and the southbound off-ramp would be in a diamond interchange configuration, while the southbound on-ramp would be configured in a loop layout.

A 1.0-mile long Exit 7 Interchange East-West Connector would be constructed from Front Street to Dunbarton Road to the north of the Manchester Community College and the Manchester Landfill, while avoiding the steep terrain and additional wetland impacts. The Exit 7 Interchange West Connector would pass under I-293 and the Eversource ROW and provide a new signalized intersection at Dunbarton Road. The new intersection at Dunbarton

> The Goffstown Road/Eddy Road/Front Street intersection would be reconfigured to allow Goffstown Road to bridge over Front Street/Eddy Road and connect directly to the SPUI bridge and Amoskeag Street. By separating this intersecting traffic, the conflicts and congestion adjacent to the SPUI interchange would not occur, allowing safer and more efficient traffic flow at the SPUI. Front Street would be realigned and, by eliminating the existing direct access to Goffstown Road and Amoskeag Street, would become a local

> The reconstruction of the existing I-293 southbound on-ramp opposite the intersection of Eddy Road with Lorraine Street. The new southbound ramp, unlike the existing ramp that is restricted to right-turn only, would provide highway access for both northbound and

> The existing T-type configuration of the Coolidge Avenue intersection with Goffstown Road, and the four-way signalized intersection connecting River Front Drive and Fletcher Road would allow for a future connection to the Hackett Hill area, which would support the City of Manchester's Hackett Hill Master Plan for future development opportunities.

The new Exit 7 Interchange East Connector would connect to Front Street at a newly configured four-way traffic signal controlled intersection. This new intersection would provide direct access to the residential community of Country Club Drive. Additionally, the new roadway would provide access to the Manchester Community College with a new driveway located approximately half way between the interchange and the Front Street intersection. The Manchester Community College's existing driveway on Front Street would remain. The new configuration would result in a substantial reduction in traffic on the segment of Front Street south of the new connector roadway as the new roadway would serve as the primary connection to I-293.

3.1.4 Drainage and Stormwater Management Systems

During construction of the highway improvements, the existing drainage system would be reconfigured, and up to 14 stormwater basins are anticipated to be constructed to address the treatment of the additional pavement associated with the reconstructed and expanded highway system. Three distinct types of permanent, stormwater best management practices (BMPs) are included in the Proposed Action:

- > Wet Extended Detention Basin. Eleven of the proposed stormwater BMPs are wet extended basins, which consist of a permanent pool of water and an extended detention impoundment that is empty under normal weather conditions. Wet extended basins protect water quality and provide some degree of flood storage.
- Gravel Wetland. A gravel wetland would be constructed near Dunbarton Road, west of the relocated Exit 7. This area drains to Black Brook and requires increased treatment efficiencies to meet state rules regarding water pollution. Gravel wetlands have an enhanced ability to remove nitrogen and phosphorus from stormwater runoff, thereby protecting water quality.
- Vegetated Swale (Treatment Swale). Vegetated treatment swales are a more compact stormwater BMP. These swales are less efficient at protecting stormwater and reducing flooding, so are used primarily where space limitations make other BMPs impractical. The two swales would be located off Foundry Street at the southern end of the Study Area, and parallel with Front Street directly north of the Black Brook Bridge.

The exact size, configuration and location of these BMPs would be confirmed during the final design phase of the Project and the current design should be considered conceptual. For more information on the stormwater analysis and proposed stormwater basins, please see Section 4.6.

3.1.5 Bridge Construction and Modifications

Nine bridges exist along the I-293 corridor within the Study Area. The Proposed Action would remove, replace or reconstruct seven of these existing bridges, and would also construct three new bridges as discussed below.

The Proposed Action would remove both the south ramp bridge and the Goffstown Road/Amoskeag Street bridge. A new bridge structure carrying an elevated SPUI over I-293 would be built in the general location of the Goffstown Road/Amoskeag Street Bridge as described in **Section 3.1.2** above. The new superstructure would be supported on either: full-height reinforced concrete abutments, in-line with retaining walls supporting the new I-293 off and on-ramps, or; the new substructure would be reinforced concrete caps, likely supported on piles, and perched behind the new retaining walls for the off- and on-ramps.

with 3,056-square-foot concrete decks.

The Proposed Action would replace the two bridges with a single, widened bridge. The new Black Brook Bridge deck would be wider than the existing deck to accommodate the two additional lanes on I-293 and the new Exit 6 SPUI southbound and northbound off and on-ramps. The details of this new bridge would be determined during final design, but the current conceptual design calls for a new steel or concrete superstructure supported on new substructure units. The design of the new bridge would comply with the NH Department of Environmental Services' (NHDES) Stream Crossing Rules such that the bridge opening would remove floodplain fill, provide wildlife passage and be geomorphically compatible to Black Brook's bankfull width to the maximum extent possible.

- supported on new substructure units.

> West Bridge Street Bridge. The West Bridge Street Bridge comprises an eastbound bridge (Bridge 122/073) and a westbound bridge (Bridge 123/073) which carries vehicles and pedestrians on West Bridge Street over I-293 and the Merrimack River. The West Bridge Street Bridge, built in 1990, is 1,544 feet long and is constructed of steel I-beams with concrete decking. The Proposed Action would not alter this bridge but would accommodate the widening of I-293 below the bridge to six lanes as proposed.

> Amoskeag Traffic Circle (Amoskeag Interchange). The Exit 6 interchange, originally built in 1957, includes two bridges which carry vehicles and pedestrians over I-293. Both interchange bridges are constructed of steel I-beams with concrete decks. Reconstructed in 1988, the south ramp (Bridge 111/066) is 104 feet long with a 3,906 square-foot deck. Bridge 107/066 carries Goffstown Road/Amoskeag Street over I-293; this bridge is 96 feet long with a 4,760 square-foot deck and was reconstructed in 1989.

> **Black Brook Bridge.** The Black Brook Bridge comprises a southbound bridge (Bridge 099/066) and a northbound bridge (099/067). Built in 1956, the bridges carry vehicular traffic traveling on I-293 over Black Brook, which flows into the Merrimack River about 300 feet to the east. The bridges are each 74 feet long and constructed of steel I-beams

> Stark Way Bridge. Stark Way Bridge (Bridge 091/063) was built in 1956 and carries vehicular traffic traveling on I-293 over Stark Way. The concrete rigid frame bridge is 30 feet long with a 3,300 square-foot deck. Stark Way passes beneath the bridge in an east to west direction; a sidewalk is provided on the south side of the road. The Proposed Action would replace this existing bridge. Again, details would be developed during final design, but the current conceptual plan includes a new steel or concrete superstructure

Front Street Bridge. Two bridges make up the Front Street Bridge at Exit 7, which carries vehicular traffic traveling on I-293 over Front Street. The southbound (Bridge 090/061) and northbound (Bridge 090/062) bridges are each 197 feet long, with 9,730 square foot decks. The bridges were built in 1956-1957 and reconstructed in 1995. These two bridges would be replaced with a single new steel or concrete superstructure bridge supported on new substructure units.

The Proposed Action would also construct three new bridges:

- > Exit 6 SPUI Bridge. As described above in Section 3.1.2, a new bridge would be constructed at Exit 6 to carry the new SPUI over the widened I-293 in the general location of the existing Goffstown Road/Amoskeag Street bridge.
- Goffstown Road Bridge. A new bridge would be constructed to connect Goffstown Road to the new Exit 6 SPUI. This bridge would carry vehicles and pedestrians over Front Street at a location just west of the new Exit 6 SPUI.
- New Exit 7 Bridge Relocated Interchange with East-West Connector Road, as described above in Section 3.1.3, a new bridge would be constructed at the new Exit 7 interchange with the new East-West Connector Road running east-to-west beneath I-293 from Front Street to Dunbarton Road.

In addition to bridge work, the Proposed Action would require replacement or extension of culverts within the Project Footprint. Culvert modifications would be determined during the final design phase of the Project.

3.1.6 Sound Walls

The Proposed Action includes construction of three proposed sound walls at locations adjacent to I-293 where abatement is warranted to mitigate vehicle traffic noise. According to the noise analysis results, sound walls would be feasible and reasonable to construct at the following areas:

- > Along the east side of I-293, north of Exit 6, adjacent to Riverfront Drive and Stark Lane;
- > Along the west side of I-293, north of Exit 6, adjacent to a portion of Front Street between Omega Street and Amoskeag Street; and
- > Along the east side of I-293, extending north from the relocated Exit 7 interchange, in the vicinity of Country Club Drive.

Section 4.3, Noise Environment, summarizes the results of the highway noise study. The highway noise study is based on a more detailed technical report which is available for public review upon request to the NHDOT.³

3.1.7 Bicycle and Pedestrian Facilities

There are seven designated bicycle routes within the Study Area, including:

1. Dunbarton Road west of Straw Road in Goffstown continuing onto Front Street to Goffstown Road, just west of the Amoskeag Traffic Circle (Exit 6).

- 2. Straw Road from Dunbarton Road continuing onto Goffstown Road to Coolidge Avenue, just west of the Amoskeag Traffic Circle (Exit 6).
- 3. Coolidge Avenue between Goffstown Road and West Bridge Street.
- 4. Kelly Street between Goffstown and Coolidge Avenue.
- 5. Bridge Street from Coolidge Avenue through Downtown Manchester east to I-93.
- 6. Elm Street from Bridge Street to Queen City Avenue.
- 7. Canal Street from Bridge Street continuing along River Road, West Clark Street, and Union Street beyond I-93 in Hooksett.

accommodate bicycle traffic.

Sidewalks and crosswalks would also be constructed as part of the SPUI to allow pedestrians to safely cross over I-293. A sidewalk ramp will be constructed to connect Goffstown Road to the newly constructed sidewalk on the west side of Front Street and Eddy Road, which connects to the existing sidewalk at Bremmer Street. The existing sidewalks along Goffstown Road, Coolidge Ave, and Front Street would be reestablished.

The Exit 7 Interchange East-West Connector design also includes one sidewalk on the south side as well as crosswalks at intersections. Along the Interchange West Connector, sidewalk would begin at the new intersection at Dunbarton Road. The sidewalk would continue to the east along the Exit 7 Interchange East Connector and end along Front Street. All sidewalks will be maintained by the City of Manchester. The Exit 7 Interchange East-West Connector shoulders would be five feet wide to accommodate bicycle traffic.

3.2 Other Alternatives Considered and Rejected

During the project development process, many build alternatives were considered but ultimately rejected in favor of the Proposed Action. The development of alternatives considered three segments of the highway corridor within the Study Area:

- > The "Southern Mainline Segment," including the highway from the southern limit of the Study Area to a point just south of the Eddy Road southbound slip ramp,
- > The "Exit 6 Segment," from a point just south of the Eddy Road southbound slip ramp to about the Black Brook Bridge, including all on/off-ramps and immediately connecting roads, and
- and extending northward to the Project limits.

Additionally, a No-Build Alternative was considered and is evaluated in Chapter 4 of this EA. The following describes each of the Project alternatives by segment and explains the reasons why they were rejected. Alternative design plans are provided in Appendix B.

- Under the Proposed Action, roadway shoulders of the Exit 6 SPUI would be five feet wide to

> "Exit 7 Segment," including the area near the existing Exit 7, from the Black Brook Bridge

Vanasse Hangen Brustlin, Inc. 2019. Highway Noise Technical Report, I-293 (F.E. Everett Turnpike) Exits 6 & 7 Improvements Project (Manchester #16099).

3.2.1 No-Build Alternative

The No-Build Alternative does not address the deficiencies and safety concerns described in the Purpose and Need. The No-Build Alternative would maintain the existing two-lane traffic along the northbound and southbound I-293 mainline, as well as the existing configuration of the Exit 6 and Exit 7 interchanges. Several problems currently exist along the mainline and Exits 6 and 7 (see Section 2.2.1) that would not be addressed by the No-Build Alternative, including:

- > Lack of a northbound on-ramp and southbound off-ramp at Exit 7.
- > Vehicle gueues along the Exit 6 northbound off-ramp extending into the I-293 mainline during peak hours.
- > Congestion and delays caused by the close proximity of the Exit 6 southbound on- and off-ramps.
- > Unsafe line-of-sight along the curves of the mainline segment of I-293.
- > Two lanes along I-293 northbound and southbound is projected to be unable to accommodate future growth as segments of the I-293 mainline within the Study Area are projected to be at LOS E and F by future year 2035.

The No-Build Alternative would not address the Purpose and Need of the proposed Project and was therefore rejected.4

3.2.2 Exit 6 Interchange Alternatives

Diamond Interchange

In addition to the replacement of the existing Amoskeag Street bridge crossing of I-293, this alternative would consist of the construction of a second and separate bridge crossing of I-293 south of the Amoskeag Street bridge crossing (see Figure B-1 in Appendix B). The second bridge would extend from Eddy Road on the west side of I-293 to a traffic signal-controlled intersection with Amoskeag Street on the east side of I-293. Northbound and southbound on- and off-ramps would connect to the new bridge in a typical diamond configuration. The northbound and southbound ramp intersections would be traffic signal-controlled. This alternative would also require a second northbound on-ramp directly from Amoskeag Street.

This alternative was rejected because of the poor operating conditions at the Amoskeag Street/new bridge intersection and in particular, because of the vehicular queuing that would impact operations at the intersection with the northbound on- and off-ramps (traffic signal spacing is less than 500').

Diverging Diamond Interchange

In response to the operational deficiencies of the standard Diamond Interchange, consideration was given to a Diverging Diamond Interchange (DDI) alternative (see Figure B-2 in Appendix B). The layout would be similar to the Diamond Interchange alternative with the exception that with the DDI, motorists traveling along the bridge crossing over I-293 move from the established right-side of the roadway and cross over to the left-side of the roadway between the signalized ramp intersections. Shifting traffic from the right-side to the left side eliminates any conflict with through traffic and allows all the left-turning traffic to enter I-293 without the need to use a left-turn signal phase at the signalized ramp intersections. As a result, the DDI operates more efficiently than the Diamond Interchange.

Nevertheless, this alternative was rejected because of the lack of community support. The DDI was viewed as unconventional and would be confusing and potentially hazardous to motorists and pedestrians who would be unfamiliar with its operations. There are currently no DDIs in New Hampshire.

Offset Diamond Interchange

The primary feature of this alternative is that it eliminates the I-293 southbound weave movement by reconfiguring the southbound on- and off-ramps at Eddy Road so that southbound traffic exits the highway first followed by motorists entering the highway (see Figure B-3 in Appendix B). The existing Amoskeag Street bridge crossing of I-293 would be replaced with a new bridge at the same location. Eddy Road, modified to provide two-way traffic flow, would intersect Goffstown Road opposite Front Street at a four-way traffic signal-controlled intersection. The northbound off-ramp would intersect Amoskeag Street at a traffic signal-controlled intersection, while the northbound on-ramps would be directional, with the eastbound and westbound traffic entering I-293 at separate on separate northbound ramps.

Although acceptable operating levels of service could be attained, this alternative was rejected because of its unconventional layout, which would likely be confusing to motorists, and because of the alternative's adverse impact on the residential neighborhood to the west of the interchange. The proximity (less than 300 feet) of the traffic signal controlled Amoskeag Street/Front Street intersection to the Coolidge Avenue access/egress to the residential neighborhood would require the prohibition of left-turn movements onto and off-of Coolidge Avenue. This left-turn prohibition would result in traffic being rerouted to Montgomery Street (another point of access to the neighborhood), which would adversely impact residents of Montgomery Street and would require the upgrade (roadway widening and traffic signal control) of the Goffstown Road/Montgomery Street intersection. This action would also necessitate the widening of Goffstown Road from Montgomery Street to the Exit 6 interchange. The widening would in-turn result in additional property acquisition along Goffstown Road.

More information on these geometric and capacity deficiencies is included in Section 2.2.1 and Section 4.1.

3.2.3 Exit 7 Interchange Alternatives

Diamond Interchange (Existing Location)

This alternative would maintain the existing location of the Exit 7 interchange but would provide a northbound on-ramp and a southbound off-ramp, thus providing direct access to Front Street for southbound travelers and direct access to I-293 northbound for Front Street travelers (see Figure B-4 in Appendix B). Under this alternative there would be no opportunity to create additional access from Goffstown to the I-293 highway, therefore this alternative would not meet the project Purpose and Need of improving this access to meet the economic vision for the communities of Manchester and Goffstown. This alternative would also not meet acceptable LOS due to its close proximity to Exit 6, therefore, this alternative would require the addition of a northbound lane between the northbound on-ramp at Exit 6 and the northbound off-ramp at Exit 7. The additional lane would result in major property impacts and additional costs. This alternative would also require substantially greater wetland impacts in comparison to the other alternatives. Therefore, this alternative was determined to be unfeasible and was eliminated.

Relocated Interchange with Connection to Goffstown Road

This alternative would relocate the Exit 7 interchange approximately 0.5 miles to the north, as described for the Proposed Action above, but would include an additional connector road from Dunbarton Road to the intersection of Goffstown Road and Straw Road (see Figure **B-5** in **Appendix B**). This alternative has been determined unfeasible at this time due to the extensive wetland impacts that would result from the construction of the additional connector road across Black Brook from Dunbarton Road to Goffstown Road. The additional connector road would also have a much higher cost and ROW acquisition than the other alternatives. Therefore, this alternative was eliminated. The connection to Goffstown Road has the potential to be constructed by the municipalities in the future with the implementation of the Proposed Action through an independent environmental analysis.

3.2.4 Southern Mainline Segment Alternatives

There are several constraints within the Southern Mainline Segment that limit the potential alternatives. For example, in order to meet the Project Purpose and Need, the Proposed Action requires an additional lane in each direction. But, this new six-lane section must fit between the existing piers of the existing West Bridge Street Bridge. Additionally, as an interstate highway, the new six-lane section must maintain the minimum radius allowed for a 55-mph design speed as it maneuvers between the Merrimack River to the east and the Cotton Duck Building/Amoskeag Millyard Historic District to the west. The tight radius requires additional shoulder width to the west (inside of the curve) to achieve adequate sight distance for vehicles traveling southbound. Working within these design constraints, two main alternatives to the Proposed Action were considered, as discussed below.

Skew Toward River

This alternative essentially holds the existing westerly edge of the I-293 pavement as it curves around the Cotton Duck Building (see Figure B-6 in Appendix B). This design control shifts the widening improvements easterly toward the Merrimack River, avoiding impacts to the Cotton Duck Building and the Millyard Historic District. This alternative would require a combination of steepened stone slopes and retaining walls (approximately 2,000 feet) to minimize impacts to the Merrimack River and its associated 100-year floodplain. In areas where the river could be substantially impacted by the widening, retaining walls (approximately 1,000 feet) would be constructed in combination with cantilevered highway sections to mitigate impacts. As a result, a portion of I-293 would extend over the river.

This alternative was rejected primarily due to the extensive impacts to the Merrimack River. The construction cost for retaining walls, especially the cantilever type is extremely costly (approximately \$10-20 million). The retaining wall construction would be more complex with the proximity of the river and require a longer construction duration. Future maintenance needs would be costlier and more frequent for this option, primarily for the retaining walls. And, this alignment would have a substantial impact on the remaining buffer to the Merrimack River and its associated floodplain.

Skew Toward Cotton Duck Building

This alternative essentially holds the existing westerly edge of the I-293 pavement as it curves around the Cotton Duck Building (see **Figure B-7** in **Appendix B**). This design control shifts the widening improvements westerly away from the Merrimack River, avoiding any direct impacts to the river. Though the construction cost for this alternative would be substantially less as no retaining walls would be required, it would require the acquisition and demolition of the Cotton Duck Building, which would be approximately \$10 million, and would result in a greater adverse effect on the Amoskeag Historic District. This cost does not include the additional costs for relocating the businesses currently situated in the existing building. For this reason, and due to the historic value of the Cotton Duck Building and Millyard property, this alternative was rejected.

3.2.5 Transportation Systems Management

Transportation Systems Management (TSM) refers to short range, low to moderate cost measures and strategies aimed at reducing congestion and enhancing safety on the existing transportation system or roadway network. Generally, these measures involve little or no ROW impacts. Such strategies might include arterial management (including traffic signals retiming and coordination), integrated corridor management, freeway management, roadway weather management, real-time traveler information, incident and operations management, and work zone management. TSM strategies are a mix of technological, operational process, and design elements. These strategies will not eliminate the need for the Proposed Action but can increase efficiencies on the existing system. The section below describes the specific TSM improvements that NHDOT has implemented and proposed for the I-293 corridor through Manchester.

Arterial Management

Managing traffic along the arterials approaching the interchanges is a TSM approach that may alleviate pressures on the downstream transportation system, which in this case is the F.E. Everett Turnpike / I-293 and increase safety and reliabilities of the system. The City of Manchester and NHDOT are pursuing a traffic signal timing and coordination improvements project that would include the six signals along Granite Street including the I-293 Exit 5 interchange. This project would include the second installment in New Hampshire, and first in New Hampshire's largest city, of an Adaptive Signal Control system, where signal timings, offsets, queuing, and overall corridor performance would be continually monitored and optimized throughout each day.

Integrated Corridor Incident and Operations Management

The NHDOT's Bureau of Transportation Systems Management and Operations (TSMO) plans for and deploys Intelligent Transportation System (ITS) devices throughout New Hampshire's highway system, which include Closed-Circuit Television (CCTV) systems, Dynamic Message Signs (DMSs), Variable Speed Limit Systems, Roadway Weather Information Systems (RWISs), and other technological tools. TSMO also operates the Transportation Management Center (TMC), which uses the ITS devices to monitor and manage traffic, whether due to incidents, special events, or commuting bottlenecks, and coordinating with emergency services and weather patrols.

Within the I-293 Exits 6 & 7 corridor, TSMO and the TMC operates a permanent overhead DMS at I-93 southbound, south of the Hooksett Tolls and approaching the I-293 and I-93 interchange, providing real-time traveler information, such as travel time or incidents, ahead on I-293 or I-93. A co-located RWIS pavement sensor and CCTV exists at I-293-mile marker 10.4 northbound to identify weather conditions affecting the roadway just north of the Project Footprint and allows TSMO to coordinate plowing and sand/salt applications. An existing portable DMS exists on I-293, adjacent to the MCC, providing northbound I-293 travelers with real-time traveler information approaching the I-293 and I-93 interchange.

Current and Future ITS Deployments

In 2016, TSMO finalized the F.E. Everett Turnpike Corridor ATMS Deployment Plan, a master plan to identify locations along the F.E. Everett Turnpike for ITS device deployments and a communications backbone. Within the I-293 Exits 6 and 7 area, four CCTVs, two DMS, and three microwave vehicle detector systems were identified within the ITS Deployment Plan to monitor operations and relay real-time traveler information to I-293. The CCTVs, DMSs, and microwave vehicle detector systems would provide continuous data and live feeds into the operations and conditions of the roadway. As speeds slow and trigger speed alarms at the TMC or weather alarms at the existing RWIS or crashes witnessed or called in from the CCTVs can be used to alert the City of Manchester and neighboring communities as well as roadway users with the use of messaging on DMSs. During special events or during highway construction requiring temporary traffic control layouts, TSMO and the City of Manchester can coordinate monitoring and messaging associated with the events.

NHDOT Project 29408 is a \$4.7 million design-build project for the Bureau of Turnpikes, managed by TSMO, installing a new wireless communication backbone consisting of installing and modifying 27 ITS device deployment locations from Concord to Nashua, including five proposed and existing on I-293 through Hooksett, Manchester, and Bedford. Within the I-293 Exits 6 and 7 Project Footprint, devices installed by this project include CCTVs at mile marker 6.1 northbound, adjacent to the Exit 5 interchange, and at mile marker 7.5 northbound, adjacent to the Exit 6 interchange. The ability to monitor I-293, the interchanges, and the arterials are aimed to improve the ability to manage traffic and coordinate incident or emergency responses to the area.

3.2.6 Transportation Demand Management

Transportation Demand Management refers to policies, programs, and actions that are directed towards increasing the use of high-occupancy vehicles and the use of non-motorized modes of transportation such as bicycling and walking. These policies, programs, or actions can include transit, carpooling or enhanced parking management such as park and ride lots.

Because the Project need is primarily driven by the geometric and safety related deficiencies of the existing configurations of the Exits 6 and 7 interchanges, the implementation of Transportation Demand Management actions would not meet the Project's Purpose and Need. Nevertheless, the Proposed Action has incorporated bicycle and pedestrian access accommodations. The proposed interchanges would include sidewalks, crosswalks, pedestrian actuated traffic signal control, and a bicycle ramp connecting Front Street with the Exit 6 interchange.

Evaluating and documenting existing conditions is a multi-step process that involves regulatory and data review to describe the existing conditions within each resource's Study Area. The Study Area as defined in Chapter 1, Introduction, and as depicted in Figure 1.1-2 was used to focus resource evaluations for most mapped resources. Certain other analyses used a resource-specific Study Area; in these cases, the resource-specific Study Area is clearly defined in the methodology subsections.

This chapter also includes the environmental consequences analysis, or impacts analysis, which compares the probable consequences of the Proposed Action and the No-Build Alternative. Impacts, also known as "effects", may be direct, indirect, temporary, and/or permanent.⁵ Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action, are later in time or farther removed in distance, but are still reasonably foreseeable. Temporary impacts are short-term impacts that occur during the construction period. Conversely, permanent impacts are those which permanently change the existing environment during operation of the Project.

Impacts may also be beneficial or adverse. Where applicable, each resource section considers the potential need for mitigation measures when adverse impacts are unavoidable. Potential permitting and regulatory compliance requirements are described in Chapter 7, Permits, Approvals, and Certifications.

4.1 Transportation

This section describes the methodology used to evaluate traffic flow within the Study Area and presents the results of the operational analyses of the Existing, future year No-Build, and future year Proposed Action conditions.

4.1.1 Methodology

The methodology used to evaluate traffic conditions began with the collection of manual turning movement traffic volume counts during the weekday morning and evening peak periods at Exit 6, Exit 7, and at other major intersections, as well as the collection of multi-day automatic traffic recorder counts along key local roadways. Additionally, NHDOT permanent traffic count stations along I-293 provided useful hourly, daily, weekly, and monthly traffic volume data. Based on the historical count data at the permanent count stations, the collected traffic volume counts were seasonally adjusted to reflect an appropriate design hour volume (DHV) condition.

Having established the appropriate DHV condition, the Southern New Hampshire Regional Planning Commission's (SNHRPC) regional transportation daily model, which uses the CUBE/Voyager travel demand modeling software package as well as the SNHRPC socio-economic database and 2010 Census information, was used to project future traffic growth and to reassign traffic under the Proposed Action plan.

Affected Environment and Environmental Consequences

This chapter describes the existing conditions with the area that may be affected by the Project. Existing conditions are the current natural, cultural, and social conditions of an area that are subject to change, both directly and indirectly, because of a proposed Federal action.

The resources analyzed for the Project include:

- > Transportation
- > Air Quality
- > Noise Environment
- > Farmland Soils
- > Groundwater Resources
- > Water Quality
- > Floodplains and Floodways
- > Wetlands and Surface Waters
- > Wildlife and Habitat
- > Fisheries
- > Threatened and Endangered Species

- > Parks, Recreation, and Conserved Lands
- > Cultural Resources
- > Hazardous Materials and Contamination
- Visual and Aesthetic Resources
- **Environmental Justice**
- Socio-Economic Conditions
- Construction >
- > Indirect Effects and **Cumulative Impacts**

Council on Environmental Quality. 1981. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations. 46 Federal Register 18026. Accessed from https://www.energy.gov/sites/prod/files/G-CEQ-40Questions.pdf. Accessed on October 10, 2018.

Lastly, to evaluate traffic operating conditions for the Existing, future year No-Build, and future year Proposed Action conditions, traffic operational analyses were conducted to determine how well the roadway facilities serve the traffic demands.

The traffic performance measures and the evaluation criteria used in the operational analyses are based on the methodologies presented in the 2000 and 2010 Highway Capacity Manuals (HCM).⁶ The 2010 HCM methodology was used for all freeway and ramp (merge, diverge, and weave) analysis, while the 2000 HCM methodology was used for intersection capacity analysis because the 2010 methodology cannot evaluate signalized intersection operations properly with exclusive pedestrian phases.

A primary result of capacity analysis is the assignment of Level of Service (LOS), which is a gualitative measure describing operational conditions. LOS generally describes these conditions in terms of such factors as speed and travel time, density or freedom to maneuver, traffic interruptions, comfort, and convenience, thereby providing an index to quality of traffic flow. Six levels of service are defined that range in letter designation from LOS A to LOS F, with LOS A representing the best operating condition and LOS F representing the worst. LOS C describes a stable flow condition and is considered desirable for design hour traffic flow. LOS D is generally considered acceptable, particularly when the cost and impacts of making the additional improvements needed to achieve LOS C are deemed unjustifiable. LOS E reflects a capacity condition, but under certain circumstances may be considered acceptable, such as in urban areas or where there's a desire to encourage multi-modal use and discourage single-occupant vehicles.

To determine the existing traffic volume demands and flow patterns in the Study Area, a traffic volume count program was conducted in November 2015. The 2015 counts were supplemented with other count data available from the NHDOT. Weekday morning and weekday evening peak period manual turning movement counts were conducted at Exit 6, Exit 7, and other major intersections surrounding the I-293 Study Area. Multi-day automatic traffic recorder counts were also conducted along key local roadways that provide access to and from Exits 6 and 7.

4.1.2 Existing Conditions

4.1.2.1 Traffic Volumes

Review of the hourly traffic volumes for a typical weekday (August 2015) on I-293 northbound and southbound, as depicted in Exhibits 4-1 and 4-2 respectively, reveals typical commuter route characteristics. The graphs show distinct weekday morning and evening commuter activity. The highest recorded northbound traffic volume occurs during the weekday evening peak hours, while the highest recorded southbound volume occurs during the weekday morning peak hours.

Environmental Assessment





AM and PM peak hour and Average Weekday Traffic recorded during November 2015 for I-293 between Exists 5 and 6, and other nearby roadways such as Front Street, Dunbarton Road, Straw Road, and Goffstown Back Road are summarized in **Table 4.1-1**.



Exhibit 4-1 Traffic Volume I-293 Northbound Between Exits 5 and 6 (August 2015)

Exhibit 4-2 Traffic Volume I-293 Southbound Between Exits 5 and 6 (August 2015)



Transportation Research Board. 2010. 2000 & 2010 Highway Capacity Manual. Washington, DC.

Table 4.1-1 Traffic Volume Summary (November 2015)

Location	Peak Hour		Average Weekday
	AM	PM	Traffic
I-293 between Exits 5 and 6			
Northbound	2,020	2,940	30,170
Southbound	2,850	2,380	28,320
Total	4,870	5,320	58,490
Front Street north of Country Club Drive			
Northbound	420	730	7,950
Southbound	720	790	8,690
Total	1,139	1,520	16,640
Dunbarton Road east of Straw Road			
Eastbound	310	120	1,830
Westbound	90	210	1,610
Total	400	330	3,440
Straw Road south of Dunbarton Road			
Northbound	30	60	480
Southbound	50	40	410
Total	80	100	890
Goffstown Back Road west of Straw Road			
Eastbound	710	230	4,040
Westbound	180	560	4,140
Total	890	790	8,180

4.1.2.2 Design Hour Volume (DHV)

The unit of measure used to evaluate and design roadway facilities is an hourly traffic volume measured in vehicles per hour. However, because hourly traffic volumes can vary during the course of a day, and throughout the year, it is necessary to select an appropriate DHV condition. The hourly traffic volume used for the purpose of design should not be exceeded very often or by very much. However, it should not be so high that the traffic volume would rarely be high enough to make full use of the facility. It is wasteful to design a facility based on the maximum peak hour traffic of the design year, yet the use of the average hourly traffic may result in an inadequate design. Therefore, the procedure typically used to evaluate traffic volume demands on a roadway system, as described in A Policy on

Geometric Design of Highways and Streets,⁷ is to establish a 30th-highest hour volume, or DHV, as the future design condition. Given the economic considerations involved in the planning and design of roadway facilities, the DHV design criterion is selected because the 30th-highest hour volume generally reflects a "point of diminishing return" in that a substantial increase in capacity would only accommodate few periods of higher traffic volumes.

A review of historical count data at the NHDOT count station on I-293 between Exits 5 and 6 (Station #02285002) revealed that increasing the August 2015 peak hour traffic counts on I-293 by ten percent best approximates the DHV condition. Specifically, the K-Factor (12.41 percent), which is the percent of traffic of the Average Annual Daily Traffic that occurs during the 30th highest hour at this location, was applied to the estimated 2015 Average Annual Daily Traffic (26,075) to establish the DHV (3,235) on I-293 northbound during the weekday evening peak hour. A ten percent adjustment was also applied to the slightly lower weekday morning peak period on I-293.

4.1.2.3 Seasonal Adjustment

The manual turning movement counts collected in November 2015 were seasonally adjusted to represent an average month condition. Historical count data at numerous nearby NHDOT permanent count stations (I-293 in Manchester between Exits 5 and 6, F.E. Everett Turnpike at the Bedford Tolls, I-93 at the Hooksett Tolls, and NH Route 3A in Bow south of Robinson Road) revealed that average month conditions are approximately equal to the November conditions during the weekday morning peak hour and four percent higher than the November conditions during the weekday evening peak hour. Therefore, no adjustment was made to the November 2015 weekday morning peak hour volumes and a four percent increase was applied to the November 2015 weekday evening peak hour volumes to represent an average month condition. The seasonally adjusted intersection turning movement traffic volumes were blended with I-293 mainline DHVs to establish the 2015 weekday AM and PM peak hour traffic volume networks (Figures 4.1-1 and 4.1-2).

4.1.2.4 Traffic Model

The SNHPC maintains a regional transportation daily model which utilizes the CUBE/Voyager travel demand modeling software package and SNHPC's socio-economic database, as well as the 2010 Census. The model is used to help understand traffic demand in the future based on land use growth and planned roadway projects. The base model contains 290 internal traffic analysis zones (TAZs) and 67 external stations. Internal TAZs are geographic units that contain land use information (population, households, employment by type) while external TAZs represent vehicle traffic that enters and exits the model area from outside the region. The traffic forecasting procedure generally follows the standard four-step process described below:

American Association of State Highway and Transportation Officials. 2011. A Policy on Geometric Design of Highways and Streets, 6th Edition. Washington, DC.



I-293 Exits 6 and 7

2015 Weekday AM Peak Hour Traffic Volumes


I-293 Exits 6 and 7

2015 Weekday PM Peak Hour Traffic Volumes

- > **Trip Generation.** Determines the quantity of trips generated at each traffic zone based on the land use contained in the TAZ.
- > **Trip Distribution.** Determines the origin and destination patterns of trips generated at each TAZ.
- Modal Split. Determines what modes the trips are going to use to travel to their destinations.
- > **Traffic Assignment.** Determines which routes the trips are going to take to their destination.

The roadway network assumed in the regional model includes the principal roadway street system as defined by NHDOT. It is not necessary to include all the local streets in the region. Within the modal, a road segment is called a "link" and the intersection of two or more streets is called a "node." Each link is defined by characteristics such as length, average free flow speed, number of lanes, capacity and one way or two-way traffic flow.

Before the model can be utilized to forecast traffic for a horizon year, it must first be able to reasonable represent base year travel activity in the region. This involves modifying the model parameters until actual base year traffic is replicated.

For this study, and to better understand the traffic patterns and flows in the Study Area, a number of TAZs were disaggregated. This was helpful for the alternative analysis since smaller TAZs allow for more accurate loading of trips from TAZs. Four TAZs in the Study Area were disaggregated into a total of 15 TAZs. The land use associated with each TAZ was disaggregated to these new TAZs based on 2010 census data as well as the SNHPC's employment data.

To check the model's calibration along I-293, and surrounding roadway network, the traffic model output was compared to actual daily traffic volume counts at 51 locations. These locations included all of links on I-293 in the Study Area, ramp volumes at Exits 4 through 7 as well as roadways on either side of I-293. Once the model was calibrated, it was run using 2035 land use and roadway assumptions. The annual daily growth rate was then calculated for the roadway links in the Study Area. This annual growth rate provides the basis for forecasting future year 2035 traffic volumes for this study.

To better understand morning and evening peak hour traffic volumes, the daily model output for the existing and future conditions was used to develop a model that also produced morning and evening peak hour volumes. This model also included a more detailed roadway network. This peak model was instrumental in understanding the potential traffic volume "shifts" (diversions that may occur under various alternatives considered in the study.

Forecast year 2035 traffic volumes obtained from the model were used to predict a rate at which traffic is expected to grow. A review of volumes assigned to the roadway links within the SNHRPC regional model revealed a projected average annual growth rate of 0.85 percent, which is consistent with historical US Census population growth trends between 1980 and 2010 within the surrounding communities of Manchester, Hooksett, and Goffstown. Therefore, for the purpose of this evaluation, a slightly higher but still modest

1.0 percent average annual background growth rate was used to project the future year 2035 traffic volume demand. The 2035 No-Build weekday AM and PM peak hour traffic volume networks are shown in Figures 4.1-3 and 4.1-4.

In addition to the anticipated local and regional traffic growth that is projected for the year 2035 by the regional travel demand model, there are opportunities within the Study Area for specific land development that if developed, could generate concentrated traffic demand in the vicinity of that development. One of these potential development areas is the Hackett Hill property.

The City of Manchester acquired the Hackett Hill property in 1988 from the University of New Hampshire. The property, which consists of approximately 833 acres, is located on the north end of the Study Area west of I-293 and extends from Dunbarton Road to Hackett Hill Road. The Hackett Hill Master Plan, which the City prepared in 2000, describes a plan with the potential for approximately 1,290,000 square feet of office space in a corporate campus environment. More recently, and based on market demand, city officials anticipate more of an office/light industrial build-out scenario.

Applying trip-generation rates published by the Institute of Transportation Engineers in Trip Generation⁸ (Institute of Transportation Engineers Industrial Park - Land Use Code 130), it is estimated that the full build-out of the Hackett Hill property could generate approximately 1,085 (890 entering and 195 exiting) vehicle-trips during a weekday morning peak hour and approximately 1,110 (235 entering and 875 exiting) vehicle-trips during a weekday evening peak hour.

The 2035 Proposed Action weekday AM and PM peak hour traffic volume networks are shown in Figures 4.1-5 and 4.1-6.

4.1.2.5 Public Transportation

Bus Routes: MTA

The Manchester Transit Authority (MTA) provides public transportation within the Study Area. MTA provides four service zones to the City of Manchester: 13 regular bus routes throughout Manchester and neighboring communities, two intercity routes to the cities of Concord and Nashua, known as Zip Line, two seasonal services to the towns of Hampton Beach and Deerfield, NH, and a downtown circulator (via two wheelchair accessible hybrid electric buses), known as the Green DASH (Downtown Area Shuttle), and shopper shuttles to local grocery stores. In general, MTA service is hourly, with more frequent service along corridors served by multiple routes. The Green DASH (Route 7) runs every 30 minutes during weekdays. The Study Area's existing transit routes are shown in **Figure 4.1-7**.

The MTA system converges downtown at Veterans Park and the Radisson Downtown with one line (Route 3) departing from the nearby Manchester Transportation Center on Canal Street. Service is generally limited to the City of Manchester, with a few lines extending into

Institute of Transportation Engineers. 2008. Trip Generation, Eighth Edition, ITE, Washington, DC.



I-293 Exits 6 and 7

2035 No Build Weekday AM Peak Hour **Traffic Volumes**



I-293 Exits 6 and 7

2035 No Build Weekday PM Peak Hour Traffic Volumes



2035 Proposed Action Plan

Weekday AM Peak Hour **Traffic Volumes**



I-293 Exits 6 and 7

2035 Proposed Action Plan Weekday PM Peak Hour **Traffic Volumes**







I-293 Exits 6 and 7

Existing Transit Routes

the neighboring towns of Bedford, Goffstown, Hooksett and Londonderry. Two express lines run to Concord and Nashua. Four transit routes are within the project limits of the Proposed Action:

- Route 6 Manchester West and Goffstown via Bremer St and Mast Road.
- > Route 7 Bedford Grove Plaza via Second Street.
- > Route 11 Front Street and Hackett Hill Road via the Amoskeag Circle.
- > Route 21 The Concord Express Zipline.

Ridership data provided by MTA for the 2014-2015 fiscal year indicates that average total daily ridership is approximately 1,600. Total monthly ridership varies between 35,000 in January and February and a peak of 45,000 in September and October. Total annual ridership was approximately 485,000 during the 2014-2015 fiscal year.

In addition to the above routes, the MTA operates:

- > "StepSaver" a program that provides origin to destination shared-ride service to individuals with disabilities who are unable to use the regular fixed route bus service.
- > "Senior Center Shuttle" a program that provides free on demand service every Tuesday between various locations around Manchester and the Cashin Senior Center on Douglas Street.
- "Goffstown Shuttle" a program that provides free curb to curb service on Monday, Wednesday, and Friday with priority bookings for riders over the age of 62 and medical appointments.
- School buses for the Manchester School District.

The Manchester Transportation Center is owned by the City of Manchester and operated by Boston Express. The terminal is located at 119 Canal Street off Granite Street, accessible via I-293 Exit 5. Scheduled service at this terminal is provided by Boston Express, Concord Coach Lines, Greyhound Bus Lines and Peter Pan Bus Lines.

- Boston Express provides service between Concord to the north and Londonderry, Salem, Nashua, and Tyngsborough (Massachusetts) to the south with continuing service to Logan Airport and Boston South Station.
- Concord Coach Lines provides multiple bus routes with service between northern New Hampshire (Littleton, Plymouth, and Tilton / Berlin, Conway, and Meredith), central/southern New Hampshire (Concord, Manchester, Londonderry, and Salem), and Boston, Massachusetts (South Station and Logan Airport).
- > Greyhound Bus Lines provides daily round trips between Boston and Montreal stopping in Manchester.
- > Peter Pan Bus Lines provides two daily routes with stops in Manchester:
- > New Hampshire Worcester New York and
- > Boston Worcester Springfield New Hampshire Foxwoods Casino.

Bicycle Facilities

The NHDOT has designated bicycle routes throughout the state as shown on seven Regional Bicycle maps available online at: https://www.nh.gov/dot/programs/bikeped/maps/ index.htm. The Study Area falls within the Merrimack Valley Region that generally offers rolling terrain with heavy traffic within urban areas. Within the Study Area, the following have been designated as bicycle routes:

- > Dunbarton Road east of Straw Road in Goffstown continuing onto Front Street to Goffstown Road, just west of the Amoskeag Traffic Circle.
- Straw Road from Dunbarton Road continuing onto Goffstown Road to Coolidge Avenue, just west of the Amoskeag Traffic Circle.
- Coolidge Avenue between Goffstown Road and West Bridge Street.
- > Kelly Street between Goffstown and Coolidge Avenue.
- > Bridge Street from Coolidge Avenue through Downtown Manchester to I-93.
- > Elm Street from Bridge Street to Queen City Avenue.
- Canal Street from Bridge Street continuing along River Road, West Clark Street, and Union Street beyond I-93 in Hooksett.

4.1.2.6 Vehicle Crash Evaluation

NHDOT vehicle crash data was compiled for I-293 within the Study Area and the surrounding roadway network for the most recent four-year period available (2012 - 2015). As shown in **Figure 4.1-8**, a total of 303 crashes were reported within the project limits during this four-year period. Of the total 303 crashes, 73 (30 percent) occurred on the mainline of I-293, 67 (27 percent) occurred on the Exit 6 and 7 interchange ramps, and the remaining 106 occurred along the adjacent Study Area roadways.

Ramp junctions and major intersections are generally the highest crash locations. Specifically, the Exit 6 ramps along the Amoskeag Traffic Circle experience the highest number of crashes, and the highest crash rates, within the Study Area. High numbers of crashes were also reported along Amoskeag Street between the Merrimack River and Front Street, along Eddy Road at the Exit 6 southbound on and off-ramps, on I-293 at Exit 7, and between Exits 5 and 6 along the "S-Curve." Table 4.1-2 summarizes the number of crashes and crash rates along I-293 and the Exit 6 and 7 ramps within the Study Area.

4.1.3 Impacts: Operational Analyses

Measuring the volume of traffic in the Study Area indicates the importance of I-293 to the regional transportation system but does not necessarily indicate the quality of traffic flow. To assess the quality of traffic flow along the corridor, capacity analyses were conducted to determine how well the roadway facilities serve the traffic demands placed on them. The traffic performance measures and the evaluation criteria used in the operational analyses are



City Park Land Conservation/Public Land

Stream

Town/City Boundary

3 - 5

19 or Greater

303 Total Crashes No Fatal Crashes Reported

I-293 Crash Density (2012-2015)

based on the methodologies presented in the HCM.⁹ The 2010 HCM methodology was used for all freeway and ramp (merge, diverge, and weave) analysis, while the 2000 HCM methodology was used for intersection capacity analysis because the 2010 methodology cannot evaluate signalized intersection operations properly with exclusive pedestrian phases.

Table 4.1-2 I-293 Mainline and Ramp Crash Summary (2013 to 2015)

	Crashes ((2013-2015) ¹	2015 Traffic Volume		.015) ¹ 2015 Traffic Volume Length		Length	Crash Rate
Segment	Total	Average	Peak Hour	Daily	(miles)	(MVMT) ²		
I-293 Northbound Mainline								
Exit 5 On-Ramp to Exit 6 On-Ramp	18	6	3,235	26,068	0.89	0.71		
Exit 6 Off-Ramp to Exit 6 On-Ramp	7	2.3	2,205	17,768	0.52	0.69		
Exit 6 On-Ramp to Exit 7 Off-Ramp	6	2.0	3,095	24,940	0.48	0.46		
North of Exit 7 Off-Ramp	15	5.0	2,195	17,687	1.00	0.77		
Total	46	15.3	2,667	21,487	2.89	0.68		
I-293 Northbound Ramps								
Exit 6 On-Ramp	16	5.3	1,030	8,300	0.17	10.36		
Exit 6 On-Ramp	11	3.7	890	7,172	0.21	6.67		
Exit 7 Off-Ramp	4	1.3	900	7,252	0.18	2.8		
Total	31	10.3	936	7,540	0.56	6.7		
I-293 Southbound Mainline								
North of Exit 7 On-Ramp	5	1.7	2,140	17,469	100	0.26		
Exit 7 On-Ramp to Exit 6 On-Ramp	13	4.3	2,780	22,694	0.71	0.74		
Exit 6 On-Ramp to Exit 6 Off-Ramp	21	7.0	3,405	27,796	0.08	8.62		
Exit 6 Off-Ramp to Exit 6 On-Ramp	8	2.7	2,755	22,490	0.25	1.30		
Exit 6 On-Ramp to Exit 5 Off-Ramp	20	6.7	3,130	25,551	0.68	1.05		
Total	67	22.3	2,648	21,619	2.72	1.04		
I-293 Southbound Ramps								
Exit 7 On-Ramp	10	3.3	640	5,224	0.12	14.17		
Exit 6 On-Ramp (north)	17	5.7	625	5,102	0.10	30.43		
Exit 6 Off-Ramp	12	4.0	650	5,306	0.14	14.75		
Exit 6 On-Ramp	6	2.0	375	3,061	0.07	25.57		
Total	45	15.0	597	4,870	0.43	19.62		
•••								

Notes:

A total of 303 crashes were reported in the Study Area from 2012 to 2015. This table only analyzes crashes on the I-293 mainline and 1 ramps from 2013 to 2015.

Crash Rates are expressed in crashes per million vehicle miles (MVMT) 2

Transportation Research Board. 2010. 2000 & 2010 Highway Capacity Manual, Washington, DC.

A primary result of capacity analysis is the assignment of LOS, which is a qualitative measure describing operational conditions. LOS generally describes these conditions in terms of such factors as speed and travel time, density or freedom to maneuver, traffic interruptions, comfort, and convenience, thereby providing an index to guality of traffic flow. Six levels of service are defined that range in letter designation from LOS A to LOS F, with LOS A representing the best operating condition and LOS F representing the worst. LOS C describes a stable flow condition and is considered desirable for design hour traffic flow. LOS D is generally considered acceptable, particularly when the cost and impacts of making the additional improvements needed to achieve LOS C are deemed unjustifiable. LOS E reflects a capacity condition, but under certain circumstances may be considered acceptable, such as in urban areas or where there's a desire to encourage multi-modal use and discourage single-occupant vehicles.

Results of the 2015 Existing operational analyses, which were conducted for the key freeway, ramp merge, ramp diverge, and ramp weave segments throughout the Study Area, as well as signalized and unsignalized intersections that control traffic operations at nearby major intersections are summarized in Table 4.1-3 (freeway and ramps), Table 4.1-4 (signalized), and Table 4.1-5 (unsignalized).

4.1.3.1 Mainline (Freeway and Ramps)

As shown in **Table 4.1-3**, the results of the 2015 existing conditions analysis at the freeway and ramp junctions indicate that several freeway segments and ramp junctions are currently operating at LOS D. This occurs during the peak periods along I-293 southbound during the weekday morning and northbound during the weekday evening. Additionally, the weave section between the Exit 6 southbound on and off-ramps operates at LOS E during the weekday morning peak hour. It is, however, important to note that the analysis procedure used to evaluate the freeway segments and ramps does not reflect the effects associated with the overall roadway network, such as when the ramp intersections back-up onto I-293. As a result, some of the reported levels of service are shown to operate better than actual operations in the field. This effect is reflected at the Exit 6 southbound on and off-ramps where the weave congestion slows and often stops the mainline flow. Although the analysis procedure shows a LOS E operation for the weave condition, field observations would suggest a LOS F condition.

4.1.3.2 Signalized Intersections

As shown in **Table 4.1-4**, the results of the operational analyses at the Study Area's signalized intersections show that the Main Street/McGregor Street intersections operates at LOS D under the 2015 existing conditions. All other intersections show a LOS C or better. Although good operating levels of service are reported at the three signalized intersections located along Amoskeag Street at the Amoskeag Circle, much like the I-293 SB weave, the analysis fails to reflect actual conditions. Merging, diverging, and weaving traffic within the Amoskeag Circle create delay, congestion, and at times leads to vehicles queueing back into theses signalized intersections. When this occurs, the operations at these intersections essentially deteriorates to LOS F.

Table 4.1-3 2015 Existing Freeway and Ramp Analyses

		Level of Service			
Location	Movement	AM Peak Hour	PM Peak Hour		
I-293 NB from Exit 5 to Exit 6	Freeway	С	D		
Exit 6 NB Off-Ramp	Diverge	С	D		
Exit 6 NB On-Ramp	Merge	В	D		
I-293 NB from Exit 6 to Exit 7	Freeway	В	D		
Exit 7 Off-Ramp	Diverge	В	D		
I-293 NB north of Exit 7	Freeway	В	С		
I-293 SB north of Exit 7	Freeway	С	В		
Exit 7 SB On-Ramp	Merge	С	С		
I-293 SB from Exit 7 to Exit 6	Freeway	D	С		
Exit 6 SB Weave	Weave	E	С		
Exit 6 SB On-Ramp at Eddy Road	Merge	D	С		
I-293 SB from Exit 6 to Exit 5	Freeway	D	С		

Table 4.1-4 2015 Existing Signalized Intersection Analyses

	AM Peak Hour		PM Peak	Hour
Location	Delay	LOS	Delay	LOS
Goffstown Road/Front Street/Eddy Road	5	А	9	А
Exit 6 NB Off-Ramp/Amoskeag Street	13	В	28	С
Amoskeag St/River Front Dr. / Fletcher St	9	А	8	А
Main St/McGregor St	45	D	39	D

As shown in Table 4.1-5, the results of the operational analyses at the unsignalized intersections revealed poor operations (LOS E and LOS F) for the side street movements at the Goffstown Road/Coolidge Avenue, Front Street/Dunbarton Road, and Front Street/MCC intersections. Note that actual delay experienced by motorists at the Dunbarton Road approach to Front Street and at the MCC driveway onto Front Street is not as high as the analysis methodology predicts. Nevertheless, both approaches do operate at LOS F with long and unstable delays.

Level of service analyses, like those conducted for the existing conditions, were performed for the future 2035 No-Build and the 2035 Proposed Action. The 2035 No-Build reflects the continuation and perpetuation of the existing transportation infrastructure within the Study Area. The 2035 Proposed Action reflects the proposed plan described in Section 1.3, which includes:

- > Widening the northbound and southbound barrels of I-293 from two to three lanes in each direction.
- > Reconstruction Exit 6 more or less in its existing location using a SPUI configuration.

full access interchange.

Table 4.1-5 2015 Existing Unsignalized Intersection Analyses

		AM Peak Hour			Р	M Peak Ho	ur
Location	Movement	Demand	Delay	LOS	Demand	Delay	LOS
	EB	820	1	А	315	1	А
	WB	410	3	А	910	2	А
Goffstown Road/Coolidge Ave	NB LT/Thru	5	70	F	25	37	E
	SB	5	918	F	30	263	F
	EB	545	245	F	280	746	F
	WB	10	33	D	5	47	E
Front Street/Dunbarton Road	NB	215	6	А	430	10	А
	SB	365	1	А	505	0	А
	EB LT	15	45	E	75	1,000+	F
Front Street/Manchester	NB	620	8	А	1130	8	А
community college (MCC)	SB	885	0	-	755	0	-
Front Street/Country Club Drive	EB LT	15	21	С	10	25	С
	NB	435	1	А	965	3	А
	SB	790	0	-	730	0	-

Results of the 2035 No-Build operational analyses, which were conducted for the key freeway, ramp merge, ramp diverge, and ramp weave segments throughout the Study Area, as well as signalized and unsignalized intersections that control traffic operations at nearby major intersections are summarized in Table 4.1-6 (freeway and ramps), Table 4.1-7 (signalized), and Table 4.1-8 (unsignalized).

Results of the 2035 Proposed Action operational analyses, which were similarly conducted for the key freeway, ramp, as well as signalized and unsignalized intersections are summarized in Table 4.1-9 (freeway and ramps), Table 4.1-10 (signalized), and Table 4.1-11 (unsignalized).

4.1.3.3 2035 No-Build Mainline (Freeway and Ramps)

As shown in Table 4.1-6, by 2035, seven of the locations that operate at LOS D under existing conditions are expected to deteriorate to LOS E. The Exit 6 southbound weave movement, which shows a LOS E under existing deteriorates to LOS F.

> Relocating Exit 7 approximately 0.5 mile north of its current location and constructing a

		Level of Service			
Location	Movement	AM Peak Hour	PM Peak Hour		
I-293 NB from Exit 5 to Exit 6	Freeway	С	E		
Exit 6 NB Off-Ramp	Diverge	С	E		
Exit 6 NB On-Ramp	Merge	С	E		
I-293 NB from Exit 6 to Exit 7	Freeway	С	E		
Exit 7 Off-Ramp	Diverge	С	E		
I-293 NB north of Exit 7	Freeway	В	С		
I-293 SB north of Exit 7	Freeway	С	С		
Exit 7 SB On-Ramp	Merge	D	С		
I-293 SB from Exit 7 to Exit 6	Freeway	D	С		
Exit 6 SB Weave	Weave	F	D		
Exit 6 SB On-Ramp at Eddy Road	Merge	E	D		
I-293 SB from Exit 6 to Exit 5	Freeway	E	D		

Table 4.1-6 2035 No-Build Freeway and Ramp Analyses

4.1.3.4 2035 No-Build Signalized Intersections

As shown in Table 4.1-7, by 2035, under the No-Build condition, the Exit 6 NB off-ramp/Amoskeag Street signalized intersection has deteriorated to an LOS F operation during the PM peak hour. Note that the congestion associated with the merging, diverging, and weaving traffic within the Amoskeag Circle described earlier in the report, is also expected to worsen. Additionally, operations at the Main Street/McGregor Street intersection shows a LOS E in the AM and a LOS D in the PM.

Table 4.1-7 2035 No-Build Signalized Intersection Analyses

	AM Peak Hour		PM Peak H	our
Location	Delay	LOS	Delay	LOS
Goffstown Road/Front Street/Eddy Road	8	A	15	А
Exit 6 NB Off-Ramp/Amoskeag Street	17	В	97	F
Amoskeag St/River Front Dr/ Fletcher St	11	В	11	В
Main Street/McGregor Street	59	E	46	D

4.1.3.5 2035 No-Build Unsignalized Intersections

As shown in Table 4.1-8, by 2035, under the No-Build condition, the side street movements at the unsignalized intersections deteriorate substantially with LOS F and long delays reported at the Goffstown Road/Coolidge Avenue, Front Street/Dunbarton Road, and Front Street/MCC intersections. Operations at the Country Club Drive approach to Front Street, which under existing conditions showed a LOS C in the PM peak hour has deteriorated to LOS E.

Table 4.1-8 2035 No-Build Unsignalized Intersection Analyses

		AM Peak Hour			F	PM Peak Ho	ur
Location	Movement	Demand	Delay	LOS	Demand	Delay	LOS
	EB	1050	1	А	500	1	А
Goffstown Road/Coolidge	WB	545	3	А	1160	4	А
Ave	NB LT/Thru	5	70	F	30	844	F
	SB	5	918	F	40	1,000+	F
	EB	735	695	F	400	1,000+	F
Front St/Dunbarton Road	WB	10	86	F	5	125	F
	NB	290	7	А	780	14	В
	SB	460	1	А	625	0	А
	EB LT	20	114	F	90	1,000+	F
Front Street/Manchester	NB	775	11	В	1405	13	В
Community College (MCC)	SB	1115	0	-	960	0	-
Front Street/Country Club	EB LT	20	32	D	15	47	E
	NB	570	2	А	1215	4	А
Dive	SB	1005	0	-	920	0	-

4.1.3.6 2035 Proposed Action Mainline (Freeway and Ramps)

As shown in **Table 4.1-9**, the results of the freeway and ramp operational analyses for the 2035 with the Proposed Action in place show good operating conditions (LOS C or better) during the AM peak hour and acceptable operating conditions (LOS D or better) during the PM peak hour. All poor operating conditions (LOS E or LOS F) found under the 2035 No-Build condition have been eliminated.

Table 4.1-9 2035 Proposed Action Freeway and Ramp Analyses

		Level of Service		
Location	Movement	AM Peak Hour	PM Peak Hour	
I-293 NB from Exit 5 to Exit 6	Freeway	С	С	
Exit 6 NB Off-Ramp	Diverge	С	D	
Exit 6 NB On-Ramp	Merge	В	С	
I-293 NB from Exit 6 to Exit 7	Freeway	В	D	
Exit 7 NB Off-Ramp	Diverge	С	D	
Exit 7 NB On-Ramp	Merge	В	С	
I-293 NB north of Exit 7	Freeway	В	D	
I-293 SB north of Exit 7	Freeway	С	В	
Exit 7 SB Off-Ramp	Diverge	С	В	
Exit 7 SB On-Ramp	Merge	С	С	

2035 Proposed Action Freeway and Ramp Analyses (Cont.) Table 4.1-9

	Level of Service					
Location	Movement	AM Peak Hour	PM Peak Hour			
I-293 SB from Exit 7 to Exit 6	Freeway	С	С			
Exit 6 SB Off-Ramp	Diverge	С	С			
Exit 6 SB On-Ramp at Eddy Road	Merge	С	В			
I-293 SB from Exit 6 to Exit 5	Freeway	С	С			

4.1.3.7 2035 Proposed Action Signalized Intersections

As shown in **Table 4.1-10**, the results of the signalized intersection analyses for the 2035 with the Proposed Action in place show acceptable operating conditions (LOS D or better) for the AM and PM peak hour conditions.

	AM Peak Hour		PM Pea	k Hour
Location	Delay	LOS	Delay	LOS
Exit 6 SPUI	30	С	20	В
River Front Dr / Fletcher St	13	В	9	А
Main St/McGregor St	37	D	49	D
Elm St/Bridge St	30	С	42	D
Exit 7 SB Ramps	18	В	20	В
Exit 7 NB Ramps	49	D	49	D
Exit 7 Interchange East Connector/Front St	17	В	21	С
Exit 7 Interchange West Connector/Dunbarton Road	37	D	45	D

Table 4.1-10 2035 Proposed Action Signalized Intersection Analyses

4.1.3.8 2035 Proposed Action Unsignalized Intersections

As shown in Table 4.1-11, left-turn movements from Coolidge Avenue would continue to experience long delays during the peak hours. Similarly, delays would be experienced by motorists turning left from the Community College onto the new Exit 7 Interchange East-West Connector. Alternative city street access parallel to Coolidge Avenue is available for secondary egress and access during peak flows (i.e., Goffstown Road/Montgomery Street, McGregory Street/Bremer Street and/or West Bridge Street/Coolidge Street). The Community College driveway will be located between two signalized intersections and will benefit from the operational 'gaps' for egress and access.

Note that the Proposed Action has resulted in a substantial improvement in the operations for the side street movements from Dunbarton Road onto Front Street and from the existing MCC driveway onto Front Street with both locations improving from LOS F to LOS C or better.

Table 4.1-11 2035 Proposed Action Unsignalized Intersection Analyses

		A	M Peak Ho	our	F	PM Peak Ho	our
Location	Movement	Demand	Delay	LOS	Deman	Delay	LOS
	EB	1180	1	А	670	1	А
	WB LT	205	15	С	200	10	В
Goffstown Road/Coolidge Ave	NB LT/Thru	10	469	F	25	42	E
	SB	10	1,000+	F	40	1,000+	F
	EB	215	12	В	70	13	В
	WB	15	15	В	10	16	С
Front Street/Dunbarton Road	NB	120	2	A	260	3	А
	SB	195	1	A	275	1	А
	EB LT	10	12	В	60	17	С
Front St/Manchester Community	NB	190	3	A	400	3	A
college (MCC)	SB	375	0	-	300	0	-
	EB LT	5	10	В	10	11	В
Exit 7 Interchange East	WB LT	75	11	В	55	15	В
Connector/Manchester Community College (MCC)	NB	50	146	F	95	1000+	F
	SB	15	64	F	25	259	F
Exit 6 SB On-Ramp at McGregor	NB	530	0	-	660	0	-
St	SB	200	5	А	110	5	А

4.1.3.9 Public Transportation

Bus Routes: MTA

The Manchester Transit Authority (MTA) operates several bus lines within the project limits of the Proposed Action, the routes are described in **Section 4.1.2.5**. The Proposed Action will likely impact those routes as follows:

- Bridge Street.
- eliminates the access to Front Street from the Exit 6 area.

> Route 6 – Manchester West and Goffstown via Bremer St and Mast Road. This route is unlikely to be impacted by the Proposed Action as the route crosses over I-293 via West

> Route 7 – Bedford Grove Plaza via Second Street. This route is unlikely to be impacted by the Proposed Action as the route crosses over I-293 via West Bridge Street.

> Route 11 – Front Street and Hackett Hill Road via the Amoskeag Circle. This route is anticipated to be impacted by the Proposed Action. The existing transit route accesses Front St. via the Amoskeag circle to provide service to Manchester Community College, the Hackett Hill neighborhood, and shopping centers to the north. The Proposed Action

> Route 21 – The Concord Express Zipline. This route uses I-293 to link Manchester and Concord. It enters/exits I-293 from Exit 5 and provides express service to and from

Concord NH. This route is unlikely to be permanently impacted by the Proposed Action as express bus uses Exit 5 to access I-293. This route may experience delays resulting from construction along I-293.

The MTA, through ongoing coordination, has provided generally favorable feedback on the Proposed Action, acknowledging that additional coordination and analysis will be needed during final design to mitigate the changes to Transit Route 11 described above. The MTA is evaluating revisions to existing routing, as well as potentially expanding service with additional routes, to offset the loss of direct access to Front Street from Exit 6. Other transit service enhancements, such as the addition of bus pull-outs will be evaluated during final design.

Bicycle Facilities

Section 4.1.2.5 describes the NHDOT designated bicycle routes within the project area. Of those routes, it is anticipated the following will be impacted by the Proposed Action:

- > Dunbarton Road east of Straw Road in Goffstown continuing onto Front Street to Goffstown Road, just west of the Amoskeag Traffic Circle.
- > Coolidge Avenue between Goffstown Road and West Bridge Street.

These designated bike routes, in their existing configuration, connect Dunbarton Rd (serving Goffstown) to West Bridge Street allowing cyclists access to a designated bike route crossing of the Merrimack river via Front Street and Coolidge Avenue. The Proposed Action removes the connection between Front Street and Goffstown Road, thus eliminating the currently viable bike route. However, the Proposed Action connects Front Street and Eddy Road (which becomes McGregor St) to West Bridge Street with fewer intersections for cyclists to cross, and more direct connection from Dunbarton Road to West Bridge Street. The Proposed Action provides a more bicycle and pedestrian friendly corridor, with Front Street and Eddy Road serving as a local road rather than a part of the existing Exit 6 interchange.

The designated bicycle route between Goffstown Road and West Bridge Street via Coolidge Ave will be perpetuated by the Proposed Action. The impact resulting from the Proposed Action consists of the reconfiguration of the intersection of Goffstown Road and Coolidge Ave, which adds a Left turn lane and should improve mobility for eastbound cyclists turning onto Coolidge Ave to access West Bridge Street.

4.1.4 Mitigation

The Proposed Action has a beneficial effect on traffic operations and safety and therefore mitigation is not required. Construction activities, however, may require temporary traffic detours resulting in increased delays.

To mitigate these impacts, the NHDOT plans to construct the northern portion of the project including the new Exit 7 interchange and associated roadways first. Much of this early construction would be completed offline resulting in minimal impacts to existing traffic operations. Traffic control would be needed along I-293 and where the offline construction meets Front Street and Dunbarton Road. Note that during the I-293 mainline construction,

times.

be able to be diverted to Exit 7.

A comprehensive Traffic Control Phasing Plan will be prepared under the design phase of the project. Additional discussion on the Construction Impacts is provided in Section 4.18.

4.2 Air Quality

This section defines the Air Quality resource category set forth by the US Environmental Protection Agency (USEPA) and the Clean Air Act (CAA) (42 USC 7401), the primary statute that drives regulation of air guality and sets the nation's air guality standards for pollutants. It established National Ambient Air Quality Standards (NAAQS) (40 CFR 50) for various criteria pollutants in order to protect the health and welfare of the general public. The CAA authorizes the USEPA to "protect public health by regulating emissions of harmful pollutants." The 1990 Clean Air Act Amendments (CAAA), protects the quality of the nation's air resources at both the federal and state level. NEPA and the Conformity Rule also require the analysis of potential impacts in terms of a project's context, intensity, and duration.

From a transportation perspective, the primary pollutants of concern are carbon monoxide (CO), volatile organic compounds, and oxides of nitrogen, which are emitted from gasoline and diesel engines.

The CAAA and the State Implementation Plan (SIP) require that a proposed project not:

- Cause any new violation of the NAAQS;
- > Delay attainment of any NAAQS.

These criteria are addressed in a microscale (local) and mesoscale (regional) analyses. The local evaluation considers a microscale analysis that evaluates carbon monoxide hotspot concentrations; the regional evaluation discusses the Project's compliance with Transportation Conformity. FHWA has established procedures for the Transportation Conformity requirements of the CAA, as amended in 1990 (40 CFR 51 and Part 93). Additional relevant Federal laws and regulations include Control of Hazardous Air Pollutants from Mobile Sources (72 FR 8427)¹⁰ and FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents.¹¹

the Contractor would be required to maintain two lanes of travel in each direction at all

Completing the construction and having the new Exit 7 interchange fully operational prior to commencing construction at Exit 6 would help minimize delays as some Exit 6 traffic would

> Increase the frequency or severity of any existing violations; or

US Environmental Protection Agency. 2007. Final Rule for Control of Hazardous Air Pollutants from Mobile Sources. Accessed from https://www.epa.gov/mobile-source-pollution/final-rule-control-hazardous-air-pollutants-mobile-sources. Accessed on June 6, 2017. ¹¹ Federal Highway Administration. 2016. Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Accessed from

https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/. Accessed on June 12, 2017.

4.2.1 Methodology

This air quality assessment quantifies and summarizes the NAAQS criteria pollutants and hazardous air pollutants emissions resulting from the construction and operation of the Proposed Action, and the corresponding effect on ambient air.

4.2.1.1 Transportation Conformity

The State of New Hampshire, through the SNHRPC, has determined that the Project is regionally significant and has included its air quality emissions in the New Hampshire Department of Transportation 2019-2022 Statewide Transportation Improvement Program (TIP) (approved April 26, 2019).¹² The Project reference is #16099 "Preliminary Engineering and ROW for reconstruction of the F.E. Everett Turnpike at Exits 6 & 7." The Statewide Transportation Improvement Program (STIP), which includes this Project, was approved by FHWA and Federal Transit Administration in February 2017 as satisfying the transportation conformity requirements. Since the regional air quality impacts of the Proposed Action were addressed in the transportation conformity analysis, pursuant to 23 CFR 770, this Project conforms to the SIP and no additional analysis of regional emissions is required, and none have been included in this air quality study.

4.2.1.2 Impact Criteria

The NAAQS for the pollutants included in the microscale analysis are shown in **Table 4.2-1**.

	Primary	Standards	Secondary Standards		
Pollutant	Level	Averaging Time	Level	Averaging Time	
Carbon	9 ppm (10 mg/m ³)	8-hour	None	None	
Monoxide	35 ppm (40 mg/m ³)	1-hour	None	None	
Ozone1	0.070 ppm (138 μg/m³)	8-hour	0.070 ppm (138 µg/m ³)	8-hour	

Table 4.2-1 National Ambient Air Quality Standards

Note: Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

4.2.1.3 Microscale Analysis Methodology

A microscale modeling analysis that predicts CO levels at critical receptor locations within the Study Area evaluated the air quality impacts of the following conditions:

- Proposed Action; and
- improvements.

Five intersections, listed in **Table 4.2-2**, were modeled in the microscale analysis; these were selected based on level of service and intersection volumes as outlined in the USEPA's Guideline for Modeling Carbon Monoxide from Roadway Intersections (the "USEPA Guidance").¹³ The air quality study assumes that if these intersections would not exceed the NAAQS, then all other intersections, regardless of alternative, which would have lower volumes and better levels of service, would not exceed the NAAQS.¹⁴

Table 4.2-2 Intersection Analysis Rankings

Detailed Analysis

Exit 6 SPUI at Goffstown Road Exit 7 Ramps at new Exit 7 Interc Connector (Proposed Action Onl

FHWA Categorical Hot-spot

Main St/McGregor St & Amory S Fletcher St/Riverfront Dr & Amos Dunbarton Road and new Exit 7 Connector (Proposed Action On

The intersection analysis is provided for informational purposes to evaluate the changes in CO concentrations from No-Build Condition to the Proposed Action. Given the same LOS, the PM peak hour was chosen for the analysis because it has higher overall volume than the AM peak hour. Thus, the PM peak hour condition presents the greatest potential for impact.

The microscale analysis was evaluated using both the USEPA's computer model CAL3QHC and FHWA's carbon monoxide categorical hot-spot finding tool. For intersections with parameters that fell within the acceptable ranges of the FHWA categorical hot-spot guidance, the FHWA tool was used. A more detailed analysis was conducted for those intersections that fell outside of the acceptable ranges of this guidance.

FHWA Categorical Hotspot Finding. Three of the evaluated intersections were analyzed following the FHWA's carbon monoxide categorical hot-spot finding guidance. Under the final conformity rule amendments at 40 CFR 93.123(a)(3),¹⁵ urban projects that include one or more intersections under consideration for CO hot-spot analysis may rely upon the CO categorical hot-spot finding in place of completing a detailed analysis for the project-level conformity determination. As of 2008, USEPA has allowed for the CO categorical hot-spot finding to replace detailed hot-spot analysis if appropriate modeling showed that a type of

> No-Build Alternative (2035): reflects general background regional growth without the

Proposed Action (2035): reflects background regional growth including proposed Project

	Ranking
	Highest Volume
:hange East-West ly)	Worst LOS
	Ranking
St/West Bridge St	Ranking Highest Volume/ Worst LOS
St/West Bridge St skeag St	Ranking Highest Volume/ Worst LOS Highest Volume

¹³ US Environmental Protection Agency. 1992. *Guideline for Modeling Carbon Monoxide from Roadway Intersection*. EPA-454/R-92-005.

New Hampshire Department of Transportation, Bureau of Planning and Community Assistance. Approved April 26, 2019. New Hampshire Department of Transportation 2019-2022 Statewide Transportation Improvement Program.

¹⁴ The ranking of the Study Area intersections is presented in **Appendix C**, Hot Spot Finding and Intersection Microscale Analysis.

¹⁵ 40 CFR 93.123, Procedures for Determining Localized CO, PM10, and PM2.5 Concentrations (Hot-Spot Analysis).

highway or transit project would not cause or contribute to a new or worsened local air guality violation of the CO NAAQS. If the intersections of interest have modeling parameters within the acceptable range defined by FHWA, the Project is considered sufficiently similar to the intersection modeled in the CO categorical hot-spot finding and no further analysis is warranted.

FHWA has released a web-based tool¹⁶ to organize modeling parameters and check for conformity against the acceptable parameter ranges. Traffic volumes, speeds, and LOS were obtained from the traffic analysis associated with the Project. Topology and intersection configurations were obtained from Geographic Information System (GIS) and project plans. It was assumed that the heavy-duty truck percentage was five percent on all roadways and a persistence factor of 0.7 was used per USEPA guidance.¹⁷ A summary of these hot-spot inputs are included in **Appendix C**.

Emissions Modeling. The remaining two intersections were evaluated using more refined modeling techniques. The emission factors used in the microscale analysis were obtained from the USEPA's Motor Vehicle Emissions Simulator (MOVES), 2014a. MOVES input files, which include fuel data, inspection and maintenance files (I/M), age distribution data and meteorological information, were obtained from the NHDOT. MOVES was modeled using input files consistent with the current SIP, which reflects New Hampshire specific emission control programs and registration distribution. The MOVES modeling methodology was consistent with Federal Regulations and USEPA Project-Level CO Analysis Guidance¹⁸ on the analysis of hotspot scenarios – producing emission factors for a typical January weekday from the 8 AM to 9 AM hour or a "worst case scenario." Links were developed consistent with the planned links of the CAL3QHC model. Specific roadway grades were considered for links that had substantial increasing grade. Finally, emission rates were calculated using the built-in CAL3QHC post-processing script of the MOVES module.

Dispersion Modeling. The detailed CO microscale analysis used CAL3QHC for dispersion modeling and was based on the procedures outlined in the USEPA Guidance. The analysis included existing and future proposed roadway geometry, traffic signal timings, and peak hour traffic volumes. This analysis evaluated 1-hour and 8-hour CO concentrations at sensitive receptor locations. Receptors were located in areas with the possibility of impact to the public at distances of at least 9.8 feet (3 meter) from the edge of the roadway and in 82 foot (25 meter) spacing. Receptors were modeled at 6 feet (1.8 meters) above the ground and at all intersections chosen for analysis. Figure 4.2-1 and Figure 4.2-2 show the Study Area intersections and receptor quadrants.

4.2.1.4 Mobile Source Air Toxics Methodology

Controlling air toxic emissions became a national priority with the passage of the CAAA, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants.¹⁹ The USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from their 2011 National Air Toxics Assessment.²⁰ These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (PM) (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.

The FHWA developed a tiered approach for analyzing Mobile Source Air Toxics (MSAT) in NEPA documents, depending on specific project circumstances. The FHWA has identified three levels of analysis:

- > No analysis for projects with no potential for meaningful MSAT effects;
- > Qualitative analysis for projects with low potential MSAT effects; or
- effects.

A qualitative MSAT analysis is required for projects that exceed the requirements set forth in the 'No Analysis Requirements' section, but do not meet the requirements set forth in the 'Quantitative Analysis Requirements' section. The proposed Project does not exceed the requirements set forth in either section; however, a qualitative MSAT analysis is presented to show that the steps to assess MSAT's is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of the Project.

Existing Conditions 4.2.2

4.2.2.1 Attainment Status

Guidance from the USEPA and NHDES define the air guality modeling and review criteria for analyses prepared pursuant to the CAAA and the SIP. The CAAA divides regions into attainment and non-attainment areas with classifications based upon the severity of their air quality problem. A non-attainment area is an area that has had measured pollutant levels that exceed the NAAQS and that has not been designated to attainment. The CAAA established emission reduction requirements that vary depending on an area's classification. The Project is located in Hillsborough County in the City of Manchester, New Hampshire; the attainment status for each pollutant follows:

Quantitative analysis to differentiate alternatives for projects with higher potential MSAT

US Department of Transportation, Federal Highway Administration. Undated. Air Quality Transportation Conformity. Accessed from: http://www.fhwa.dot.gov/environment/air guality/conformity/policy and guidance/cmcf/intersection form.cfm. Accessed on June 7, 2017

US Environmental Protection Agency. 1995. Guideline for Modeling Carbon Monoxide from Roadway Intersections. EPA-454/R-92-006 (Revised). Research Triangle Park, NC.

¹⁸ US Environmental Protection Agency. 2015. Using MOVES2014 in Project-Level Carbon Monoxide Analyses. EPA-420-B-15-028.

¹⁹ The US Environmental Protection Agency has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, Page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS).

²⁰ US Environmental Protection Agency. 2015. 2011 National Air Toxics Assessment, Accessed from https://www.epa.gov/national-air-toxicsassessment/2011-national-air-toxics-assessment. Accessed on June 6, 2017.





Manchester 16099



New Hannoshire

Manchester, NH

I-293 Exits 6 and 7

Exit 6 Receptor Quadrants No-Build (Left); Build (Right)

Source: NHGRANIT, City of Manchester, VHB





Manchester 16099



New Hannashire

Manchester, NH

I-293 Exits 6 and 7

Exit 7 Receptor Quadrants

Carbon Monoxide (CO) Status. The Project Footprint is within the boundary of the Carbon Monoxide Standard (1971) Maintenance Area for Manchester, NH.

Particulate Matter (PM) Status. On December 14, 2012, the USEPA promulgated the 2012 Particulate Matter (PM_{2.5}) standards that updated the requirements of the 24-hour and annual averaging period criteria. Under this standard, the Project is located in an attainment area. Additionally, the Project is located in an attainment area for the PM₁₀ standard.

Ozone Status. Ozone is analyzed at the regional level through an evaluation of the TIP and the SIP. The Project Footprint lies within the boundary of the 1-Hour Ozone Standard (1979-Revoked) Marginal Nonattainment Area and 8-Hour Ozone Standard (1979-Revoked) Moderate Maintenance Area, as designated by the USEPA. The USEPA revised the 8-hour standard in 2008 and designated New Hampshire as in Attainment. The 8-hour standard was again revised in 2015. While USEPA has not made official designations for this revision, recent monitoring data shows that all of New Hampshire will be in attainment. However, existing maintenance measures required by the SIP are still enforced to avoid slipping back into nonattainment.

4.2.2.2 Summary of Existing Conditions

The NHDES maintains a network of air quality monitors to measure background concentrations of the criteria pollutants. Background concentrations are ambient pollution levels from all stationary, mobile, and area sources. The values presented in this EA are from the USEPA's Air Quality Design Values²¹ website and represent recently approved monitoring data for the area. The concentrations represent design values, determined using monitoring data measured at the Londonderry monitoring station. The background design values are presented in Table 4.2-3.

4.2.3 Impacts

The air quality analysis presents the results of the impacts for the local air quality impacts of the I-293 Exits 6 and 7 improvements in Manchester, NH. The local evaluation considers a microscale analysis that evaluates carbon monoxide hotspot concentrations. The regional evaluation was discussed earlier in Section 4.2.1.1 Transportation Conformity, and no further Conformity analysis is presented. Technical information in support of this analysis is contained in Appendix C. Temporary air quality impacts related to construction impacts are also discussed below in Section 4.2.3.2.

Table 4.2-3 Air Quality Background Concentrations

	Background Concentrations		NAAQS	
Pollutant	Level	Averaging Time	Level	Averaging Time
	0.4 ppm	8-hour	9 ppm	8-hour
Carbon Monoxide	0.6 ppm	1-hour	35 ppm	1-hour
	5.1 µg/m ³	Annual	12.0 µg/m ³	Annual
Particulate Matter 2.5	14.0 µg/m ³	24-hour	35.0 µg/m ³	24-hour
Nitrogen Dioxide	3 ppb	Annual	53 ppb	Annual
(NO ₂)	23 ppm	1-Hour	100 ppb	Annual
Ozone	0.065 ppm	8-hour	0.070 ppm	8-hour

4.2.3.1 Permanent Impacts

The following discusses the permanent impacts for both the indirect and direct impacts of the I-293 Exits 6 and 7 improvements for the No-Build and Proposed Action.

No-Build Alternative

The No-Build Alternative does not include any substantial physical changes to I-293 that would cause air quality emissions to vary significantly from the existing condition. Traffic volumes in the No-Build Alternative would increase due to predictable growth in population and future forecasts of travel demands. These changes in volumes and invariable change of vehicular emission factors due to the passage of time are the primary differences between the No-Build Alternative and existing conditions in terms of air quality.

Direct impacts associated with the No-Build Alternative are a result of pollutant emissions at a local scale. These local emissions are evaluated by microscale analyses. The CO hotspot analyses were considered for the No-Build Alternative to evaluate how increasing traffic volumes due to background growth and decreasing emission factors affect local pollutant concentrations. The results of the No-Build Alternative microscale are presented in Tables 4.2-4 and 4.2-5 for the 1-hour and 8-hour CO concentrations, respectively. The 1-hour CO concentrations ranged between 0.8 and 0.9 ppm, and the 8-hour CO concentrations ranged between 0.5 and 0.6 ppm for 2035 No-Build condition. Consistent with the attainment status of the Study Area, the results of the microscale analysis demonstrate that the 2035 No-Build CO concentrations (both 1-hour and 8-hour values) are well below the NAAOS.

Indirect impacts associated with the No-Build Alternative are a result of pollutant emissions at a regional scale. Expected land use, traffic growth, and transportation projects are typically considered in future emission estimates for the New Hampshire State Implementation Plan and conformity determinations.

US Environmental Protection Agency. Undated. Air Quality Design Values. Accessed from https://www.epa.gov/air-trends/air-qualitydesign-values. Accessed on June 6, 2017.

Proposed Action

The following discusses the permanent impacts for both the direct and indirect impacts of the Proposed Action.

Direct impacts associated with the Proposed Action are a result of pollutant emissions at a local scale. These local emissions were evaluated by microscale analyses. The CO hotspot analyses were considered for the Proposed Action to evaluate how the Proposed Action would affect local pollutant concentrations.

All three intersections were modeled for a 2035 opening year for both No-Build and the Proposed Action where applicable. A summary of these hot-spot inputs is included in Appendix C. The highest 1-hour and 8-hour CO concentrations for each intersection are presented in Table 4.2-4 and Table 4.2-5, respectively.

			1-Hour CO Co	oncentrations (ppm)
No.	Intersection	Receptor Group ³	2035 No-Build	2035 Proposed Action
1	I-293 Exit 6	North	N/A ⁴	0.8
		Northeast	0.8	0.8
		Southeast	0.9	0.8
		South	N/A ⁴	0.9
		Southwest	0.9	0.8
		Northwest	0.8	0.9
2	I-293 Exit 7	North	N/A ⁵	0.8
		Northeast	N/A ⁵	0.7
		Northwest	N/A ⁵	0.8
		Southeast	N/A ⁵	0.8
		Southwest	N/A ⁵	0.8

Table 4.2-4 Predicted Maximum 1-Hour CO Concentrations^{1, 2}

Notes:

See Figure 4.2-1 and Figure 4.2-2 for intersection quadrants.

2 The concentrations are expressed in parts per million (ppm) and include a 1-hour background concentration of 0.6 ppm. The 1-hour NAAQS for CO is 35 ppm.

Concentrations represent maximum concentrations within the grouping of receptors placed in the 3 respective directions of each intersection.

4 Grouping only exists for Proposed Action geometry.

5 Intersection only exists in the Proposed Action scenario.

Table 4.2-5 Predicted Maximum 8-Hour CO Concentrations^{1, 2}

			8-Hour CO Concentrations (ppm)	
No.	Intersection	Receptor Group ³	2035 No-Build	2035 Proposed Action
1	I-293 Exit 6	North	N/A ⁴	0.5
		Northeast	0.5	0.5
		Southeast	0.6	0.5
		South	N/A ⁴	0.6
		Southwest	0.6	0.5
		Northwest	0.5	0.6
2	I-293 Exit 7	North	N/A ⁵	0.5
		Northeast	N/A ⁵	0.5
		Northwest	N/A ⁵	0.5
		Southeast	N/A ⁵	0.5
		Southwest	N/A ⁵	0.5

Notes:

- See Figure 4.2-1 and Figure 4.2-2 for intersection quadrants. 2 3 respective directions of each intersection.
- Grouping only exists for Proposed Action geometry. Λ
- 5 Intersection only exists in the Proposed Action scenario.

The CO concentrations for each intersection under the No-Build and Proposed Actions show that there are minimal to no increases for 1-hour and 8-hour CO concentrations between the 2035 No-Build and Proposed Actions due to the minor traffic volume increase and minimal intersection delays experienced at the study intersections. The 1-hour CO concentrations ranged between 0.7 and 0.9 ppm, and the 8-hour CO concentrations ranged between 0.5 and 0.6 ppm for 2035 No-Build and Proposed Action. The results of the microscale analysis demonstrate that the 2035 No-Build and Proposed Action CO concentrations (both 1-hour and 8-hour values) for the Proposed Action are well below the NAAQS.

Mobile Source Air Toxics. The Proposed Action is a project with Low Potential MSAT effects which includes projects that serve to improve the operations of the highway without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. This includes minor widening projects and projects where the design year traffic is projected to be less than 140,000 Average Annual Daily Traffic. I-293 is expected to serve approximately 59,000 vehicles per day (vpd) under future 2035 design year conditions, well below the 140,000 vpd threshold.

The amount of MSAT emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Proposed Action is essentially the same along I-293 as the No-Build Alternative. Although the additional capacity increases the efficiency of the roadway and could attract rerouted trips from elsewhere in the transportation network, I-293 is still the only viable choice for commuters in the corridor within the Study Area.

The concentrations are expressed in parts per million (ppm) and include an 8-hour background concentration of 0.4 ppm and a persistence factor of 0.7. The 8-hour NAAQS for CO is 9 ppm. Concentrations represent maximum concentrations within the grouping of receptors placed in the

Because the estimated VMT is projected to be nearly the same under the No-Build and the Proposed Action, it is expected there would be no appreciable difference in overall MSAT emissions between these alternatives. Also, emissions would likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by 90 percent between 2010 and 2050. The magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the Study Area are likely to be lower in the future in nearly all cases.

The additional travel lanes under the Proposed Action would have the effect of moving some traffic closer to nearby homes, businesses and other land uses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Proposed Action compared to the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. Overall, when a highway is widened, the localized level of MSAT emissions could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). However, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be significantly lower than today.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts

Analysis. In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives.

MSAT Conclusion. The science of mobile source air toxics analysis is a continuing area of research. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. As the science progresses, FHWA would continue to revise and update this guidance. FHWA is working with stakeholders, USEPA and others to better understand the strengths and weaknesses of developing analysis tools and their applicability on project level decision documentation. In the meantime, the I-293 Improvements Project is not expected to cause substantial increases in MSAT.

Indirect impacts associated with the Proposed Action are a result of pollutant emissions at a regional scale. Expected land use, traffic growth, and transportation projects are typically considered in future emission estimates for the New Hampshire State Implementation Plan and conformity determinations.

Permanent Impacts Conclusion

The air quality analysis demonstrates that the Proposed Action would comply with the CAAA and the New Hampshire SIP. The microscale analysis also demonstrates that CO concentrations for the No-Build Alternative and Proposed Action are below the NAAQS standards for CO. The results of the microscale air quality analysis demonstrate that the Proposed Action is in conformance with the SIP because:

> No new violation of the NAAOS would be created.

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The proposed Project also satisfies the regional transportation conformity requirements because it was included in the NHDOT's STIP for Fiscal Years 2017-2020.

4.2.3.2 Temporary Impacts

The Proposed Action may result in a temporary increase of emissions during construction. Impacts include fugitive dust emissions, direct emissions from construction equipment and truck exhausts, and increased emissions from motor vehicles on local streets due to traffic disruption. These types of impacts could occur during various stages of highway construction. Emissions from the operation of construction equipment would include nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter. These emissions would be temporary and the locations at which they occur would change over time. It is anticipated that the Project would be constructed in two contracts with Exit 7 being constructed first followed by Exit 6. Based on the NHDOT's Ten Year Plan, ²² it is anticipated that Exit 7 would have a 3-year construction schedule and Exit 6 would have a 3.25-year construction schedule.

Construction activities can result in traffic disruption and rerouting. Traffic disruption, such as decreased roadway capacity or detouring, can lead to increased traffic congestion, attendant increases in motor vehicle exhaust emissions on the nearby roadways, and high CO concentrations. The measures to mitigate the temporary impacts on air guality are presented in Section 4.2.4.

Fugitive dust emissions can result from movement of construction equipment and transport of materials to and from a construction site. Dust emissions can also occur during site preparation activities such as grading, curb laying, or grubbing and removing vegetation to prepare a site for construction. Fugitive dust would generally be a problem during periods of intense construction activity and would be accentuated by windy and/or dry conditions. The measures to mitigate the temporary impacts on air quality are presented in Section 4.2.4.

4.2.4 Mitigation

permanent impacts is required.

Although no significant adverse impacts are anticipated during construction, various measures can be taken to reduce pollutant emissions. These include dust suppression measures; idling restrictions; the use of Ultra Low Sulfur Diesel (ULSD) fuel; proper maintenance of all motor vehicles, machinery, and equipment; and proper fitting of equipment with mufflers or other regulatory-required emissions control devices. Excessive idling of construction equipment engines could also be prohibited.

²² New Hampshire Department of Transportation. 2018. Ten Year Transportation Improvement Plan 2019-2018.

> No increase in the frequency or severity of any existing violations would occur, and > No delay in attainment of any NAAQS standard would result.

No significant permanent or long-term impacts are anticipated. Therefore, no mitigation for

Construction contractors would be required to implement protective measures to protect local residents, visitors, passengers, and passers-by from off-site exposure to dust and debris. Appropriate methods of dust control would be determined according to the surfaces concerned (roadways or disturbed areas) and would include, as applicable, wetting or chemically treating; stone surfacing of construction roads; covering dust-producing materials during transport, and limiting construction activities during high wind conditions, seeding of areas of exposed or stock-piled soils; wheel washing; and regular sweeping of paved roadways. These measures should minimize the dust impacts. Recycling construction waste and demolition materials may also reduce dust emissions.

Compared with emissions from other motor vehicle sources in the Study Area, emissions from construction equipment and trucks are generally quite low with respect to compliance with the ambient air quality standards. When this equipment is properly operated and maintained, no adverse impacts on ambient air quality standards are expected.

The potential adverse effects of traffic disruption can be mitigated by proper traffic management during the construction period. This includes finding less congested routes for construction-related truck traffic, creating temporary detours for regular roadways where capacities have been diminished, providing traffic control, routing trucks away from residential neighborhoods, and restricting construction activities during hours of high traffic volumes on the existing roadways. In addition, staging areas and parking for construction workers can be established away from residential and other sensitive receptors.

It is recommended that the contractor or contractors adhere to the New Hampshire anti-idling regulations (Env-A 1100)²³ to minimize the health and environmental impacts of idling by establishing a limit on the amount of time that engines are permitted to idle. The limit established in the regulations is based on outside temperature and is generally limited to between 5 and 15 minutes.

It is further recommended that the contractor or contractors utilize diesel-fuel construction equipment that has been fitted with after-engine emission controls, and that the contractor or contractors utilize ULSD fuel for all off-road construction vehicles as an additional measure to reduce air emissions. Any non-road diesel equipment should be rated 50 horsepower or greater to meet USEPA's Tier 4 emission limits or be retrofitted with appropriate emission reduction equipment. Emission reduction equipment could include USEPA-verified or CARB-verified diesel oxidation catalysts or diesel particulate filters.

4.3 Noise Environment

Highway noise has the potential to affect people living and working near highways by causing annoyance or interfering with conversation. This noise section presents the results of a highway noise analysis to determine existing and future design-year build noise conditions

in the Study Area, identify noise-sensitive receptors, and evaluate whether noise abatement is warranted, feasible and reasonable.

This highway noise analysis was prepared in accordance with FHWA noise regulations, 23 CFR 772 (Procedures for Abatement of Highway Traffic and Construction Noise), and the New Hampshire Department of Transportation "Policy and Procedural Guidelines for the Assessment and Abatement of Highway Traffic Noise for Type I & Type II Highway Projects" approved November 2016.

This section summarizes the results of the highway noise study; it is based on a more detailed technical report which is available for public review upon request to the NHDOT.²⁴

4.3.1 Methodology

The methodology for evaluating highway noise includes identifying noise-sensitive land use, conducting measurements at key receptor locations, predicting existing and design-year noise at all receptors, and evaluating noise abatement as warranted.

The Study Area includes a diversity of land uses including residential, commercial, and institutional buildings categorized by FHWA Activity Categories. Receptors and their associated land use have been identified using statewide parcel and land use code data, aerial photography, and field visits. Noise receptors are primarily located at outdoor areas of frequent human use.

Existing noise measurements were conducted in March 2016 in conformance with FHWA noise monitoring guidelines²⁵ with simultaneous traffic counts including volumes, vehicle mix (automobiles, medium trucks, and heavy trucks), and operating speed observations.

Existing (2015) and design-year Build (2035) noise levels have been predicted at all receptors using the FHWA's Traffic Noise Model (TNM) version 2.5 which incorporates the existing and proposed highway geometries, terrain features, intervening buildings, different ground covers, and receptor locations. Noise abatement, such as traffic management measures or construction of sound walls, must be considered for areas where receptors approach or exceed the FHWA Noise Abatement Criteria (NAC).

FHWA has established NAC for different types of land uses to help protect public health, welfare and livability from excessive vehicle traffic noise. Table 4.3-1 presents the FHWA land use Activity Categories and the NAC based on loudest-hour Leg noise levels. When noise levels approach or exceed the NAC, then abatement must be considered. NHDOT implements the NAC by defining that "approaching the NAC" means noise levels are 1 dBA²⁶ below the NAC criteria. For example, if design-year noise levels would be 66 dBA (Lea) at a residential receptor, that would approach the NAC of 67 dBA (Leg). These abatement criteria apply to design-year noise conditions for a proposed Project regardless of whether the

Vanasse Hangen Brustlin, Inc. 2019. Highway Noise Technical Report, I-293 (F.E. Everett Turnpike) Exits 6 & 7 Improvements Project

²⁵ US Department of Transportation, Federal Highway Administration. 1996. *Measurement of Highway-Related Noise*. FHWA-PD-96-046.

New Hampshire Department of Environmental Services. New Hampshire Code of Administrative Rules, Chapter Env-A Air Program Rules, Section 1100 Prevention, Abatement, and Control of Mobile Source Air Pollution. Effective May 22, 2013.

⁽Manchester #16099).

²⁶ dbA = A-weighted decibels

proposed Project would increase or decrease noise conditions. NHDOT also defines a substantial increase in noise as an increase in design-year noise levels that is greater than 15 dBA compared to existing levels. A substantial noise increase does not depend on whether design-year noise levels approach or exceed the absolute NAC.

4.3.2 Existing Conditions

As shown in **Figure 4.3-1**, the Study Area has been divided into 18 common noise environments (CNEs) containing receptor locations that are sensitive to highway noise and seven additional CNEs with receptors not sensitive to noise (Activity Category F).

4.3.2.1 Noise Measurements

Ambient monitoring was conducted to characterize existing noise levels in the Study Area. Monitoring was conducted at seven receptor locations, as shown in Figure 4.3-1, which are representative of the noise exposure throughout the Study Area. A Larson Davis LxT sound level meter, which is certified to meet the American National Standards Institute Type I accuracy, was used for all noise measurements. The predominant noise source in the Study Area included vehicles on I-293 and other local roadways. Table 4.3-2 presents the results of the noise monitoring and the predicted results from the TNM with the traffic conditions that existed during the measurements. The model and measurement results are within 3 dBA at all locations, so the existing TNM provides valid results.

Table 4.3-1 Noise Abatement Criteria — Hourly-Equivalent (Leg) Sound Levels (dBA)¹

Activity	NAC	Description of Activity Cotogony
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
В	67 (exterior)	Residential.
С	67 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	Undeveloped lands that are not permitted.

Notes:

23 CFR 772 - Procedures for Abatement of Highway Traffic Noise and Construction Noise.

L_{eq}(h) is an energy-averaged, one-hour, A-weighted sound level in decibels (dBA). 2

The loudest-hour existing (2015) traffic data was incorporated into the validated TNM model to calculate the existing loudest-hour noise levels for at all receptor locations in the Study Area. The results presented in Table 4.3-3 summarize number of dwelling units or receptors and the range of existing noise levels in each CNE. The highest noise levels generally occur at front-row receptors adjacent to I-293 and lower noise levels occur farther from I-293 and/or behind intervening objects such as terrain lines and buildings.

The results of the existing noise analysis demonstrate that noise levels currently approach or exceed the NAC at several CNEs including residences on McGregor Street (CNE 4), residences on Eddy Road (CNE 5), apartments on Riverfront Drive (CNE 9), residences on Coolidge Avenue near Amoskeag Street (CNE 10), residences on Front Street between the existing Exit 6 and 7 (CNE 11 and 12), single-family residences on Stark Lane south of Stark Way (CNE 13), and apartments on Country Club Drive (CNE 17).

Table 4.3-2 Noise Model Validation Data

		Noise Levels dB(A)		
Site	Locations	Measured	Predicted	Difference
M1	35/10 Stark Way	67	69	+2
M2	690 Coolidge Avenue (north side of property)	62	64	+2
M3	Lorraine St at Eddy Rd (north side of D.D.)	66	66	0
M4	Manchester Community College (northern lot)	64	65	+1
M5	45/57 Stark Ln (front yard)	67	67	0
M6	River Front Dr (west side of northern building)	62	65	+3
M7	SE corner of Greely Street at Goffstown Road	60	58	-2
Note: Difference is the predicted level minus monitored level.				

Table 4.3-3 Existing Noise Levels (dBA)

CNE	Activity Category	Location	Dwelling Units/Receptors	Existing Noise Levels (dBA, Leq)
1	D	McGregor Street (at Foundry Street)	1	57 (32 interior) ¹
2	C/D	Alard Drive	2	64-73 (38 interior) ¹
3	B ² /D/E/F	Mill West	1	59-75 (40 interior) ¹
4	В	Dione Street and McGregor Street	6	68-70
5	В	Eddy Road and Adeline Street	13	64-69
6	В	Coolidge Avenue (near Bremer Street)	12	65
7	В	Coolidge Avenue (near Leyte Street)	7	59-63
8	E	Fletcher Street / La Quinta Inn Motel	109	64
9	В	Riverfront Drive	194	52-72
10	В	Coolidge Avenue (near Amoskeag Street)	18	57-68





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I-293 Exits 6 and 7

Common Noise Environments & Monitoring Locations



Source: NHGRANIT, City of Manchester, VHB

CNE	Activity Category	Location	Dwelling Units/Receptors	Existing Noise Levels (dBA, Leq)
11	В	Front Street (between Omega and Amoskeag Street)	32	66-71
12	В	Front Street (near Stark Way)	28	65-74
13	В	Stark Lane (south of Stark Way)	14	63-68
14	В	Stark Lane (central)	15	62-64
15	В	Stark Lane (northern)	19	56-60
16	D	Manchester Community College	1	70 (35 interior) ¹
17	В	Country Club Drive	670	45-70
18	В	Front Street (Old Hackett Hill Rd to Country Club Dr)	5	55-64

Table 4.3-3 Existing Noise Levels (dBA) (Cont.)

Notes: 1

Interior spaces have been evaluated assuming a 35-dBA outdoor-to-indoor sound attenuation for masonry buildings with double-pane windows in accordance with FHWA guidelines.

2 Residential receptors at Mill West have no outdoor areas of frequent human use.

XX The sound level approach or exceed the FHWA noise abatement criterion.

4.3.3 Impacts

This section presents the permanent (operational) and temporary (construction) noise impacts of the proposed Project. Permanent noise impacts are locations where design-year Build highway noise levels would approach or exceed the NAC. Temporary noise impacts are locations where construction activities have the potential to exceed applicable noise limits.

4.3.3.1 Permanent Impacts

No-Build Alternative

Highway noise levels for the No-Build Alternative are similar to the existing conditions except that there would be a greater volume of traffic in 2035 and consequently slightly higher noise levels. There would be no changes to the highway geometry or other features, such as terrain lines and intervening buildings, which would affect highway noise.

Traffic volumes are expected to increase approximately one percent per year. Therefore, No-Build traffic volumes in 2035 would increase approximately 22 percent relative to existing (2015) conditions; this is less than a doubling in traffic volumes, which would be expected to increase highway noise by 3 dBA. Assuming that traffic speeds and the percentages of trucks and automobiles would not substantially change and based on the expected background growth in traffic volume, highway noise levels would increase approximately 0.8 dBA with the No-Build Alternative. This would be a relatively small change in future noise conditions as changes in sound of less than 3 dBA are generally considered to be imperceptible.

Since there would be no highway improvements associated with the No-Build Alternative there would not be a Type I highway improvement project and the communities near the Study Area would not be eligible for noise abatement under the NHDOT Type I program. For areas that currently approach or exceed the NAC, noise abatement may be considered as

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part of the NHDOT's Type II Sound wall Program. The Type II sound wall program would require the City to coordinate with NHDOT, enact noise-compatible planning regulations or ordinances, and commit to matching 20 percent of the total project cost of sound walls eligible for the program.

Alternative.

Proposed Action

This section presents the results of the highway noise analysis for the design-year Build (2035) traffic volumes. Table 4.3-4 presents the range of design-year build noise levels, the applicable threshold to approach or exceed the NAC, and an assessment of whether noise levels would approach or exceed the NAC.

Table 4.3-4 Design Year Noise Levels (dBA)

			Noise Levels (L _{eq} , dBA)		
CNE	Activity Category	Location	Design-Year Build (No Sound Wall)	Approach NAC	Approach or Exceed NAC
1	D	McGregor Street (at Foundry Street)	58 (33 interior) ¹	52 (interior)	No
2	C/D	Alard Drive	63-72 (37 interior) ¹	66/52 (interior)	No
3	B ¹ /D/E/F	Mill West	58-74 (39 interior) ¹	52 (interior)	No
4	В	Dione Street and McGregor Street	64-68	66	Yes
5	В	Eddy Road and Adeline Street	61-65	66	No
6	В	Coolidge Avenue (near Bremer Street)	64	66	No
7	В	Coolidge Avenue (near Leyte Street)	61	66	No
8	E	Fletcher Street / La Quinta Inn Motel	64	72	No
9	В	Riverfront Drive	53-71	66	Yes
10	В	Coolidge Avenue (near Amoskeag Street)	58-68	66	Yes
11	В	Front Street (between Omega and Amoskeag Street)	64-68	66	Yes
12	В	Front Street (near Stark Way)	64-73	66	Yes
13	В	Stark Lane (south of Stark Way)	62-67	66	Yes
14	В	Stark Lane (central)	62-64	66	No
15	В	Stark Lane (northern)	56-61	66	No
16	D	Manchester Community College	73 (38 interior) ^A	52 (interior)	No
17	В	Country Club Drive	48-71	66	Yes
18	В	Front Street (Old Hackett Hill Rd to Country Club Dr)	57-64	66	No

Notes:

Interior spaces have been evaluated assuming a 35-dBA outdoor-to-indoor sound attenuation for masonry buildings with double-pane 1 windows in accordance with FHWA guidelines.

2 Residential receptors at Mill West have no outdoor areas of frequent human use.

XX The sound level approach or exceed the FHWA noise abatement criterion.

There would be no changes to other noise sources besides I-293 as part of the No-Build Alternative. Therefore, there would be no indirect noise effects associated with the No-Build

Design-year noise levels approach or exceed the NAC at several CNEs including:

- > CNE 4 Residences on McGregor Street
- > CNE 9 Apartments on Riverfront Drive
- > CNE 10 Residences on Coolidge Avenue near Amoskeag Street
- > CNE 11 and 12 Residences on Front Street between existing Exit 6 and 7
- > CNE 13 Residences on Stark Lane south of Stark Way
- > CNE 17- Apartment on Country Club Drive

Noise abatement must be considered for all CNEs where design-year Build noise levels would approach or exceed the NAC even if the Proposed Action would reduce future noise conditions.

There would be no changes to other noise sources besides I-293 as part of the Build Alternative. Therefore, there would be no indirect noise effects associated with the Build Alternative.

4.3.3.2 Temporary Impacts

No-Build Alternative

There would be no construction associated with the No-Build Alternative and therefore there would be no temporary construction noise and vibration effects

Proposed Action

Construction of the Proposed Action would introduce new sources of noise and vibration that have the potential to adversely affect people nearby. There are no statewide noise regulations that relate to construction activities in New Hampshire. The City of Manchester Noise Ordinance prohibits the operation of any construction equipment or conduct any construction activities between the hours of 9:00 PM and 7:00 AM that exceed noise levels depending on the land use zoning of the source of sound and where it is received. The Department is not subject to local restrictions related to construction noise but will coordinate construction activities with the City of Manchester to the fullest extent possible. Additional mitigation measures intended to limit construction-phase noise impacts are outlined in Section 4.18.2, Construction Mitigation.

4.3.4 Mitigation

The following sections present the methodology used to evaluate whether noise abatement is warranted, feasible and reasonable and the results of the noise abatement analysis for the proposed Project.

4.3.4.1 Mitigation Analysis Methodology

Highway noise abatement must be considered for areas where there are receptors that approach or exceed the NAC. Potential noise abatement measures include traffic

management measures, traffic control devices, vehicle-type restrictions, nighttime-use restrictions, reducing speeds, designated lanes, alteration of the horizontal or vertical alignment, construction of sound walls or berms, or noise insulation of public-use or non-profit institutional structures.

The feasibility and reasonableness of sound walls is evaluated according to NHDOT criteria in the Noise Policy. These criteria have been established to provide a consistent approach and procedure for providing noise abatement across the State. NHDOT's feasibility and reasonableness criteria address the following factors:

Engineering Feasibility

The sound wall must be able to be constructed given the topography, roadway geometry, potential conflicts with utilities, access requirements and maintenance needs. The sound wall must maintain safety requirements regarding clear zones, redirection of crash vehicles, snow removal, adequate sight distances, and fire access. Typically, a minimum of 10 feet is provided between the roadway and the sound wall for snow storage. The sound wall design should also consider potential environmental impacts to wetlands, historic properties, and park lands.

Acoustic Feasibility

Every effort should be made for the sound wall to provide at least 10 dBA of noise reduction to first-row receptors. The sound wall must be able to provide a minimum of 7 dBA of noise reduction to at least one benefited receptor.

Effectiveness

Because NHDOT must balance available funds statewide, the Department's Dimensional Effectiveness Index (DEI) criterion is calculated for all sound walls to consider the reasonableness of mitigation. In residential areas, the DEI is calculated based on the total area of the sound wall and the number of benefited receptors (those receiving 5 dB or more of noise reduction). The DEI criterion is 1,500 square feet per benefited receptor.

The DEI criterion is increased for projects in municipalities which have enacted noise compatible planning regulations for at least one year to avoid, minimize, or mitigate exterior highway traffic noise impacts associated with new noise-sensitive developments adjacent to state highways. The City of Manchester has not implemented noise compatible planning regulations and, therefore, the applicable DEI criterion is 1,500 square feet per benefitted receptor.

Viewpoints of Benefitted Receptors

FHWA requires that the views of impacted residents be considered when reaching a decision on the reasonableness of an abatement measure chosen to reduce roadway noise. FHWA allows the Department to decide the methods used for obtaining the viewpoints of benefitted receptors and weighing their input to determine the reasonableness of an abatement measure. As outlined in the Noise Policy, a two-step process is followed for Type I sound walls. The first step involves determining if objections against a sound wall are

expressed by the public during a project's general public outreach. Should objections be stated a more detailed solicitation for public opinions is required.

4.3.4.2 Mitigation Analysis

The following summarizes the noise abatement analysis for all locations where design-year Build noise levels would approach or exceed the NAC. Refer to Figure 4.3-2 for locations of sound walls evaluated.

CNE 4 - Residences on McGregor Street

Design-year Build noise levels at CNE 4 would approach or exceed the NAC. The predominant sources of noise at these receptors is McGregor Street and Amory Street since there is a large intervening building reducing noise from the I-293 mainline. Since McGregor Street and other local roads are a substantial factor in noise levels approaching or exceeding the NAC, for noise abatement to be acoustically effective it would need to reduce noise from McGregor Street as well as I-293. It is not feasible to alter the alignment of McGregor Street or institute speed or truck restrictions to these local roads, and sound walls are not feasible since a wall would eliminate pedestrian access from the sidewalk to these homes and would likely impact the sidewalk and the subject properties.

CNE 10 – Coolidge Avenue (near Amoskeag Street)

Design-year Build noise levels would approach or exceed the NAC at three residences on Coolidge Avenue in CNE 10 and noise abatement, such as sound walls, must be considered. The terrain increases substantially from Front Street to the backyards of the residences on Coolidge Avenue. Sound walls ranging from 10 to 25 feet were evaluated along the west side of the proposed Front Street. As shown in Figure 4.3-2, a 15-foot tall sound wall constructed as close to the proposed ROW line at the peak of the intervening slope could achieve up to 8 dBA of insertion loss; however, it would only benefit three dwelling units.

Table 4.3-5 Noise Abatement Summary – CNE 10 – Coolidge Ave

Description	Result
Sound Wall Length (ft)	970
Sound Wall Height (ft)	15
Sound Wall Area (SF)	14,550
Impacted Receptors (DUs)	3
Benefited Receptors (DUs)	3
Insertion Loss – All Benefits (dBA)	7.5 (average), 7.9 (max)
Insertion Loss - First Row (dBA)	1.6 (average), 7.9 (max)
Dimensional Effectiveness Index	4,850
Feasible and Reasonable	No
Note: DU: Dwelling unit.	

Table 4.3-5 summarizes the acoustical and cost effectiveness of a potential sound wall. The optimum sound wall would be 970 feet long, 15 feet tall, would benefit three receptors,

would provide up to 8 dBA of insertion loss at first row receptors, and would have a DEI of 4,850. Since the DEI is greater than the 1,500 square feet/benefited receptor criterion, the sound wall would not be feasible and reasonable and is not recommended for construction.

CNE 9 & 13 – Riverfront Drive and Stark Lane (south of Stark Way)

Design-year Build noise levels at 176 dwelling units at apartments on Riverfront Drive (CNE 9) and residences on Stark Lane (CNE 13) would approach or exceed the NAC. A sound wall was evaluated for each CNE individually and both CNEs together. As shown in Figure **4.3-2**, it was determined that one sound wall would be needed to sufficiently reduce noise at both CNEs.

Table 4.3-6 summarizes the acoustical and cost effectiveness of a preliminary sound wall design. An optimum sound wall would be 2,811 feet long, 16 feet tall, benefit 179 dwelling units, provide up to 10.1 dBA of insertion loss, and would have a DEI of 251. Therefore, the sound wall would be feasible and reasonable and is recommended for construction.

Based on the studies so far completed, the NH Department of Transportation is committed to the construction of feasible and reasonable noise abatement measures at the Riverfront Drive and Stark Lane area. These preliminary indications of likely abatement measures are based upon preliminary design for a sound wall that is approximately 2,811 feet long and an average of approximately 16 feet high, totaling approximately 44,976 square feet, that would reduce the noise level by up to 10.1 dBA and an average of 8.6 dBA for 179 benefitted receptors. If it is subsequently found during final design that these conditions have substantially changed, the abatement measures might not be provided. A final decision on the installation of the abatement measures would be made during the final design process following the completion of public involvement.

Table 4.3-6 Noise Abatement Summary – CNE 9 & 13 Riverfront Drive and Stark Lane

Description	

Description	Result
Sound Wall Length (ft)	2,811
Sound Wall Height (ft)	16
Sound Wall Area (SF)	44,976
Impacted Receptors (DUs)	176
Benefited Receptors (DUs)	179
Insertion Loss – All Benefits (dBA)	8.6 (average), 10.1 (max)
Insertion Loss - First Row (dBA)	6.4 (average), 10.1 (max)
Dimensional Effectiveness Index	251
Feasible and Reasonable	Yes
Note: DU: Dwelling unit.	

CNE 11 & 12 – Front Street

Design-year Build noise levels would approach or exceed the NAC at 30 dwelling units on Front Street and noise abatement, such as sound walls, must be considered. Sound walls



vroject Footprint

Town/City Boundary

uilding

Assessor's Tax Parcels

Surface Water

Stream

City Park Land

Conservation/Public Land

Noise Barriers Evaluated (Recommended)

Noise Barriers Evaluated (Not Recommended)

CNE 17 Noise Barrier Option (Outside proposed ROW)

I-293 Exits 6 and 7

Proposed Sound Walls



Source: NHGRANIT, City of Manchester, VHB

were evaluated for separate sound walls for CNE 11 and 12 and a combined sound wall for both CNEs crossing CNE 7F (which does not include noise-sensitive receptors). Sound walls ranging from 10 to 25 feet were evaluated. It was determined that either a sound wall for CNE 12 alone or one for both CNE 11 and 12 would exceed the DEI criterion and would not be feasible and reasonable. It was determined that one sound wall at CN 11 would be needed to sufficiently reduce noise at receptors along Front Street (between Omega and Amoskeag Street).

Table 4.3-7 summarizes the acoustical and cost effectiveness of a preliminary sound wall design for CNE 11 which includes receptors on Front Street between Omega Street and Amoskeag Street. The proposed sound wall is shown in Figure 4.3-2. This sound wall would benefit 14 dwelling units, provide up to 9 dBA of insertion loss, and would have a DEI of 1,461. Since the DEI is below the criterion and up to 9 dBA of insertion loss would be provided at first row receptors, the sound wall would be feasible and reasonable and is recommended for construction.

Table 4.3-7	Noise Abatement Summary – CNE 11 – Front Street (between Omega
	Street and Amoskeag Street)

Description	Result
Sound Wall Length (ft)	1,461
Sound Wall Height (ft)	14
Sound Wall Area (SF)	20,454
Impacted Receptors (DUs)	14
Benefited Receptors (DUs)	14
Insertion Loss – All Benefits (dBA)	7.4 (average), 8.7 (max)
Insertion Loss - First Row (dBA)	5.4 (average), 8.7 (max)
Dimensional Effectiveness Index	1,461
Feasible and Reasonable	Yes
Nata: DH Duvelling unit	

Note: DU: Dwelling unit.

CNE 17– Country Club Drive

Design-year Build noise levels would approach or exceed the NAC at 108 dwelling units on Country Club Drive (CNE 17) and noise abatement, such as sound walls, must be considered. Sound walls on the east side of the proposed I-293 Exit 7 northbound on-ramp were evaluated ranging in height of 9 to 25 feet.

Two sound wall options were evaluated for the apartments on Country Club Drive. Option A is 3,135 feet long and 19 to 25 feet tall located parallel to the proposed Exit 7 northbound on-ramp. Option A is the baseline assumption for the sound wall which minimizes the need for ROW acquisition and is generally advantageous for constructability and maintenance. The second sound wall option (Option B) is similar in length to Option A but shifts the alignment approximately 100 feet outside of the proposed ROW to take advantage of

existing elevated terrain and to include an extension perpendicular to the Exit 7 northbound on-ramp along the southern property line of the apartment buildings adjacent to a property owned by the MCC. The purpose of sound wall Option B is to meet the noise reduction design goal and benefit additional receptors on the roadside facade of receptors including 6, 10 and 12 Country Club Drive. The proposed sound wall plans including Option A and Option B are shown in **Figure 4.3-2**.

Table 4.3-8 summarizes the acoustical and cost effectiveness of Option A for CNE 17. A 3,135-foot long sound wall with an average height of 22.4 feet would benefit 158 dwelling units, provide up to 11.9 dBA of insertion loss, with an average of 7.8 dBA of insertion loss, and would have a DEI of 444. There would be 56 dwelling units that approach or exceed the NAC and would not benefit from the potential sound wall. Since the topography varies greatly in this area, the proposed sound wall would range in height between 19 and 25 feet. Since the DEI is below the criterion and up to 11.9 dBA of insertion loss would be provided at first row receptors, the sound wall would be feasible and reasonable and is recommended for construction.

Table 4.3-8 Noise Abatement Summary – CNE 17 Option A – County Club Dr

Description	Result
Sound Wall Length (ft)	3,135
Sound Wall Height (ft)	22.4 (average)
Sound Wall Area (SF)	70,099
Impacted Receptors (DUs)	108
Benefited Receptors (DUs)	158
Insertion Loss – All Benefits (dBA)	7.9 (average), 10.9 (max)
Insertion Loss - First Row (dBA)	6.6 (average), 10.9 (max)
Dimensional Effectiveness Index	444
Feasible and Reasonable	Yes
Note: DU: Dwelling unit.	

Table 4.3-9 summarizes the acoustical and cost effectiveness of Option B for CNE 17. A 3,248-foot long sound wall with an average height of 20.5 feet would benefit 198 dwelling units, provide up to 11.2 dBA of insertion loss, with an average of 8.0 dBA of insertion loss, and would have a DEI of 336. There would be 36 dwelling units that approach or exceed the NAC and would not benefit from the potential sound wall. Since the topography varies greatly in this area, the proposed sound wall would range in height between 11 and 25 feet. Since the DEI is below the criterion and up to 11.2 dBA of insertion loss would be provided at first row receptors, the sound wall would be feasible and reasonable and is recommended for construction.

Table 4.3-9 Noise Abatement Summary – CNE 17 Option B – County Club Dr

Description	Result	
Sound Wall Length (ft)	3,248	
Sound Wall Height (ft)	20.5 (average)	
Sound Wall Area (SF)	66,552	
Impacted Receptors (DUs)	108	
Benefited Receptors (DUs)	198	
Insertion Loss – All Benefits (dBA)	8.0 (average), 11.2 (max)	
Insertion Loss - First Row (dBA)	6.8 (average), 10.9 (max)	
Dimensional Effectiveness Index	336	
Feasible and Reasonable	Yes	
Note: DLI: Dwelling unit		

Note: DU: Dwelling unit

Sound wall Option B would benefit several more dwelling units that Option A. The extension along the southern property line would provide approximately 10 dBA of insertion loss for R181 at 6 Country Club Drive, meeting the noise reduction design goal, compared to the 5 dBA of insertion loss that would be provided with Option A. At 6 Country Club Drive, Option B would benefit second-floor receptors (R200) and would increase insertion loss at ground level receptors (R202) from 5 dBA to 10 dBA, meeting the noise reduction design goal. Option B would also provide additional benefit to receptors on the western facade at 12 Country Club Drive (R254 to R256, R272 to R274) by increasing the insertion loss approximately 4 to 6 dBA.

Although sound wall Option B would provide greater noise reduction than Option A, there are concerns about the cost of ROW acquisition, constructability and maintainability of Option B since it is substantially farther outside the existing ROW. Therefore, Option A has been assumed to be the baseline as it relates to other project factors such as potential wetland impacts, ROW acquisitions, and other environmental impacts. If Option B is selected, then additional review of ROW and environmental impacts may be necessary.

Based on the studies so far completed, the NH Department of Transportation is committed to the construction of feasible and reasonable noise abatement measures at the Country Club Drive area. These preliminary indications of likely abatement measures are based upon preliminary design for a sound wall that is approximately 3,135 to 3,248 feet long and an average of approximately 21 to 22 feet high, totaling approximately 66,552 to 70,099 square feet, that would reduce the noise level by up to 11 to 12 dBA and an average of 8.0 dBA for 158 to 198 benefitted receptors. If it is subsequently found during final design that these conditions have substantially changed, the abatement measures might not be provided. A final decision on the installation of the abatement measures will be made during the final design process following the completion of public involvement.

4.4 Farmland Soils

Farmland soils are valuable resources in New Hampshire due to the services and aesthetic quality they provide, as well as the limited amount of tillable soils that exist within the "Granite State" due to the largely rocky soils.

The Farmland Protection Policy Act of 1984²⁷ provides guidelines to Federal agencies involved in projects that may convert existing or potential farmland areas to non-agricultural uses. The Farmland Protection Policy Act directs Federal agencies to "...(a) identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland."²⁸

The Farmland Protection Policy Act Manual,²⁹ Part 523.11(B) indicates that transportation activities which use Federal assistance are covered by the Farmland Protection Policy Act. However, as stated in Part 523.10(B) of the Farmland Protection Policy Act Manual, projects within urbanized areas as designated by the US Census Bureau are exempt from the full requirements of the Farmland Protection Policy Act, as is the case with the Proposed Action, and require no formal coordination with the Natural Resources Conservation Service.

4.4.1 Methodology

The Natural Resources Conservation Service Web Soil Survey was used to identify important farmland soils within the Study Area of the Proposed Action. The four categories of farmland soils in Part 523 of the Farmland Protection Policy Act of 1981, Subpart C – Important Farmland Soils, include: prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance. These categories are discussed briefly below.

- farming methods.
- groves.

> **Prime Farmland**: Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when the land is treated and managed using acceptable

> Unique Farmland: Land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. Examples of such crops in New Hampshire include apple orchards, lowbush blueberries, vegetable truck gardens, and maple sugar

US Department of Agriculture, Natural Resources Conservation Service. 2012. Farmland Protection Policy Act Manual. Accessed from

Section 1539-1549, Public Law 97-98, 95 Statute 1341-1344 (7 United States Code 4301 et seq.).

²⁸ 73 CFR 658.1, Farmland Protection Policy.

https://www.nrcs.usda.gov/Internet/ FSE_DOCUMENTS/stelprdb1049240.pdf. Accessed on September 20, 2018.

- > Farmland of Statewide Importance: Land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Generally, these farmlands include those areas that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.
- Farmland of Local Importance: Certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops.

A map of the Study Area overlaying these farmland soil categories was used to estimate the potential impacts to these farmland soil types (refer to Figure 4.4-1). Additionally, these areas were reviewed through desktop and field surveys to confirm the presence or absence of these farmland soil types.

4.4.2 Existing Conditions

Upon evaluation, the following farmland soil types were found to occur within the Project Footprint (refer to Figure 4.4-1):

- > A small area of prime farmland is mapped within the parcel of land owned by MCC.
- > Farmland of local importance is mapped along the I-293 corridor within the northern portion of the Study Area beginning within the vicinity of Country Club Drive.

No unique farmlands occur within the Study Area and no farmland of statewide importance occurs within the Study Area. Farmlands identified as "prime farmland if drained" are located just outside of the Study Area east of I-293 Exit 7 within the vicinity of 390 Stark Lane.

4.4.3 Impacts

4.4.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, no farmland soils would be permanently impacted since the existing roadway configurations would remain the same.

Proposed Action

The Proposed Action would impact approximately 4 acres of prime farmland soils and approximately 1.4 acres of farmlands of local importance. The calculated acre for farmland soils of local importance excludes land that has already been converted to roadway use (I-293), which the mapped farmland intersects.

The impacted prime farmland soils occur north of the MCC in an area that would be directly impacted by the construction of the Exit 7 Interchange East Connector. This small area is currently forested, somewhat sloping, and falls within urbanized area - although mapped as prime farmland soil, these attributes limit the area's potential for agricultural production.

The impacted farmland soils of local importance is located in the northern portion of the Project Footprint north of the relocated Exit 7 interchange. Much of this area where impacts are proposed has already been converted to roadways, businesses, or residences; or is located around streams and wetlands. These mapped farmland soils do not necessarily reflect areas conducive to agricultural production.

A small amount of permanent impact would occur to farmland soils under the Proposed Action. However, since the Study Area is located within an urbanized area as identified by the US Census Bureau, the Project is exempt from Farmland Protection Policy Act requirements, the Proposed Action would not result in substantial impacts to farmlands.

4.4.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, no farmland soils would be temporarily impacted since the existing roadway configurations would remain the same.

Proposed Action

Under the Proposed Action, no temporary impacts to farmland soils would occur, as the Study Area lies within an urbanized area and is therefore exempt from Farmland Protection Policy Act requirements.

4.4.4 Mitigation

Since the Proposed Action is not anticipated to substantially impact farmland soils, and the Study Area is located within an urbanized area and is therefore exempt from Farmland Protection Policy Act requirements, no mitigation is proposed as part of the Proposed Action.

4.5 Groundwater Resources

Groundwater resources within the Study Area consist of stratified-drift aquifers and any identified municipal water supplies, public water supply wells, and inventoried private water wells. These groundwater resources are regulated under the New Hampshire Groundwater Protection Act, 1991, which empowers local municipalities to regulate land uses in certain cases.

4.5.1 Methodology

The following layers obtained through New Hampshire's GRANIT Geographic Information System Clearinghouse (or NH GRANIT) were reviewed to identify locations of aquifers, water supply wells, and wellhead protection areas within the Study Area:

- > Aquifer Transmissivity and Boundaries (USGS)
- > Public Water Supply Wells (NHDES)





Note: The entire map extent is located within the US Census Bureau Urbanized Area (See inset map for detail)

Farmland of statewide importance

Prime farmland if drained Prime farmland if protected from flooding or not frequently flooded during the growing season Manchester 16099



Manchester, NH

I-293 Exits 6 and 7

Farmland Soils

- > Water Well Inventory (NH Geological Survey)
- > Wellhead Protection Areas (NHDES)

Municipal water supplies, public water supply wells, and private water supply wells within the Study Area were identified as well as any mapped stratified-drift aquifers or Wellhead Protection Areas. Public water supply wells are those which serve multiple residences such as condominium complexes or major subdivisions, or transient population of at least 25 people per day associated with restaurants, day care centers, schools, office buildings, and other businesses. The public and private water supply wells are replenished by underlying aquifers. The impact analysis for groundwater resources focused on identifying areas where new impervious surfaces would be placed over known aquifers.³⁰

This analysis was completed by overlaying the existing and Proposed Action pavement area on the Groundwater Resources map in Figure 4.5-1. Acreages were calculated where new pavement overlapped with known aquifers. Roadway areas within each of the various zones of transmissivity values mapped by the NH GRANIT data were evaluated.

4.5.2 Existing Conditions

Most of the Study Area is underlain by stratified-drift deposits and an associated aquifer. The US Geological Survey (USGS) defines stratified-drift aquifers as "...being composed of fine- to coarse-grained sands or sands and gravels deposited by glacial meltwaters; these deposits, in part, are now sufficiently saturated to yield significant quantities of water to wells and springs."³¹ The underlying geologic deposits in the Study Area were influenced by the presence of two former glacial lakes, Lake Merrimack and Lake Hooksett, and the outwash material that was deposited during the last glacial retreat that occurred more than 10,000 years ago. During the glacial retreat, meltwaters deposited coarse sand and gravel material on top of finer, silt and clay lacustrine deposits that were within the lakes. The depth and uniformity of the coarser outwash material relative to the finer silt and clay material within these stratified-drift deposits greatly influences the groundwater storage capacity and the relative potential for future water supply purposes.

4.5.2.1 Aquifers

Within the Study Area, the mapped stratified-drift deposits extend east and west of the Merrimack River within the City of Manchester and then much farther west into Goffstown and along the Black Brook valley between Dunbarton Road and Goffstown/Straw Road (see **Figure 4.5-1**, *Groundwater Resources*). Although much of the stratified-drift aguifer is mapped as having relatively high transmissivity (a relative index of its groundwater storage capacity and permeability), the potential future use of this mapped stratified-drift aquifer is likely limited due to the existing developed areas and land use activities, as well as the proximity of the Manchester Landfill.

A former sand and gravel mining operation and cement manufacturing facility exists between Dunbarton Road and Straw Road in the western half of the Study Area. Previous mining operations have likely reduced the original depth of sand and gravel deposits in the immediate area, which would diminish the transmissivity for water supply purposes.

4.5.2.2 Public Water Supplies

No public or municipal water supply wells are known to be located within the Study Area based on NH Geological Survey data obtained from NHDES. The nearest public water supply is associated with a commercial facility located approximately 0.6 mile north of the Project Footprint (Well ID #17828 & 45284, New England Poultry Products).

4.5.2.3 Private Water Supplies

Manchester's municipal water supply distribution system extends along Dunbarton Road almost into Goffstown and serves most homes and businesses within this area. The NH Geological Survey's database of private well information indicates that several private wells are still located along Dunbarton Road to the west and Stark Lane to the east despite availability of municipal water. It is unclear if these are still active water supply wells or remain from previous use. The mapped locations are shown on Figure 4.5-1 and additional details for each of the wells are provided in **Table 4.5-1** below.

Table 4.5-1 Private Wells Located Within Study Area (NHGS)					
Map ID	Address	Town	Мар	Parcel	Use
17832	Straw Rd	Manchester			Commercial
31575	Straw Rd	Manchester		479	Domestic
38004	305 Straw Rd	Manchester	890	9-A	Domestic
40789	Straw Rd	Manchester		Lot 475	Domestic
42789	489 Stark Ln	Manchester			Domestic
51491	666 Dunbarton Rd	Manchester			Domestic
62366	144 Dunbarton Rd	Manchester	789	5	Agricultural

In addition to the supply wells contained within the NHGS Well Inventory, several more assumed private supply wells were identified by reviewing residential locations in relation to the Manchester municipal water supply service area. Because the NHGS well database does not include wells installed prior to 1984, assumed wells are shown on occupied properties within the Study Area but outside the known municipal water supply area (*i.e.*, on Straw

The impact analysis did not include encroachment or impacts to Wellhead Protection Areas since the nearest wellhead protection area is located approximately 2,000 feet from the northern limits of the Project Footprint.

³¹ US Geological Survey. 1995. Geohydrology and Water Quality of Stratified-Drift Aquifers in the Middle Merrimack River Basin, South-Central New Hampshire. Water-Resources Investigations Report 92-4192. Bow, New Hampshire.



4001 - 99999

Town/City Boundary

Figure 4.5-1

Road and Dunbarton Road). The assumed locations of these wells are shown on Figure 4.5-1 (denoted as "Private Well – Location Assumed"); additional information pertaining to these wells, including their current use/status is not available.

4.5.2.4 Groundwater Management Zones

There are currently three active Groundwater Management Zones (GMZ) located within the Study Area. Within a GMZ, state regulations may require the restriction of groundwater extraction and/or use for drinking water purposes via recorded easement or other form of restriction due to the presence of contamination.³² The City of Manchester's Land-Use Zoning regulations prohibit the residential, irrigation, agricultural, or industrial use of groundwater within a designated GMZ associated with the Manchester Landfill, a portion of which is located within the Project Footprint.³³ Further discussion of the GMZs is provided in Section 4.14.

4.5.3 Impacts

4.5.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no impacts to groundwater resources.

Proposed Action

The Proposed Action would increase the amount of pavement overlying the mapped stratified-drift deposits that exist mostly near the Exit 7 interchange and in the northerly section of the Project Footprint. Table 4.5-2 compares the estimated amount of pavement area overlying the mapped stratified-drift and till deposits under existing and proposed conditions associated with the Proposed Action. Within the area of the Proposed Action, the estimated transmissivity of the stratified-drift deposits ranges from 4,001 to 99,999 square feet per day, indicating the potential for high productivity. This stratified-drift area is estimated to span approximately 15,600 acres (24.4 square miles) in total, and well beyond the limits of the Project Footprint. The majority of new pavement associated with the proposed Exit 7 interchange and the widened mainline north of the Exit 7 interchange would overlay mapped stratified-drift deposits with a small amount overlaying mapped till deposits as well.

Given the proximity to the Manchester Landfill and the extent of existing development and land uses within the Project Footprint, the additional pavement resulting from the Proposed Action is not likely to adversely affect the potential use of the stratified-drift aquifer for future water supply purposes. Given the overall size of the mapped stratified-drift area, the

estimated 32.5 acres of added pavement within the aquifer represents approximately 0.2 percent of the total stratified-drift area.

The Proposed Action is not expected to adversely impact any public water supply wells within the Project Footprint since the nearest public water supply wells are located approximately 3,500 feet north of the Project Footprint.

Table 4.5-2 Net Change in Pavement Area within Aquifer Boundaries (Acres)

Aquifer Type	Existing Pavement (acres)	Proposed Pavement (acres)	Net Change (acres)
Stratified Drift	40.7	73.2	32.5
Till	0.3	0.8	0.5
Total	41.0	74.0	33.0

4.5.3.2 Temporary Impacts

No-Build Alternative

Alternative.

Proposed Action

Minor temporary impacts to groundwater would occur from the Proposed Action during project construction. Construction would likely require temporary drawdown of the groundwater table in certain areas, but at a scale and duration that is unlikely to impact adjacent wells. Most notably, dewatering of groundwater is expected within the Manchester Landfill GMZ and possibly other areas of known groundwater contamination. See Section 4.14, Hazardous Materials and Contamination for more information.

4.5.4 Mitigation

Given the minimal potential for impacts to groundwater resources associated with the Proposed Action as demonstrated by the impact analysis, no mitigation measures are considered necessary. However, the following measures would be employed to minimize potential impacts:

No direct or indirect temporary groundwater impacts would result from the No-Build

> As part of the final design, measures that could be used to promote infiltration of stormwater as part of the drainage design could be considered to help maintain existing groundwater recharge conditions. These measures would compensate for any initial restriction to recharge caused by an increase in impervious area.

> Contractors working within the Project Footprint would use BMPs to contain any spills that may occur from construction equipment. Spill prevention plans are anticipated to be

³² New Hampshire Code of Administrative Rules Env-Or 600, Contaminated Site Management Rules, June 1, 2015; 607.06(b), 607.06(f),

City of Manchester, Planning and Community Development Department. Zoning Ordinance, City of Manchester, NH. February 7, 2001, amended August 15, 2017: 7-26 - 7-27.

developed prior to construction to limit the potential and outline containment measure in the unlikely event of inadvertent spill during construction.

Where temporary groundwater dewatering is required, proper containment and handling measures would be deployed to prevent any turbid or potentially contaminated water from being released to surface waters or other resources.³⁴

4.6 Water Quality

The Project considers water quality protection of the surface waters that are located within the Study Area, which include the Merrimack River, Black Brook, and Milestone Brook (see Figure 1.1-2). This section discusses the results of an analysis of potential water quality impacts related to stormwater runoff on these resources, including a description of a proposed stormwater treatment system designed to minimize and offset impacts.³⁵

Surface water quality regulations are administered by the NHDES Watershed Management Bureau. Any discharge to a surface water resource is subject to NHDES Surface Water Quality Regulations (Env-Wg 1700). These regulations established water guality standards for various physical, biological and chemical parameters for the protection of aquatic life and human health that vary depending on their designated use classification. NHDES also, as required by the federal Clean Water Act, conducts routine biological and water quality monitoring of the state's water resources through its Consolidated Assessment Listing Methodology to determine if water quality standards are currently being met and if the designated uses are fully supported. In cases where the in stream designated uses and/or water quality standards are not being supported or met, respectively, the waterbodies are then added to the NHDES 303(d) list of impaired waters, which is updated every two years. Depending on the severity of the impairment and the source or type of pollutant causing the impairment, NHDES determines whether a future Total Maximum Daily Load study is needed, which ultimately would establish an allocation or load reduction target that is required for each of the source(s) to alleviate the impairment. The latest list of impaired waterbodies approved by the USEPA in NH is the NHDES 2016 303(d) list.

Additionally, land disturbance activities and management of stormwater runoff associated with development projects are regulated by the NHDES Alteration of Terrain (AoT) regulations (Env-Wg 1500). NHDOT has executed a Memorandum of Agreement (MOA) with NHDES that outlines Best Management Practices (BMPs) that NHDOT will utilize to minimize and control sediment erosion during construction and to manage stormwater during post-construction phases of the project. The MOA is routinely revisited and updated to address any changes in the state requirements in lieu of a permit application and approval process.

At the federal level, stormwater is regulated by USEPA's Construction General Permit for projects that will disturb more than 1 acre and USEPA's 2017 NH Small Municipal Separate Urbanized Areas.

NHDOT will comply with the Construction General Permit (CGP) by submitting a Notice of Intent (NOI) and by developing a Stormwater Pollution Prevention Plan (SWPPP) that will outline appropriate erosion control BMPs that will be used on the project prior to initiating construction. The execution of the SWPPP which involves implementation and maintenance of the selected BMPs will also address the MOA with NHDES regarding Alteration of Terrain regulations, as discussed above. The CGP permit requirements are designed to avoid and minimize temporary and long-term water quality impacts associated with eroded sediment caused by land disturbance and development activities including roadway improvements.

The Proposed Action will also be subject to the 2017 NH MS4 Permit since it is located in the Urbanized Area and will result in more than one acre of disturbance. Both NHDOT and the City of Manchester ('City') have submitted separate NOI's in September 2018 for permit coverage and have recently developed their own Stormwater Management Plans (June 2019) that outline various good housekeeping measures used to maintain their existing roadway and storm drain infrastructure. Both the NHDOT and the City have received Letters of Authorization from USEPA Region 1 indicating MS4 permit coverage.³⁶

For new projects located in the Urbanized Area that disturb more than 1 acre of area, the MS4 permit requires permittees to adopt regulations or internal policies by July 2020 to require stormwater treatment BMPs that will capture and treat the Water Quality Volume (WQV), as defined in Env-Wg 1504.10, generated from the total impervious area within the Project limits that drains to surface waters. Section 4.6.3 below presents the results of a preliminary stormwater treatment analysis that identifies potential stormwater treatment locations for both NHDOT and City roadway area that would be improved and/or disturbed under the Proposed Action.

NHDOT has also recently developed a statewide Salt Management Plan that outlines various equipment and operational measures that are designed to increase the efficiency and effectiveness of winter deicing practices consistent with the MS4 permit. Executing this Plan and incorporating these same efficiency measures in maintaining the road within the project area would appear to meet the MS4 requirements. NHDOT has incrementally adopted these measures over time and is now utilizing these measures throughout much of southern New Hampshire.

4.6.1 Methodology

Consistent with the requirements of the EPA 2017 MS4 Permit, NHDOT has adopted a design goal for roadway projects located within an Urbanized Area to capture and treat the Water Quality Volume (WQV) as defined by the AoT regulations (Env-Wq 1507.03), from the entire roadway area within the Project Footprint to the maximum extent practicable using

Stormwater Sewer Systems (MS4) General Permit for projects located in designated

Copies of the EPA MS4 letters of authorization can be found at the EPA website: https://www.epa.gov/npdes-permits/regulated-ms4-

³⁴ More information on dewatering within contaminated groundwater is discussed in **Section 4.14**, Hazardous Materials and Contamination.

³⁵ Additional discussion of direct impacts in the bed and banks of the Merrimack River and Black Brook is addressed in Section 4.8.

new-hampshire-communities
stormwater treatment BMPs in accordance with the NH Stormwater Manual. Treating both the existing and proposed roadway area would likely result in a net decrease in pollutant loads or a net water quality benefit to receiving water bodies, especially if the existing roadway area is currently untreated. This level of stormwater treatment will address the water quality anti-degradation provisions inherent to the various state and federal water guality and stormwater related permits and as these are all based on the federal Clean Water Act regulations. The effect of the potential stormwater treatment and likely pollutant load reduction is typically demonstrated though a preliminary stormwater drainage and pollutant loading analysis using modeling techniques accepted and provided by NHDES and EPA.

To assess the feasibility of incorporating stormwater BMPs into the proposed project design, existing and proposed drainage or sub-watershed areas were delineated to estimate the amount of roadway area that could be captured and potentially treated along the flow paths to each stormwater discharge point. The drainage area delineations were based on detailed topographic data generated from Light Detection and Ranging (LIDAR) data and existing stormwater system mapping of storm drain and outfall locations contained in an NHDOT GIS database. The second major step involves determining the minimum amount of area needed to incorporate a stormwater treatment BMP based preliminary sizing calculations and known physical constraints along the flow path. The NHDES stormwater BMP sizing worksheets were used to determine the preliminary sizing for each BMP.

Pollutant loads under existing and proposed conditions were calculated for each discharge location using the NHDES Simple Method Pollutant Loading Spreadsheet Model (last updated in April 2015). This method estimates average annual pollutant loads focusing on three main pollutants typically associated with stormwater, including Total Suspended Solids (TSS), Total Nitrogen (TN), and Total Phosphorus (TP), while accounting for the roadway area within each sub-watershed drainage area, the average annual precipitation, average pollutant concentrations in stormwater runoff and any existing or proposed stormwater treatment. Specific details regarding the model inputs and capabilities can be found in the NHDES guidance manual (NHDES Report WD-10-11, May 2010).

Chloride loading impacts from the increased pavement area were qualitatively assessed based on the estimated potential increase in lane miles, the potential available dilution capacity of the receiving water bodies and the recent progress that NHDOT has made in incorporating more efficient road salt application practices as part of its statewide Salt Management Plan.

4.6.2 Existing Conditions

NHDES categorizes existing water quality conditions for the state's rivers and streams by various sections, known as hydrologic assessment units (AUs), based on previous water quality data collected that meet accepted quality control standards. An AU generally reflects a segment or an entire water body that has similar hydrologic conditions or inputs. Where flow conditions or inputs change due to human or natural influences such as a dam, a major waste water discharge or tidal inflow, then a separate AU is established for this segment or water body. As required by the federal Clean Water Act, every two years NHDES analyzes existing and newly collected water quality data within each of these AUs and evaluates

whether the state surface water quality standards established for the various designated uses in each AU are being met. If not, NHDES will declare the water body or AU as being impaired. The quality control procedures, type of water quality data used, and the thresholds used to determine whether water quality standards are being met, are described in the NHDES' Consolidated Listing and Assessment (CALM) Report. The water bodies that do not meet water quality standards for the various designated uses are listed in the 303(d) list of impaired water bodies. The 2016 303(d) list of impaired water bodies represents the most recent list approved by EPA.

Within the project area, the Merrimack River has two Assessment Units including NHIMP700060802-04 and NHRIV700060803-14-02 which correspond to the impoundment and free-flowing sections above and below the Amoskeag Dam, respectively.

NHDES' 2016 303(d) list indicates that each of these sections are impaired due to occasional elevated bacteria levels, which could affect primary and secondary contact uses. The impoundment section is also listed as impaired for elevated aluminum and low pH levels, which may affect aquatic life. Fish consumption is also considered to be an impaired designated use in both segments due elevated mercury levels in fish tissue. All waterbodies within the state are listed as impaired for fish consumption due to past atmospheric deposition of mercury in the region and are included within the Northeast Regional Mercury TMDL. Aside from the bacteria (E. coli), water quality impairments associated with pH and mercury are not generally associated with stormwater inputs from roadway pavement. The elevated bacteria levels are most likely attributable to the City of Manchester's occasional Combined Sewer System (CSO) discharges along the Merrimack River.

Table 4.6-1 NHDES 2016 Listed Water Quality Impairments for the Merrimack River

NHDES Assessment Unit ID	Use Description	NHDES Category	Supplemental Parameter Name(s)
NHIMP700060802-04	Fish Consumption	4A-M	Mercury
(upstream of Amoskeag Dam)	Primary/Secondary Contact Recreation	4A-M	E. coli
	Aquatic Life	5-M	Aluminum
NHRIV700060803-14-02	Aquatic Life	5-M	рН
(downstream of	Fish Consumption	4A-M	Mercury
Amoskeag Dam)	Primary/Secondary Contact Recreation	4A-P	E. coli

The hydrologic assessment unit for the lower portion of Black Brook in the Study Area is listed as NHRIV700060801-05-02 and identified as impaired for previous low pH levels and a low biotic index observed in previous Benthic Macroinvertebrate Assessments. The source(s) or cause(s) for the low macroinvertebrate biotic index is listed as unknown by NHDES. The Brook is also listed as impaired for fish consumption due to elevated mercury levels.

4.6.3 Impacts

4.6.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the existing roadway would continue to discharge stormwater to Black Brook and the Merrimack River via the existing roadway drainage system with limited stormwater treatment. There would be no change in pollutant loading to these receiving waters.

Proposed Action

Under the Proposed Action, additional pavement area would be created within the Merrimack River and Black Brook watersheds. Milestone Brook would not be affected by the increased pavement area since stormwater within the vicinity of the brook is conveyed south into the Merrimack River and Black Brook watersheds.

Table 4.6-2 presents a comparison of the estimated existing and proposed pavement area associated with the I-293 roadway as well as the anticipated net change in each of the major watersheds. In total, the Proposed Action would add approximately 33.9 acres of new roadway area, with most of this additional pavement (30.5 acres) draining directly to the Merrimack River and the remaining 3.4 acres of pavement area draining to the lower portion of Black Brook.

Table 4.6-2 Estimated Existing and Proposed Pavement Area by Watershed

Receiving Water	Existing Pavement (Acres)	Proposed Pavement (Acres)	Net Change (Acres)
Merrimack River	43.4	73.9	+30.5
Black Brook	6.0	9.4	+3.4
Total	49.4	83.3	+33.9

As discussed above, NHDOT's primary means of avoiding or minimizing potential water guality impacts associated with the proposed project and increased pavement area is to incorporate enough stormwater treatment BMPs into the proposed roadway design to treat 100 percent of the proposed pavement area, to the maximum extent practical. To provide this level of treatment would essentially meet the anti-degradation water quality provisions of the state surface water quality regulations and the enhanced stormwater treatment standards required by EPA's MS4 Permit, especially if the existing pavement area is currently untreated but will be treated under the Proposed Action.

In evaluating how much of the overall proposed pavement area within the project area can be treated by stormwater BMPs, it was generally assumed that the existing stormwater discharge locations would be maintained. At each discharge location, the feasibility of a constructing a stormwater treatment BMP was evaluated based on the available space within the ROW, existing slopes and other physical constraints that may limit suitability. The details of this stormwater analysis that identifies potential treatment locations and BMP types are included in a Technical Memorandum, which is available upon request to NHDOT.³⁷ Each potential BMP was preliminarily sized to retain the water guality volume estimated to be generated from the pavement area contributing to each BMP location. The overall area required for each BMP was based on an estimated amount of area needed to store the Water Quality Volume³⁸ and an estimated allotment for slope embankments. The NHDES BMP worksheets developed under the NHDES Alteration of Terrain Program were used for preliminary sizing calculations.

Table 4.6-3 provides a summary of the estimated proposed pavement area for each roadway segment that would be directed and treated by a stormwater BMP. As indicated, fourteen (14) locations within the state and City rights-of-way were identified as having sufficient space to construct a stormwater treatment BMP. Most of the proposed BMPs were assumed to be Extended Wet Detention Basins, while two were assumed to be Vegetated Swales and one was assumed to be a Gravel Wetland. A more detailed field investigation would be required as part of the final design phase to confirm and fully assess the site suitability and subsurface conditions for BMP construction at each of these locations.

Based on this preliminary analysis, approximately 70.6 acres of pavement, or approximately 85 percent of the total pavement area associated with the Proposed Action, was identified as being potentially treated by one of the proposed stormwater treatment BMPs. This includes some City of Manchester roadway area that is outside the Project Footprint that drains into the I-293 corridor and associated City roads.

Stormwater treatment was determined to be not feasible for approximately 12.7 acres of pavement due mostly to space constraints or unsuitable topography. This includes portions of the I-293 mainline bridge that crosses over the Black Brook where the ability to capture and divert stormwater from the bridge area is constrained by limited elevation change and limited space within the right-of-way.

Given the amount of existing and new pavement area anticipated to be treated with the proposed BMPs under the Proposed Action, the Merrimack River is anticipated have a reduction in pollutant loads or a net water quality benefit compared to existing conditions, even though some pavement area may remain untreated. This finding is further demonstrated by the results of the pollutant loading analysis discussed below.

Technical memorandum entitled "Manchester 16099, Preliminary Drainage Analysis" from Bill Arcieri and David Horner, VHB, to Marc

³⁸ NH Administrative Rule Env-Wq 1502.82 defines "Water Quality Volume (WQV)" as "the volume of water equivalent to the volume of runoff attributable to the first one inch of rainfall." Capture and treatment of the WQV removes the majority of stormwater pollutants on an

Laurin and Mark Hemmerlein, NHDOT, dated September 27, 2019.

average annual basis and is equivalent to capturing and treating the runoff from the 90th percentile of all rainfall.

Project	Roadway Segment or		Pavement Area (Acres)		
Segment	Drainage Area ID	Receiving Water	Untreated	Treated	Proposed BMP Type
	23885	Merrimack River		1.3	Vegetated Swale
	UNT007	Merrimack River	4.5		None
South	UNT006	Merrimack River	2.0		None
Mairinie	23899	Merrimack River		1.8	Extended Detention
	23906	Merrimack River		2.6	Extended Detention
	UNT002	Black Brook ¹	3.3		None
	23916	Merrimack River		3.7	Extended Detention
F 1. C	23928	Merrimack River		11.5	Extended Detention
Exit 6	23930	Merrimack River		5.6	Extended Detention
	23939	Merrimack River		0.8	Extended Detention
	23953	Merrimack River		4.5	Extended Detention
Central	23965	Black Brook		3.8	Vegetated Swale
Mainline	23983	Merrimack River		9.7	Extended Detention
	UNT008	Merrimack River	2.8		None
Exit 7	24006	Merrimack River		9.1	Extended Detention
	24013	Black Brook		2.2	Gravel Wetland
	24014	Merrimack River		5.4	Extended Detention
Northern Mainline	24046	Merrimack River		8.7	Extended Detention
Totals			12.7	70.6	

Table 4.6-3 Estimated Treated and Untreated Pavement Area Draining to Each Major Water Body

Note

1 This roadway segment drains to Black Brook at its confluence with the Merrimack River and thus, the Merrimack River is essentially the receiving water.

Pollutant Loading

A pollutant loading analysis was also conducted to estimate the average annual pollutant loads contributed by stormwater from roadway surfaces under the No-Build and Proposed Action Alternatives. The analysis focused on Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) using the Simple Method Model consistent with the NHDES Pollutant Loading Guidance Manual. This method considers the estimated pavement area draining to each discharge or potential BMP location under existing and Proposed Action conditions. To assess the potential treatment effects of these proposed BMPs, estimated pollutant removal efficiencies were applied for each BMP type and pollutant based on the pollutant removal efficiency data included in the NHDES Stormwater Manual (Vol. 1).

Table 4.6-4 presents a summary of the estimated net change in average annual pollutant loads to each of the major water bodies under the Proposed Action. An estimated net change represented by a negative value indicates an anticipated pollutant load reduction

relative to the No-Build, whereas a positive net change indicates an expected increase the pollutant load relative to the No-Build Alternative as a result of the added proposed pavement area.

Table 4.6-4 Estimated Net Change in Pollutant Loading under Proposed Action **Conditions for Each Major Water Body**

Watershed	TSS (Lbs/Yr)	TP (Lbs/Yr)	TN (Lbs/Yr)
Watershed	Net Change	Net Change	Net Change
Merrimack River	-25,429.6	-47.1	-97.5
Black Brook	-1,575.5	3.8	32.2
Total Project Footprint	-27,005.1	-43.3	-65.3

The pollutant loading results indicate that an overall decrease is expected for the estimated pollutant loads due to the anticipated stormwater treatment provided by the fourteen different treatment BMPs included in the Proposed Action. For the Merrimack River, the estimated treatment by proposed BMPs would result in a net reduction of approximately 25,429.6, 47.1 and 97.5 lbs/year of TSS, TP and TN, respectively.

For Black Brook, the pollutant loading results indicate a potential reduction for TSS of approximately 1,575.5 lbs/year but a potential net increase of 3.8 and 32.2 lbs/year of TP and TN, respectively. The anticipated stormwater discharges into the Black Brook would occur at the confluence of Black Brook with the Merrimack River. Thus, the net effect of the estimated loads under the Proposed Action would likely affect water quality conditions in the Merrimack River rather than Black Brook itself.

As indicated by the pollutant loading results, the proposed stormwater treatment for the overall project is expected to result in a net water quality benefit for the Merrimack River relative to the No-Build Alternative. The constructability and preliminary sizing of the proposed stormwater BMPs included in this analysis will need to be confirmed with more detailed investigations to be conducted as part of final design phase.

Chloride Loading

Under the Proposed Action, the additional lane-miles that would result from the proposed widening of I-293 and interchange improvements may lead to additional road salt use and a potential increase in sodium and chloride loading to receiving waters. Table 4.6-5 presents a comparison of the estimated lane mileage under the No-Build and Proposed Action Alternatives. None of the streams and rivers in the Study Area are currently listed as impaired for chloride. Given the size of the Merrimack River and its interconnection with Black Brook, these streams likely have sufficient flow volumes to assimilate the anticipated added road salt usage and potential chloride loading without exceeding water quality thresholds for chlorides.

The NHDOT and the City of Manchester have continued to upgrade its equipment and expand its use of more efficient practices, including the use of liquid deicers. With these practices, NHDOT has documented a reduction in salt use on a per lane mile basis compared to what was historically used under similar winter weather conditions. NHDOT expects to continue to achieve even greater efficiencies as newer technologies and equipment upgrades are implemented statewide and in the Project corridor in the future. These more efficient practices would offset and reduce the potential road salt usage that would generally be expected with the Proposed Action.

Table 4.6-5	Estimated Roadway Lane-Miles Associated with the Roadway in the Project
	Footprint under Existing Conditions and Proposed Action

Watershed	No-Build Alternative (Lane-miles)	Proposed Action (Lane-miles)	Net Change
Merrimack River	25	46	+21
Black Brook	4	7	+3
Total	29	53	+24

4.6.4 Mitigation

As discussed above, the Proposed Action would add impervious area within the watersheds of the Merrimack River and Black Brook that could potentially cause adverse water quality impacts due to the added stormwater runoff, if left untreated. However, as many as 14 stormwater treatment BMPs have been included in the preliminary design to treat stormwater runoff from approximately 85 percent of the total proposed pavement area. This proposed stormwater treatment would result in substantial mitigation and a net water quality benefit to receiving waters, since the pollutant loads under the Proposed Action are estimated to be less than that estimated under existing conditions even with the additional pavement area included in the Proposed Action.

As mentioned below in Section 4.8, the Project will also be subject to the USEPA National Pollutant Discharge Elimination System Construction General Permit since more than one acre of land would be disturbed at any time. Thus, a Notice of Intent and Stormwater Pollution Prevention Plan will be developed prior to initiating construction and will outline the erosion control and any dewatering measures to be used during construction.

In addition to the proposed measures described above, the following is a list environmental commitments and mitigation measures that the NHDOT will use to limit the potential for water quality impacts to surface water resources within the Study Area:

> Increased stormwater runoff from the proposed additional pavement would be mitigated by constructing various stormwater treatment BMPs as described in this document. This system would include a combination of BMPs such as wet extended detention basins, vegetated swales, and/or gravel wetlands. The exact number and type of stormwater BMPs and the amount of roadway area to be treated will be finalized as part of the final design.

- and the 2017 MS4 Stormwater Permit.
- EPA MS4 permit.
- to the added lane miles of roadway.
- Stormwater Pollution Prevention Plan would be developed.

4.7 Floodplains and Floodways

All federal projects potentially impacting floodplains require an evaluation under Executive Order 11988, Floodplain Management. Floodplain Management and Protection of Wetlands (44 CFR Part 9) sets forth the policy and procedures of this order, which is under the authority of the Federal Emergency Management Agency (FEMA). FEMA provides publicly available data to create Flood Insurance Rate Maps (FIRMs) for areas of interest.

A 100-year floodplain is defined as having a one percent annual chance of flooding and is typically the minimum level of flooding used in floodplain management regulations. Floodplain, as defined in 44 CFR Part 9, refers to "the lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year." Factors that cause or contribute to flooding include drainage area characteristics (*i.e.*, topography), storm patterns, antecedent moisture conditions, time of year, and channel obstructions. In addition to the

> NHDOT will coordinate and meet with the City of Manchester to ensure stormwater BMP inspection and maintenance plan/agreement for certain proposed BMPs and/or roadway areas that will be under the City's maintenance jurisdiction consistent with the City's Stormwater Management Plan and the 2017 EPA MS4 Stormwater Permit.

> NHDOT and City of Manchester will inspect and maintain the proposed stormwater BMPs in accordance with the NHDOT's Stormwater BMP Inspection and Maintenance Manual

> NHDOT and the City of Manchester will perform routine maintenance of their respective roadways and related stormwater infrastructure including annual catch basin cleaning and street sweeping in accordance with their Stormwater Management Plans and the 2017

> NHDOT and City of Manchester will incorporate, deicing efficiency measures as outlined in their recently updated Salt Management Plans to minimize any potential increase in road salt usage associated with the Project.³⁹ These practices include the use of liquid deicers to pretreat roads and prewet road salt, use of ground-speed controllers, more effective plow blades and enhanced weather forecasting and notification technology. Use of these measures would minimize any potential increases in deicing material usage due

> The Project would require coverage under the USEPA National Pollutant Discharge Elimination Systems' Construction General Permit since more than one acre of land would be disturbed at a time during Project construction and dewatering would be required in certain locations (Black Brook, Milestone Brook). Therefore, a Notice of Intent and

Management Plan, https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/water-guality.htm.

New Hampshire Department of Transportation. 2019. Statewide Salt Management Plan. Appendix K in the NHDOT Stormwater

floodplain, Regulatory Floodway is defined as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than the designated height."⁴⁰ Development within the Regulated Floodway could contribute to the diversion of flows and increased water depths during flood events.

4.7.1 Methodology

To determine floodplain elevations within the Study Area, the Flood Insurance Study for Hillsborough County, New Hampshire (All Jurisdictions, September 25, 2009)⁴¹ were obtained from NH GRANIT. Digital data from the FIRM for Hillsborough County was also obtained from NH GRANIT. Figure 4.7-1 shows the FEMA-defined limits of the 100-year floodplain and floodway within the Study Area, which are based on the flood elevations specified in the Hillsborough County Flood Insurance Study.

Volumetric floodplain impacts were generated using an Average End Area Methodology which calculated the volume of cut and fill between the existing ground surface, the proposed ground surfaces for each alternative, and the floodplain elevation surface. Volumetric impacts were calculated using MicroStation (refer to **Appendix D**).

Consultation with the State Floodplain Management Coordinator for the NH Office of Energy and Planning (currently the Office of Strategic Initiatives) determined that hydrologic and hydraulic analyses would not be required due to the lack of floodway impacts (Appendix L).⁴²

4.7.2 Existing Conditions

According to the FIRMs produced for Hillsborough County, portions of the Study Area are located within the 100-year floodplain of the nearest surface waters, which are the Merrimack River and Black Brook, and within the 500-year floodplain of the Merrimack River.

The Study Area is located within a Special Flood Hazard Area Zone AE of the Merrimack River, with a base flood elevation of 181 feet to 184 feet north of the Amoskeag Dam, as shown on FIRM Panel No. 33013C0690E and 33013C0686E, and a base flood elevation of 138 to 160 feet south of the Amoskeag Dam, as shown on FIRM Panel No. 33013C0690E and 33011C0876D. Zone AE is defined as a one percent annual chance floodplain that is determined in the Flood Insurance Study by detailed methods of hydraulic analysis.

Portions of the Study Area are located within the two percent annual chance flood hazard area, synonymous with the 500-year floodplain, of the Merrimack River. These areas are mainly limited to the confluence of Black Brook with the Merrimack River between I-293 and

Front Street, and west of I-293 beginning at Exit 6 and continuing south. Another small portion is located along the northeastern side of the Amoskeag Circle.

The Study Area is located within and adjacent to the designated Regulatory Floodway of the Merrimack River. Special considerations during the preliminary design phase were taken to avoid potential impacts to the floodway.

The Study Area is also located within the Special Flood Hazard Area Zone A of Black Brook (FIRM Panel No. 33011C0238D). Zone A is defined as a one percent annual chance floodplain whose boundaries are calculated using general methodology, and no base flood elevations are available for these floodplains, except immediately adjacent to the Merrimack River, where flood elevations within Black Brook are determined by backwater effects from the Merrimack. The base flood elevation in this area (*i.e.*, within the Project Footprint) is 182 feet. Note that an earthen berm (levee) is present along a portion of the southern bank of Black Brook at an elevation greater than 182 feet; therefore, a portion of the FEMA-mapped Black Brook floodplain is ineffective flow area, or effectively outside of the actual floodplain.

Portions of the Study Area are located within the Floodplain District designated by the City of Manchester under the city's Zoning Ordinance, Article 7.03.⁴³ These areas were defined using FEMA's special flood hazard areas, which include Zones A and AE. Proposed development within the Floodplain District typically requires the submission of a permit to the City of Manchester; however, since the proposed Project is state-funded, local permitting does not apply.

4.7.3 Impacts

4.7.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no impacts to floodplains or floodways.

Proposed Action

Under the Proposed Action, new construction and substantial reconstruction would directly permanently impact delineated floodplains through the addition and/or reduction of fill materials. Floodplain areas of the Merrimack River and Black Brook intersect the Project Footprint and would be directly impacted to varying degrees.⁴⁴ **Table 4.7-1** below presents estimated total direct impacts to the 100-year floodplains within the Project Footprint, accounting for new fill and removal of fill from adjacent floodplains.

City of Manchester, Planning and Community Development Department. Zoning Ordinance, City of Manchester, NH. February 7, 2001,

Impacts of detention basins on 100-year floodplains were not assessed for this analysis because detention basins are primarily additions

Federal Emergency Management Agency. 1998. Managing Floodplain Development Through the NFIP.

⁴¹ Federal Emergency Management Agency. 2009. Flood Insurance Study: Hillsborough County, New Hampshire, Volumes 1-5.

As discussed under Section 4.7.3, Floodplains and Floodways, Impacts, the Proposed Action would result in direct impacts to the 100-year floodplain; however, the floodway would remain unchanged.

amended August 15, 2017: 7-5 - 7-12.

to the floodplain volume through creating depressions below the existing grade.





Figure 4.7-1



Regulatory Floodway 0.2% Annual Chance Flood Hazard

Building

Bridge

Town/City Boundary

Stream

City Park Land

Conservation/Public Land

Proposed Floodplain Impacts

Figure 4.7-1 Sheet 3 of 4

Floodplains Map





Table 4.7-1 Total Impacts of the Proposed Action to the 100-Year Floodplain

Watershed	Floodplain Impacts (Cubic Yards)	Floodplain Impacts (Acre-Feet)
Merrimack River	6,354	3.9
Black Brook	643	0.4
Total	7,000	4.3

Volumetric impact calculations can be found in Appendix D. Black Brook impacts exclude areas of mapped Note: floodplain which are located behind a levee.

Merrimack River

The Proposed Action would encroach in the following locations of the Merrimack River floodplain which is the largest floodplain in the Study Area:

- > South of the West Bridge Street Bridge crossing over the Merrimack River
- > Adjacent to Eddy Road on the I-293 mainline
- > Exit 6 northbound on-ramp
- > I-293 Black Brook Bridge
- > I-293 mainline near Stark Way

Direct impacts within the Merrimack River floodplain would primarily result from increased fill from the setback of the existing river embankments. Impacts of the Proposed Action are depicted on Figure 4.7-1.

Black Brook

Black Brook is a tributary to the Merrimack River whose floodplain intersects with the Merrimack River shortly after passing under I-293. Direct impacts to the Black Brook floodplain would occur at the bridge crossing of I-293 over the brook. Under the Proposed Action, widening of the bridge crossing would increase the footing sizes of the bridge; however, the increased travel length of the bridge would move the current footings outside of the floodplain, resulting in a net benefit by increasing floodplain storage capacity. It should be noted that Black Brook has no delineated floodway based on the corresponding FEMA Flood Insurance Study. Impacts resulting from the Proposed Action are depicted on Figure 4.7-1.

4.7.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, no temporary impacts to floodplains or floodways would occur.

Proposed Action

Under the Proposed Action, direct temporary impacts to floodplains would occur during the construction period in areas adjacent to areas of permanent impacts. The bridge reconstruction over Black Brook would temporarily impact the floodplain through the removal of existing bridge abutments, scour protection, and associated fill; however, as discussed above, the net effect of the new bridge would be to remove existing floodplain fill at the crossing.

4.7.4 Mitigation

Permanent impacts under the Proposed Action would have a negligible effect on the base flood elevations in the Study Area. The Merrimack River permanent floodplain impacts would be minor in the context of the volume of the Merrimack River. Floodplain impacts to Black Brook would also be considered minor in the context of its relative floodplain size, limiting possible effects to the base flood elevation to a minimum.

During construction, appropriate sedimentation and erosion control BMPs would be implemented. After construction is complete, temporarily impacted floodplains would be restored to provide pre-disturbed flood storage volumes. Floodplain storage could be created or restored through the following typical methods:

- > Increasing holding areas for excess water,
- > Acquiring property in and around the floodplain; or,
- > Re-grading the area to create new floodplain storage.

necessary, during final design.

4.8 Wetlands and Surface Waters

Wetlands are a land form containing features such as surface water or saturation, characteristic wetland plants, and hydric soils which provide evidence for saturated conditions for an extended period of time. In New Hampshire, wetlands are defined as "an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions" [RSA 483-A:2(X)].

Federal protection of wetlands and surface waters (e.g., rivers, streams, ponds, and lakes) is pursuant to Section 404 of the Clean Water Act and Section 10 of the Federal Rivers and Harbors Act. The US Army Corps of Engineers (USACE) is charged with the duty of overseeing and regulating activities in wetlands at the federal level. Due to the estimated permanent wetland impacts (3.3 acres) an Individual Permit is anticipated to be obtained from the USACE. The USEPA also reviews projects that may impact wetlands and has review authority over discharges they find unacceptable.

Under the Proposed Action, opportunities for compensatory flood storage would be created at BMP 23953 and 23983. Although mitigation may not be required for minor effects, reasonable mitigation to create or restore floodplain storage could be considered, if

The State of New Hampshire regulates activities in wetlands under State of New Hampshire RSA 482-A, which grants regulatory authority to the NHDES Wetlands Bureau. Due to the estimated permanent wetland impacts (3.3 acres) a Major impact Permit is anticipated to be obtained from NHDES. Under this statute, all proposals to dredge or fill wetlands must be permitted by the NHDES Wetlands Bureau. In accordance with RSA 482-A:3(IV)(b), modification of "man-made non-tidal drainage ditches, roadside and railroad ditches, detention basins, ponds and wetlands that have been legally constructed to collect, convey, treat, or control stormwater and spring run-off" does not require permitting under most circumstances.

Communities also can enact their own ordinances to regulate activities in wetlands. The City of Manchester's Zoning Ordinance (adopted 02/07/01, amended through 09/2/14) contains rules regarding a 25-foot setback to wetlands within NHDES jurisdiction from proposed buildings, structures, or parking lots according to Article 6.09. However, since the proposed Project would be state-funded, local zoning ordinance rules do not apply.⁴⁵

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

4.8.1 Methodology

Wetland resources located within the Study Area were initially identified on aerial photographs using National Wetlands Inventory data and Natural Resource Conservation Service soils data obtained from NH GRANIT. These maps were then used in 2013 to conduct an initial wetland identification within the Study Area. During the spring of 2016 the Study Area was delineated by NH Certified Wetland Scientists.

Wetlands were delineated using the USACE's three parameter approach that considers plants, soils, and hydrology in the interpretation of the wetland/upland boundary (USACE's 1987 Wetlands Delineation Manual). Wetland delineations were performed in accordance with the technical criteria contained in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0, (January 2012). The National Wetland Plant List – Northcentral-Northeast Region published by the USACE, the Field Indicators of Hydric Soils in the United States, Version 7.0 published by the Natural Resources Conservation Service, and the Field Indicators for Identifying Hydric Soils in New England, Version 3 published by the New England Interstate Water Pollution Control Commission were also used as technical references during the wetland field investigation.

Vegetative cover type classifications were determined in the field using *Classification of* Wetlands and Deepwater Habitats of the United States (Cowardin et at., 1979, revised 1985). Vernal pools were delineated in the field in accordance with Identification and Documentation of Vernal Pools in New Hampshire, 2nd Edition, 2004 produced by the New Hampshire Fish and Game Department (NHFG) and USACE – New England District Vernal Pool Assessment Draft Guidance, dated September 10, 2013.

The limits of wetland boundaries were marked in the field using alpha-numerically coded pink flagging tape affixed to vegetation. Top-of-bank and/or centerline along subject streams, brooks, and rivers were marked in the field using alpha-numerically coded blue flagging affixed to vegetation. The top-of-bank of streams and surface waters were delineated in accordance with the definitions in NH Administrative Rule Env-Wt 101.07. For intermittent streams and smaller perennial streams, channel centerline was flagged. Vernal pools and potential vernal pools were marked in the field using alpha-numerically coded orange flagging tape affixed to vegetation. Each flag location was measured using a global positioning system (GPS) and the mapped data was verified by NH Certified Wetland Scientists.

Surface water resources within the Study Area were identified using NH GRANIT surface water data layers. These surface waters were field verified and delineated during the spring and summer of 2016. The NHDES Consolidated List of Waterbodies Subject to RSA 483-B, the Shoreland Water Quality Protection Act (SWQPA) was used to identify surface waters within the Study Area that are subject to the SWQPA.

Impacts to wetlands and surface waters were calculated using Esri's ArcMap program by overlaying the Project Footprint (limits of grading) onto the mapped wetlands, surface waters, and vernal pools and calculating the area of impact at each location.

4.8.2	Existing Conditions		
4.8.2.1	Surface Waters		
	Rivers and Streams		
	Principal rivers and streams loca Black Brook. Below is a discussio		
	Merrimack River		

4

The Merrimack River is the largest waterbody within the Study Area and is the second largest river in New England. In total, the Merrimack River is 117 miles long, beginning at the confluence of the Pemigewasset and Winnipesaukee Rivers in Franklin, NH and flowing south until emptying into the Atlantic Ocean in Newburyport, Massachusetts. The river generally bisects New Hampshire along a north-south axis.

The Merrimack River is the largest watershed in New Hampshire and the fourth largest watershed in New England. The Study Area is located within the upper half of the watershed.

ted within the Study Area include the Merrimack River and on of each of these bodies of water.

City of Manchester, Planning and Community Development Department. Zoning Ordinance, City of Manchester, NH. February 7, 2001, amended August 15, 2017: 7-5 - 7-12.

The river runs parallel to the easterly edge of the existing I-293 roadway from the southern limits of the Study Area north to the I-293 and I-93 interchange.

The segment of the Merrimack River located within the vicinity of the Study Area is classified as Riverine, Lower Perennial, Unconsolidated Bottom, Sand (R2UB2). The banks of the Merrimack River rise approximately 30 to 50 feet near the Amoskeag Mills within the southern portion of the Study Area. Further north, above the Amoskeag Dam, a rise of 10 to 20 feet is more common, with banks that are less steep.

The Amoskeag Dam is located near Exit 6 off I-293 on the east side of the river. The dam measures 750 feet long and 45 feet high and spans the river in the southern half of the Study Area; weir gates adjust depending on the flow and elevation of the river. Below the dam the river is free flowing with relatively swift currents for several miles.

Black Brook

Black Brook is a tributary of the Merrimack River that drains from the western portion of the Study Area, originating within Goffstown and Dunbarton. The brook is approximately 11.4 miles long, originating at Kimball Pond in Dunbarton and flowing southeast, winding through residential and commercial land uses in western Manchester before eventually flowing into the Merrimack River north of Exit 6.

Black Brook is classified as Riverine, Upper Perennial, Unconsolidated Bottom, Cobble-Gravel (R3UB1). The brook generally flows west to east, beginning as a channelized brook in the northwestern portion of the Study Area near the gravel pits along Dunbarton Road. Within the gravel pit area, Black Brook flows into a large emergent wetland, first ponding and then separating into braided channels through the wetland before channelizing downstream of the wetland near the Manchester Solid Waste Drop Off Facility. From here Black Brook continues along channelized flow until passing under I-293 and entering the Merrimack River. In addition to the large wetland complex that the brook passes through by the gravel pit area, several fringe wetlands run alongside the brook at varying intervals.

The Amoskeag Dam is located along the Merrimack River approximately 3,000 feet downstream from the mouth of Black Brook; therefore, there is an impounded back channel near where the brook enters the Merrimack River. The impounded back channel is classified as Riverine, Upper Perennial, Unconsolidated Bottom, Sand (R3UB2). I-293 crosses over Black Brook near the impounded back channel.⁴⁶

Ponds

Except for the impoundment of the Merrimack River, there are no ponds or lakes located within the Study Area. A portion of the Merrimack River is impounded behind the Amoskeag Dam, which also impounds portions of Black Brook.

NH Designated, and Wild and Scenic Rivers

The NH Rivers Management and Protection Program imposes additional regulations and review for any proposed activities within river segments that are designated within the Program as warranting additional protection due to their outstanding natural and cultural resources. The nearest designated river to the Study Area is the Piscataguog River, which is located approximately 0.5 mile south of the southern limits.

The National Wild and Scenic Rivers Protection Act, adopted by Congress in 1968 and administered by the National Park Service, also provides additional protections within designated rivers. However, there are no national wild and scenic rivers located within the Study Area.

4.8.2.2 Wetlands

Although much of the Study Area is urbanized, a wide variety of wetland types with various functions were delineated, including small wetlands in urbanized areas, fringe wetlands along riparian zones, large and diverse wetlands, and small forested pocket wetlands. (See Figure 4.8-1, Wetlands and Surface Water Resources Map.) Wetlands in the Study Area were separated into three main regions – the area south of Exit 6, the area north of Exit 7, and the area around Black Brook. Additionally, several wetlands along the project are associated with the Merrimack River floodplain. There are no Prime Wetlands as defined in RSA 482-A:15.

- corridor.
- forested portion of this area.

> South of Exit 6. The portion of the Study Area located south of Exit 6 along I-293 is highly developed to the west with gas stations, residential buildings, and historic mill buildings that have been converted into businesses or office space. To the east, the Merrimack River runs parallel to I-293 approximately 50-100 feet to the east of I-293 northbound. This portion of the Study Area contains disturbed wetlands of approximately 0.5 acre or less near developed commercial / residential areas or roadways. These wetlands are located between the Amoskeag Circle and the off-ramp to I-293 southbound just south of Exit 6. Some of these wetlands located within the Exit 6 interchange are non-jurisdictional isolated drainage areas that were previously constructed to convey, treat or control stormwater associated with the existing I-293

North of Exit 7. Appalachian oak-pine forest characterizes the portion of the Study Area north of Exit 7, with residential buildings along the eastern side of I-293 and undisturbed forestland to the west. The forested portion of this area is located south of Hackett Hill and includes an Eversource ROW that runs parallel to the western side of I-293. Several perennial or intermittent streams draining toward Milestone Brook run west to east throughout this portion of the Study Area, with several fringe wetlands scattered along these streams. Several vernal pools are also located within or near wetlands in the

The steep banks along Black Brook underneath the existing I-293 bridge were stabilized in the fall of 2017 under NHDES Wetlands Permit #2016-00166, prior to bridge replacement under the Proposed Action, to prevent further erosion and scour that was found to be present during recent bridge inspections. Stabilization work occurred along both the southern and northern banks of Black Brook underneath and immediately surrounding the existing bridge. The embankments were regraded to a 1:1 slope, and gabions were placed on the embankments and filled with stone to protect against future erosion.





Vernal Pool Impact Area



Stream Bank/Bed Impact Area

Vernal Pool Impact Area

Town/City Boundary

Conservation/Public Land

Top of Bank

Resources Map



Vernal Pool Impact Area



Figure 4.8-1 Sheet 5 of 12



Stream Bank/Bed Impact Area Town/City Boundary Vernal Pool Impact Area

Bridge

Wetland Impact Area

Conservation/Public Land Top of Bank

Wetland

City Park Land

Non-Jurisdictional Drainage Area ---- Ordinary High Water

Wetland and Surface Water **Resources Map**



Vernal Pool Impact Area

Figure 4.8-1 Sheet 7 of 12

Manchester, NH

I-293 Exits 6 and 7

Wetland and Surface Water Resources Map









Vernal Pool Impact Area

Figure 4.8-1 Sheet 10 of 12

Resources Map





Sheet 12 of 12 .6 --BLACKBL

Figure 4.8-1

New Hampshire

Manchester, NH

I-293 Exits 6 and 7

Wetland and Surface Water Resources Map

> **Black Brook Corridor**. Black Brook is a dominant landscape feature within the central to northwestern portion of the Study Area. The Black Brook corridor is mainly composed of residential and commercial land use, but also includes areas of previously used and/or actively used sand and gravel extraction pits to the north. A small portion of the Black Brook corridor is located along I-293 between Exit 6 and Exit 7 where the brook empties into the Merrimack River. Two small floodplain wetlands draining to Black Brook (BB-01 and BB-02) are located within this vicinity of the Study Area.

Wetlands were assigned codes MR, BB, or WR depending on hydrology. Additionally, all ditch lines were designated with the code DL, and all streams or rivers were designated with the code SA. All wetlands that drained toward the Merrimack River were coded with MR, and all wetlands with hydrology connected to Black Brook were coded with BB. Wetlands not directly connected to a large body of surface water were placed in a category of isolated wetlands with the code WR. A general description of each wetland group, as well as representative wetlands within each category, is provided below.

Merrimack River Wetlands (MR)

Several wetlands hydrologically connected to the Merrimack River were mapped along the northeastern portion of the Study Area. Intermittent streams flow through many of these wetlands and drain toward the Merrimack River. Other evidence of hydrology within these wetlands include water-stained leaves, saturation, drainage patterns, or sediment deposits. Some of these wetlands, such as MR-01A, MR-01B, and MR-01C, are located near residential or commercial areas and contain trash and debris or have been previously disturbed and have been impacted by invasive species such as glossy buckthorn (*Rhamnus frangula*), Japanese knotweed (Fallopia japonica), and American bittersweet (Celastrus scandens).

MR-02

Wetland MR-02 is located between I-293 and the Merrimack River near Exit 7. Adjacent to the wetland is a former radio station building and associated towers. MR-02 is broad and flat, receiving runoff from I-293 and water from culverts underneath I-293, which eventually drains to the Merrimack River. MR-02 is primarily classified as Palustrine Emergent (PEM), with lesser amounts of Palustrine Scrub-Shrub (PSS), Palustrine Forested (PFO), and Palustrine Unconsolidated Bottom (PUB) cover types. The primary vegetation within the PEM portion of the wetland are narrowleaf cattail. Within the PFO and PSS portions of the wetland, dominant vegetation includes cinnamon fern (Osmundastrum cinnamomeum), red maple (Acer rubrum), speckled alder (Alnus incana), and paper birch (Betula papyrifera). Evidence of hydrology include soil saturation, surface water, and water-stained leaves. Principal wetland functions of wetland MR-02 include floodflow alteration, sediment/toxicant retention, and nutrient removal.

MR-08

Wetland MR-08 is a narrow wetland that runs within the Eversource ROW south of Hackett Hill to the north of the Manchester Landfill. Wetland MR-08 is an approximately 4-acre wetland complex containing four vernal pools, VP-02, VP-03, VP-04, and VP-08. Wetland

MR-08 has no defined inlet, however the wetland is connected to vernal pool VP-01 to the north via an intermittent stream (SA-07A). The wetland is composed of a variety of cover types including PEM, PSS, and PFO.

Common vegetation within this wetland include glossy buckthorn, maleberry (Lyonia ligustrina), meadowsweet (Filipendula ulmaria), high bush blueberry (Vaccinium corymbosum), sphagnum (Sphagnum spp.), swamp dewberry (Rubus hispidus), leatherleaf (Chamaedaphne calyculata), various sedges, red maple saplings, cinnamon fern, royal fern (Osmunda regalis), and iris (Iris spp.). Evidence of hydrology include saturation, water-stained leaves, and surface water. Soils within MR-08 are organic within 0 to 0.2 inches, with 0 to 4 inches of coarse sandy loam and a matrix color of 10YR 2/1, and sandy redox at greater than 4 inches. Principal wetland functions of MR-08 include groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat.

Black Brook Wetlands (BB)

As previously described, the Black Brook wetland corridor contains previously disturbed fringe wetlands associated with the floodplain of the brook, as well as one dominant wetland BB-05 in the northwestern portion of the Study Area. There are also two small, disturbed wetlands adjacent to I-293 where Black Brook empties into the Merrimack River, BB-01 and BB-02. A portion of the Black Brook corridor between Front Street near Blodget Park and the northern portion of Greeley Street was not included in the Study Area.

BB-01 and BB-02

Due to their close proximity to Black Brook and the Merrimack River, wetlands BB-01 and BB-02 regulate overland flow from uplands and detain runoff from adjacent surface waters (Black Brook). For example, BB-02 is a PFO wetland located south of Black Brook, with steep slopes rising along the western side of the wetland, likely composed of fill for residential and commercial buildings located on top of the slope. Trash and debris were observed throughout the wetland at the time of delineation. Evidence of hydrology include saturated soils and surface water. Dominant plants within the wetland include mature tree species such as ash (Fraxinus spp.), American beech (Fagus grandifolia), black locust (Robinia pseudoacacia), and white pine (Pinus strobus) with a shrub layer of speckled alder, American bittersweet, Japanese honeysuckle (Lonicera japonica), staghorn sumac (Rhus typhina), and Japanese barberry (Berberis thunbergii). Dominant herbaceous species included sensitive fern (Onoclea sensibilis) and poison ivy (Toxicodendron radicans). Principal wetland functions of wetland BB-02 include floodflow alteration, sediment/toxicant retention, and nutrient removal.

Isolated Wetlands (WR)

Several wetlands not directly connected to surface water are scattered throughout the Study Area. There are three main types of wetlands within this group; man-made wetlands, disturbed wetlands, and forested wetlands. The principal functions of this wetland group

include sediment/toxicant retention and nutrient removal due to their isolated nature, and proximity to roadways and/or residential and commercial areas.

WR-02 and WR-03

Two man-made detention areas, WR-02 and WR-03, are located along the western side of I-293 within the Exit 6 Amoskeag Circle interchange. WR-02 and WR-03 contain no defined inlet or outlet and capture runoff from surrounding road surfaces. Since these are constructed detention areas that receive runoff from the interchange, they are non-jurisdictional drainage areas that have developed wetland characteristics. Evidence of hydrology within these wetlands include saturation and surface water. Cattails are the main vegetation growing within the wetlands, and NHDOT maintains the areas around the wetlands by mowing. Wetlands WR-02 and WR-03 are depicted as non-jurisdictional resources on Sheet 3 of Figure 4.8-1.

WR-04 and WR-05

Wetlands WR-04 and WR-05 are located within the segment of I-293 north of the proposed Exit 7 interchange. Wetland WR-04 is a PFO wetland that is fed by intermittent flow from a 12-inch concrete pipe under I-293. This wetland exhibits drainage patterns, water stained leaves, and some scour, but overall appears to be marginal. Dominant vegetation found in this soil includes red maple, high bush blueberry, and cinnamon fern. The wetland exhibits sandy soils with depletions within 3 to 16 inches.

Wetland WR-05 is a PSS wetland that extends into the adjacent Eversource ROW. This wetland drains into stream SA-11, which is a 2 to 3-foot wide stream with 0 to 6-inch bank height, moderate flow, and gravel/sand substrate.

4.8.2.3 Vernal Pools

Vernal pool habitat was identified and mapped within the Study Area in April and May of 2016. A total of eight vernal pools and three potential vernal pools were identified. Most vernal pools were mapped within the forested area south of Hackett Hill and within the Eversource ROW. A large vernal pool complex, consisting of four individual pools that are hydrologically connected within wetland MR-08, is located within 200 feet of I-293. Dominant amphibian species observed within vernal pools containing egg masses include spotted salamander (Ambystoma maculatum) and wood frog (Lithobates sylvaticus). Fairy shrimp were also common within vernal pools VP-02, VP-03, and VP-04. Some predator species, such as bullfrogs and green frogs, were observed in vernal pools VP-01, VP-05, and VP-06, however VP-01 still contained a large amount of amphibian egg masses.

In additional to these verified vernal pools, areas that appeared to provide vernal pool habitat, but lack amphibian egg masses, were identified as potential vernal pools. These potential vernal pools, designated as PVP-02 and PVP-03, may be found to support egg

Environmental Assessment

masses during subsequent field work.⁴⁷ Sheets 8 and 11 of Figure 4.8-1 for the location of each vernal pool and potential vernal pool.

4.8.3 Impacts

4.8.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged and there would be no permanent impacts to wetlands.

Proposed Action

The Proposed Action would result in permanent wetland and vernal pool impacts, as discussed further below. These include impacts within the bed and bank of rivers and streams. Overall, the preliminary estimate of total permanent jurisdictional wetland impacts resulting from the Proposed Action is approximately 143,176 square feet (3.3 acres),⁴⁸ of which a total of approximately 7,068 square feet (0.2 acres) are direct impacts to verified and potential vernal pools. Additionally, approximately 15,881 square feet (0.4 acres) of impact is proposed within perennial and intermittent streams. Impacts to each wetland, vernal pool, and stream is provided in Table 4.8-1.

Surface Waters

Merrimack River. The Proposed Action would impact a total of approximately 8,939 square feet (2,003 linear feet) of permanent impact within the banks of the Merrimack River (SA-01). These impacts would result primarily from widening the highway from two to three lanes in each direction within the Southern Mainline Segment. Impacts along the banks of the Merrimack River have been minimized to the maximum extent practicable during development of the Proposed Action. However, considerations such as impacts to historical properties, existing bridge infrastructure, and the geometric criteria for the highway⁴⁹ have been considered as well. The presence of the historic Cotton Duck Building on the west side of the highway in this segment and the West Bridge Street bridge abutments present two critical design controls on the geometry of the Proposed Action. Impacts in this area have been minimized by shifting the highway to the west to the extent possible without requiring demolition of the Cotton Duck Building. Impacts have also been minimized by the incorporation of steepened slopes and retaining walls along the river. These impacts would be limited to the banks of the river and would not extend into the bed.

Initial field work identified four such potential vernal pools. PVP-01 was subsequently determined to lack vernal pool characteristics, and PVP-04 was determined to be located outside of the Study Area.

⁴⁸ These totals do not include impacts to non-jurisdictional drainage ditches or detention areas (WR-02 and WR-03).

⁴⁹ The design speed for this segment has been reduced to 55 mph, but minimum curve geometry still applies.

Table 4 8-1 Estimated Wetland Vernal Pool and Stream Impact¹

14016 4.0-1	sie 4.0-1 Estimated Wettand, Vernai Pool, and Stream impact		Wetland Impacts	Vernal Pool Impacts	Permanent Stream Impact		Temporary Stream Impact		
Location	Wetland ID	Class Code	Impact Type	Permanent Impact (SF)	Permanent Impact (SF)	SF	LF	SF	LF
A	SA-01 ²	R2UB2	Stream Bank Impact Area			142	313		
В	SA-01 ²	R2UB2	Stream Bank Impact Area			6.076	966		
C	SA-01 ²	R2UB2	Stream Bank Impact Area			263	69		
D	SA-01 ²	R2UB2	Stream Bank Impact Area			10	10		
Е	SA-01 ²	R2UB2	Stream Bank Impact Area			0	6		
F	SA-01 ²	R2UB2	Stream Bank Impact Area			243	88		
G	WR-01	PSS	Wetland Impact	261					
Н	SA-02	R4SB3	Stream Bank/Bed Impact Area			503	167		
I	MR-01B	PFO	Wetland Impact	156					
J	MR-01C	PSS	Wetland Impact	14,804					
К	SA-03	R4SB3	Stream Bank/Bed Impact Area			895	298		
L	SA-01 ²	R2UB2	Stream Bank Impact Area			169	32		
М	BB-01	PEM, PSS	Wetland Impact	82,184					
N	SA-04	R4SB4	Stream Bank/Bed Impact Area			207	52		
0	BB-02	PFO	Wetland Impact	414					
Р	SA-05B ³	R3UB1	Stream Bank/Bed Impact Area					12,636	425
Q	SA-06	R4SB4	Stream Bank/Bed Impact Area			772	193		
R	MR-02	PSS	Wetland Impact	1,008					
S	SA-06	R4SB4	Stream Bank/Bed Impact Area			279	70		
Τ	MR-02	PEM, PSS	Wetland Impact	19,716					
U	SA-01 ²	R2UB2	Stream Bank Impact Area			2,036	520		
V	MR-08	PEM, PSS	Wetland Impact	12,596					
W	VP-08	PFO1G	Vernal Pool Impact		631				
Х	VP-08	PFO1G	Vernal Pool Impact		241				
Y	PVP-03	PFO1C	Potential Vernal Pool Impact		2,009				
Z	SA-07A	R4SB6	Stream Bank/Bed Impact Area			251	50		
AA	VP-01	PFO1C	Vernal Pool Impact		4,187				
AB	SA-07A	R4SB3	Stream Bank/Bed Impact Area			2,885	577		
AC	SA-07	R3UB2	Stream Bank/Bed Impact Area			98	39		
AD	SA-07	R3UB1	Stream Bank/Bed Impact Area			457	101		
AE	MR-04	PFO	Wetland Impact	1,832					
AF	WR-04	PFO	Wetland Impact	1,526					
AG	SA-08	R3UB2	Stream Bank/Bed Impact Area			272	61		
AH	MR-05	PFO	Wetland Impact	974					
Al	SA-09	R3UB1	Stream Bank/Bed Impact Area			186	93		
AJ	WR-05	PSS	Wetland Impact	639					
AK	SA-11	R3UB1	Stream Bank/Bed Impact Area			138	55		
TOTALS:				136,110 SF (3.1 acres)	7,068 SF (0.2 acres)	15,882 SF (0.4 acres)	3,760 LF	12,636 SF (0.3 acres)	425 LF

Notes:

The information provided above is based on field located wetland boundaries and conceptual design. All estimated impact areas are subject to change. Additional info about stream types based on NHDES vs. federal jurisdiction will be provided during the permitting phase of the project. 1 3

SA-01 indicates the Merrimack River 2

SA-05B indicates Black Brook

Additional bank impacts would result from the reconfiguration of Front Street resulting from construction of the intersection of the new Exit 7 Interchange East Connector road with Front Street. Like the impacts in the Southern Mainline Segment, these impacts have been minimized to the degree possible given the existing design constraints.

Black Brook. The Proposed Action would involve the replacement of the existing bridge crossing over Black Brook to accommodate the widening of I-293 and the reconfigured Exit 6 interchange, resulting in direct impacts to Black Brook. These impacts would result in approximately 12,636 square feet of total impacts within the bed and bank of Black Brook. This bridge replacement and the resulting impact is necessary to allow for the expansion of the highway from two to three lanes in each direction, the reconfiguration of the southbound off-ramp at Exit 6, and the construction of a sound wall on the east and west sides of the highway adjacent to the Black Brook Bridge.

Note that the existing bridge span does not comply with NHDES stream crossing rules and the associated guidelines developed by the University of New Hampshire.⁵⁰ These guidelines indicate that in order for a stream to maintain its geomorphic compatibility, a bridge structures should be constructed at 1.2 times the bankfull width (BFW) plus 2 feet.

Stream geomorphic assessments help determine the required BFW of the structure over a particular location on a stream, brook, or river. This assessment measures the BFW of the stream above the crossing and within the reference reach of the crossing (natural stream conditions without the influence of the crossing, impoundments, or other obstruction). A desktop stream geomorphic assessment for Black Brook was conducted, which indicated the estimated BFW of the upstream and reference reaches are as follows:

- > Upstream BFW Average: 31 feet; Recommended span width (1.2 times bankfull width plus 2 feet): 39.2 feet.
- > Reference BFW Average: 36 feet; Recommended span width (1.2 times bankfull width plus 2 feet): 45.2 feet.

Since the existing bankfull width of Black Brook is approximately 24 feet at the Black Brook Bridge, the existing bridge structure does not meet the standards in the NH Stream Crossing Guidelines. The new bridge structure would be designed based on a full geomorphic assessment that would confirm the exact bankfull width of this reach of the brook. Since the new bridge structure would be replaced, the existing fill associated with the I-293 roadway and slopes would be removed and the span lengthened, which would have the effect of improving the geomorphic compatibility of this crossing. This would benefit Black Brook by allowing for more natural conditions as the brook flows under I-293. The removal of fill would also create additional stream bed and bank habitat.

Wetlands

MR Wetlands. A palustrine forested wetland (MR-01B) is located to the west of Eddy Road and just south of the Exit 6 interchange. Minimal fill impacts associated with proposed slope grading along Eddy Road would occur along the southeastern edge of wetland MR-01B. Minimal edge impacts are not expected to negatively affect the existing functions or values of this wetland.

A palustrine scrub-shrub wetland (MR-01C) and its associated intermittent stream (SA-03) would be filled as part of the Proposed Action within the southern portion of the Exit 6 interchange. A stormwater BMP is proposed to be constructed in the vicinity of the wetland to mitigate for the loss of functions that the wetland currently provides, specifically treating stormwater runoff prior to entering the Merrimack River. Additionally, the hydrologic connection of SA-03 which conveys water under Eddy Road to a culvert underneath I-293 would be maintained.

A large palustrine emergent/scrub-shrub/forested/unconsolidated bottom wetland complex (MR-02) is located east of I-293 in the vicinity of Front Street. As previously mentioned, this wetland is located near existing radio towers and discharges into the Merrimack River. The Proposed Action minimizes impacts to this large wetland complex to the extent practicable; complete avoidance of this wetland is not possible due to the constraints posed by the Manchester Landfill located on the west side of this portion of the project corridor.

Fill impacts would result from slope grading to establish a sound wall within the vicinity of Black Brook. Additionally, a segment of stream SA-06 draining into the southern end of wetland MR-02 would be filled as part of the proposed grading. The hydrological connection of this stream would be maintained upon completion of the project through the installation of a culvert or redirecting the stream. Therefore, proposed impacts to the stream and wetland are minor and are not expected to eliminate the current functions of the wetland.

Permanent impacts to the northern end of wetland MR-08 and an associated vernal pool (VP-08) would result from the construction of the Exit 7 Interchange West Connector near the relocated Exit 7 interchange. Proposed impacts would result from crossing the wetland/vernal pool complex which partially exists within the Eversource ROW. The Proposed Action is being designed to minimize impacts to wetland MR-08 to the maximum extent practicable by crossing the wetland at the narrowest point. The current location of the proposed crossing also avoids impacting multiple large vernal pools to the northeast, and confines impacts to the northern edge of vernal pool VP-08. Wetland MR-08 is hydrologically connected to an intermittent stream (SA-07A) located to the north of the proposed interchange which would be impacted by the proposed Project. This intermittent stream would likely be re-routed along the proposed toe-of-slope to maintain the hydrological connection between MR-07 and MR-08.

Several small wetlands and intermittent stream channels associated with drainage systems crossing under the existing I-293 ROW would be impacted by the proposed Project north of the Exit 7 interchange due to widening I-293 within this area. These wetlands include MR-04 and associated intermittent stream SA-07, and MR-05 and associated intermittent stream SA-08. Most of these impacts would result from slope grading along the widened I-293

University of New Hampshire. 2009. New Hampshire Stream Crossing Guidelines. Accessed from https://streamcontinuity.org/pdf_files/nh_stream_crossing_guidelines_unh_web_rev_2.pdf. Accessed on May 31, 2016.

highway. The hydrological connections among these wetlands and their associated streams that currently exist underneath I-293 would be maintained through culvert extensions. Additionally, a new stormwater BMP would be constructed along the eastern side of I-293 within the vicinity of these streams and wetlands to mitigate for the loss of hydrological capacity resulting from the proposed grading impacts.

BB Wetlands. Two wetlands directly associated with Black Brook would be impacted by the Proposed Action. A palustrine emergent/scrub-shrub wetland (BB-01), located directly north of Exit 6 and west of the existing I-293 southbound lanes, would be largely filled from the construction of the proposed SB off-ramp for Exit 6 near Black Brook and the construction of a sound wall. Only a portion of the western half of this wetland would remain undisturbed upon completion of the proposed Project. Impacts to wetland BB-01 would be partially compensated by widening the hydraulic opening of the Black Brook Bridge. This additional width would allow for more natural conditions as the brook flows under I-293 by eliminating the existing channel constraints, as well as widening the floodplain of the brook within this area.

Wetland BB-02, a palustrine forested wetland located to the east of I-293 along the impounded segment of the Merrimack River where Black Brook enters the river would remain mostly intact with only a small portion of the wetland's eastern edge to be impacted from I-293 slope grading. In addition, stream SA-04 which drains from a culvert under I-293 into wetland BB-02 would be eliminated due to the installation of a stormwater BMP. The stormwater BMP is proposed to be installed adjacent to BB-02 to the south, which may help to mitigate for any loss of hydrologic storage capacity within wetland BB-02 resulting from the adjacent slope grading.

No permanent impacts are anticipated to occur within the bed or bank of Black Brook (SA-05B) as a result of the proposed Project. See below for a discussion of temporary impacts proposed within Black Brook.

WR Wetlands. A number of existing roadside palustrine scrub-shrub and palustrine emergent wetlands abutting I-293 would be impacted by the Proposed Action. One of these wetlands is a palustrine scrub-shrub wetland located south of the Exit 6 interchange (WR-01). Most of this wetland would remain undisturbed as part of the Proposed Action, with impact confined to a small portion of the wetland's northern edge.

Stream SA-02 is located immediately north of wetland WR-01 and is proposed to be completely eliminated as part of the Proposed Action due to the reconfiguration of the Exit 6 interchange. The Proposed Action would maintain the hydrological connection of this stream via a culvert or would redirect the flow of water from this stream to a stormwater BMP prior to entering the Merrimack River.

Additionally, two wetlands located along I-293 within the northern portion of the Project Footprint would be filled as a result of highway widening and slope grading work. These wetlands include a palustrine scrub-shrub wetland (WR-05) and its associated stream channel (SA-11 and SA-09), and a palustrine forested wetland (WR-04). A stormwater BMP would be constructed within the vicinity of these wetlands to compensate for the loss of functions these wetlands provide.

Non-Jurisdictional Wetlands and Drainage Areas

The Proposed Action would include filling two non-jurisdictional drainage areas classified as palustrine emergent (WR-02 and WR-03). These isolated drainage areas are approximately **0.4 acres** in combined size and are currently located within the Amoskeag Circle of the Exit 6 interchange. These drainage areas are previously constructed drainage features (detention areas) intended to convey, treat or control stormwater associated with the existing I-293 corridor. Based on their man-made origin, they are not included in the total estimation of wetland impacts. Replacing these drainage areas in the same location with new stormwater BMPs would not be possible due to the reconfiguration of the interchange, however the loss of these areas would be compensated through the construction of stormwater BMPs in other locations around the reconfigured interchange.

Several non-jurisdictional drainage ditches located within the Project Footprint would be impacted by the Proposed Action. Drainage ditch DL-01 is located along the edge of the Project Footprint and may be impacted slightly from the proposed work, however the function of this ditch will be maintained during and after construction. Drainage ditches DL-02 and DL-03 are located north of the relocated Exit 7 interchange and east of I-293. The ditches were previously constructed to convey, treat or control stormwater associated with the existing I-293 corridor. Since the ditches are man-made, impacts to the ditches are not included in the total wetland impacts. A total of approximately **0.04 acres** of impact would occur to these drainage ditches.

Protected Shoreland

The Proposed Action would require grading and tree clearing within the Protected Shoreland; both the Merrimack River and Black Brook are subject to RSA 483-B. Portions of the western bank of the Merrimack River south of the Exit 6 interchange are currently exempted from Shoreland Protection rules per RSA 483-B:12 because it is located within a designated urbanized exemption. Proposed impacts within the Protected Shoreland of the Merrimack River and Black Brook located outside of the urbanized exemption area would require a Shoreland Permit in accordance with RSA 483-B. The Shoreland Permit would account for increased pavement areas within the 250-foot Protected Shoreland Buffer, total ground disturbance within the 250-foot Protected Shoreland Buffer, and tree clearing activities within the 50-foot Waterfront Buffer and 150-foot Natural Woodland Buffer.

Vernal Pools

The Proposed Action was designed to avoid vernal pool impacts to the maximum extent practicable. The Proposed Action avoids directly impacting the largest and most significant vernal pool complex, consisting of VP-02, VP-03, and VP-04 and located within wetland MR-08, located northwest of the relocated Exit 7 interchange.

Vernal pool impacts, anticipated to total approximately 7,068 square feet (0.2 acres), would result from the construction of the Exit 7 Interchange West Connector at the relocated Exit 7. Constructing the Exit 7 Interchange West Connector would require filling a small vernal pool identified as VP-01 and a second potential vernal pool identified as PVP-03. Minor

permanent edge impacts would also occur along vernal pool VP-08 due to slope and grading impacts along the southern edge of the Exit 7 Interchange West Connector.

Additional permanent, secondary impacts to vernal pools may occur from tree removal, slope impacts, and construction of the new Exit 7 Interchange West Connector within the Vernal Pool Envelope (0 to 100-foot buffer) and the Critical Terrestrial Habitat (100 to 750-foot buffer)⁵¹ of several delineated vernal pools and potential vernal pools, including VP-02, VP-03, VP-04, and VP-08. Tree clearing within the Vernal Pool Envelope can permit additional sunlight to reach the pool surface, warming or even drying out the pool faster and changing its hydroperiod, which is an important determinant of vernal pool viability and function.

4.8.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build alternative, the existing configuration of I-293 would remain unchanged and there would be no temporary impacts to wetlands.

Proposed Action

The Proposed Action would result in some temporary impacts to wetlands and vernal pools. Temporary wetland and stream impacts would occur within Black Brook during the proposed bridge replacement work (described further below). Additionally, temporary indirect impacts may occur to vernal pool VP-02 since construction work would be located close to this resource.

Protected Shoreland

Under the Proposed Action, temporary impacts within the 250 ft Protected Shoreland Buffer may occur due to temporary construction equipment staging or temporary stockpiling of materials within uplands during construction activities. All areas temporarily used for construction equipment or materials would be returned to existing conditions once the Project is complete. No additional temporary impacts are anticipated to occur as part of the Proposed Action.

Vernal Pool – VP-02

The I-293 southbound off-ramp leading to the new Exit 7 Interchange East-West Connector is proposed to be constructed adjacent to vernal pool VP-02, which is part of the larger vernal pool complex consisting of VP-02, VP-03 and VP-04. Currently, the Project Footprint runs directly adjacent to VP-02, however direct impacts to the pool are not proposed. During construction, the water quality of VP-02 would be protected through the use of erosion control barriers or other BMPs. Erosion control barriers would be placed outside of the

delineated vernal pool, therefore no direct temporary impacts are anticipated to occur within VP-02. However, such barriers have the potential to temporarily impact amphibian movement around the pool. Tree clearing adjacent to VP-02 will be limited to the Project Footprint (limit of the proposed slope) and will not extend into the delineated vernal pool.

Construction Impacts

All temporary access and laydown areas during construction of the Proposed Action would be located within upland areas or within the NHDOT roadway and therefore would not result in temporarily impact to wetlands or vernal pools. Standard BMPs would be used throughout the duration of construction to protect the water quality of wetlands, vernal pools, and surface waters.

Under the Proposed Action, temporary water diversion methods would be used during bridge replacement work along Black Brook (SA-05B). Additionally, water diversion methods would likely also be used at other perennial stream crossings (refer to **Table 4.8-1**) during the proposed construction work within and around these streams. Water diversion methods may include cofferdams and would be implemented during low-flow conditions.

4.8.4 Mitigation

Mitigation for the wetland impacts will be determined in accordance with the NHDES Wetlands Bureau Administrative Rules, Env-Wt 801.03 and the USACE policies as outlined in New England District Compensatory Mitigation Guidance (September 7, 2016).⁵² Mitigation for direct and secondary vernal pool impacts would follow the USACE mitigation guidance, including impacts to the Vernal Pool Envelope and Critical Terrestrial Habitat. Mitigation for impacts within the Protected Shoreland beyond the NHDOT ROW, if any, would also be considered; the proposed impacts would be mitigated in such a way to ensure that the Proposed Action does not make the affected landowner non-compliant with the Shoreland Water Quality Protection Act (RSA 483-B), particularly regarding tree clearing activities.

On-site mitigation was considered as part of the proposed project. While stormwater detention basins and vegetated swales would be constructed as part of the Proposed Action, these activities would not be considered adequate on-site mitigation for the proposed wetland impacts, though they would provide replacement of functions and values, such as sediment/toxicant retention and nutrient removal. No additional land is available within the NHDOT ROW to serve as mitigation.

The City of Manchester and the Piscataquog Land Conservancy were contacted to identify potential mitigation. The City of Manchester identified City-owned parcels along Cohas Brook and McQuesten Brook that may be available for mitigation.⁵³ However, upon review, these parcels were determined to not be suitable. The Piscataguog Land Conservancy's efforts are focused on areas within the headwaters of Black Brook, which are located in

⁵² The USACE is currently developing a 2019 version of the New England District Compensatory Mitigation Guidance (September 7, 2019).

The terms "Vernal Pool Envelope" and "Critical Terrestrial Habitat" are defined in the USACE's New England District Compensatory Mitigation Guidance (September 7, 2016).

However, the 2019 version is still in draft form and is not effective at the time of this EA.

⁵³ Jeff Belanger, City of Manchester, personal communication, May 14, 2019.

communities other than Manchester, and were determined to lack relevant connections to the impacted wetlands.

Following the guidance of the NHDES Wetlands Bureau and USACE rules, and because no suitable local mitigation projects were identified within the City of Manchester, NHDOT anticipates an in-lieu fee payment to the NH Aquatic Resource Mitigation fund, as specified in RSA 482-A:30, for mitigation for both direct wetlands impacts and direct and secondary vernal pool impacts.

Further details regarding the proposed wetland mitigation and payment amount would be determined when NHDES wetlands permitting for the Proposed Action is initiated.

In addition to the proposed mitigation, the following BMPs would be utilized to limit the potential for indirect impacts to surface waters and wetlands:

- Appropriate pollution preventative measures and BMPs as outlined within the New Hampshire Stormwater Manual Vol. 3 – Erosion Control and Sediment Controls During Construction (December 2008), available on-line at NHDES's website, shall be employed to protect the water quality of wetlands, surface waters, and vernal pools located within and adjacent to the Project.
- Upon completion of the proposed work, all disturbed and graded areas located upslope of the erosion control measures would be seeded and mulched as needed. Disturbed areas that have been seeded and mulched would be considered stable once 85 percent vegetative growth has been achieved.
- > Stormwater BMPs in the form of detention basins, gravel wetlands, or other similar means, would be installed or extended along I-293 and the Exit 7 Interchange East-West Connector to treat stormwater runoff as mitigation for the increase of pavement within the Project as well as for the loss of sediment/toxicant retention and nutrient removal functions of the wetlands as a result of the Project. Further discussion of these stormwater BMPs is provided in Section 4.6.
- > A full stream geomorphic assessment would be completed along Black Brook prior to the final design of the bridge structure that would carry I-293 over the brook to confirm compliance with the NHDES Stream Rules.

4.9 Wildlife and Habitat

Wildlife habitat in New Hampshire is highly valuable to sustaining native large and small mammals, as well as invertebrate, avian, and aquatic species. Each species requires a unique habitat type or set of habitat types to be sustained, reproduce, and survive. Additionally, habitat size requirements are different for each species, since some species require large tracts of undisturbed land to thrive, while others can survive in more built, urbanized environments.

The NHFG is responsible for managing and protecting native wildlife species within New Hampshire, as authorized in RSA 212-A. These rules largely pertain to the protection of threatened and endangered species. However, RSA 212-A:5 authorizes the NHFG to gather information about wildlife species and determine types of conservation needs each species has to be sustained. To help accomplish this mission, the NHFG developed the New Hampshire Wildlife Action Plan (WAP) to assist with conserving and protecting wildlife species and habitat types throughout the State.

The US Fish and Wildlife Service (USFWS) is responsible for the protection and management of migratory species. Federal protection of wildlife on private property is confined to regulations regarding the exploitation of species and is not extended to wildlife habitat, except for the designation of critical habitat for threatened and endangered species under the Endangered Species Act of 1973 (ESA). Both wildlife species and wildlife habitats are generally protected on Federal lands, including National Wildlife Refuges, National Parks and Monuments, and National Forests, none of which are present in the Project's Study Area.

4.9.1 Methodology

The WAP emphasizes the conservation of Species of Greatest Conservation Need and the habitats these species use. The condition of wildlife habitat resources within the Study Area was evaluated based on maps created from the 2015 WAP habitat type locations and habitat tier information. Habitat type locations were field verified during field work conducted within the Study Area in the spring of 2016. The Project Footprint was then overlaid on the habitat type and habitat tier data using GIS to determine impacts. Further description of WAP habitat types and habitat tiers are provided below.

4.9.2 Existing Conditions

The southern portion of the Proposed Action is an urbanized area of dense development, which generally does not support substantial wildlife populations or contain valuable wildlife habitat. However, the Merrimack River, Black Brook, and undeveloped land within the northern portion of the Study Area associated with the southern edge of Hackett Hill and the Manchester Cedar Swamp Preserve are recognized wildlife corridors at both the state and regional levels.

4.9.2.1 Wildlife Habitat Types

Wildlife habitat land cover types were developed by the NHFG using available natural resource data. The compiled Wildlife Habitat Land Cover data predicts wildlife habitat types throughout the State to be used as a conservation tool to maintain critical wildlife habitats.⁵⁴ A brief description of the dominant habitat types found within the vicinity of the Project is included below.55

> Appalachian Oak-Pine. Forests designated as Appalachian oak-pine forests contain plant species characteristic of the central Appalachian states. Common plant species found within Appalachian oak-pine forests include white oak, black oak, scarlet oak, chestnut oak, hickories, sassafras, pitch pine, and mountain laurel. Notable wildlife species

⁵⁴ New Hampshire Fish and Game Department. 2015. *NH Wildlife Habitat Land Cover Maps*.

⁵⁵ New Hampshire Fish and Game Department. 2015. New Hampshire Wildlife Action Plan Appendix B: Habitat Profiles.

commonly found within this habitat include the whip-poor-will, silver-haired bat, and ruffed grouse.

- Grassland. Typical grassland habitats in New Hampshire are hayfields, pastures, fallow fields, wet meadows, and landfills. Large tracts of land provide breeding and nesting grounds vital to many bird species. Notable wildlife species found in grasslands are wood turtles, butterflies, state-listed endangered eastern hognose snake and northern harrier, upland sandpiper, and the state threatened grasshopper sparrow.
- Hemlock-Hardwood-Pine. This common habitat type is considered a transitional forest community between hardwood conifer forests in higher elevations and oak-pine forests in lower elevations. This habitat type is typically composed of dry, sandy soils with dominant tree species of red oak and white pine, often transitioning to a dominance of hemlock and beech. Common herb species include starflower, wild sarsaparilla, and Canada mayflower. Notable wildlife species found within this habitat include cerulean warbler, eastern pipistrelle, bobcat, goshawk, and black bear.
- Rocky Ridge. In southern New Hampshire, rocky ridge or talus slope habitats are areas of loose rock or outcrops on ridge tops with shallow soils and exposed bedrock. The associated forest often has a thin forest canopy. Common tree species found within these habitats include red spruce and American mountain ash, and common forest communities within these habitats are hemlock-hardwood-pine forests or oak-pine forests. Notable wildlife species found within this habitat are bobcat, state-listed endangered timber rattlesnake, eastern small-footed bats, and state-listed threatened peregrine falcon.
- **Temperate Swamp.** Temperate minerotrophic swamps are forested swamps with mineral soils that are less acidic than peat swamps, with saturated and organic soils. These swamps are typically isolated, with hydrology coming from groundwater seepage or seasonally-flooded swamps. Typical plant species found within temperate swamps include red maple, high bush blueberry, and winterberry. Black gum is common in temperate swamps found in southern New Hampshire, and Atlantic white cedar is common along coastal areas.
- Wet Meadow/Shrub Wetland. These wetlands are emergent marshes, wet meadows, or scrub-shrub wetlands and are mostly controlled by groundwater. These habitats have poorly-drained muck and mineral soils that are often saturated, but rarely permanently flooded. The main functions of these wetlands are to filter pollutants and to hold water which reduces flooding. Notable wildlife species found within this habitat are red-winged blackbirds, beavers, painted turtles, state-listed endangered Blanding's turtles, New England cottontails, northern harriers, ringed boghaunters, sedge wrens, state-listed threatened spotted turtles and pied billed grebes.

Field verification of the habitat types within the Study Area was conducted in the spring of 2016. The majority of habitat types are composed of Appalachian oak-pine habitat, rather than that of hemlock-hardwood-pine as mapped on the NHFG Wildlife Action Plan Habitat maps. These Appalachian oak-pine habitats include a small area south of the Manchester Landfill, a small area southeast of the intersection of Dunbarton Road and Front Street, and a large area north of the Manchester Landfill within the vicinity of Hackett Hill. Additionally,

areas initially identified as temperate swamp and grassland along I-293 within the northern portion of the Study Area are wet meadow and Appalachian oak-pine, respectively. The revised locations of Wildlife Action Plan Habitats are provided in Figure 4.9-1.

The large Appalachian oak-pine habitat within the northwestern portion of the Study Area to the south of Hackett Hill is mainly composed of mature oaks, maples, pine, and other hardwoods. This Hackett Hill habitat area is considered a wildlife corridor due to its connection to the Manchester Cedar Swamp Preserve and the urbanized land uses to the south, east, and west of the habitat. The landscape within this habitat slopes gently to the south, with little vegetation in the understory. An Eversource ROW extends along the southern and eastern portions of this habitat area, which adds to habitat diversity by providing scrub-shrub habitat. Evidence of wildlife use within this habitat was observed during field verification, including deer scat and vernal pool activity. Wetland, vernal pool, and stream habitat also occur within this area, with wet meadow/shrub wetland habitat types interspersed near the I-293 corridor.

4.9.2.2 Wildlife Habitat Tiers

In addition to habitat types, the NHFG has identified ranked habitat tiers within NH. This ranking system identifies terrestrial and wetland habitats within the State that are in the best condition to meet the needs of wildlife. These ranked habitats are especially considered important for species of greatest conservation need.

Habitat tiers are separated into three tier rankings, which are 1) Top Ranked Habitat in the State, 2) Top Ranked Habitat in Biological Region, and 3) Supporting Landscape. The first tier, Top Ranked Habitat in the State, include the top 15 percent habitat areas, which include known critical habitats of state-listed species and all known alpine, dune, saltmarsh, and rocky shore habitats. The State was then divided into regions to designate the top 30 percent of each habitat type within each region, thus creating the second tier, Top Ranked Habitat in Biological Region. This tier provides each region of the State with a more balanced approach at identifying important habitat areas. The remaining top 50 percent habitat areas are designated to the Supporting Landscape tiers, as well as large continuous tracts of forestland.

Small tracts of land along the bank of the Merrimack River are designated as either Tier 1, Top Ranked Habitat in the State or Tier 2, Top Ranked Habitat in Biological Region. These habitat areas, however, are largely developed or have been previously disturbed. Although these habitat areas are located in a highly urbanized area, there are several rare, threatened, or endangered species that have been sighted within the Merrimack River corridor, including the bald eagle (Haliaeetus leucocephalus) and peregrine falcon (Falco peregrinus anatum), which utilizes habitat along the Merrimack River. A discussion of the rare, threatened, or endangered species identified within the vicinity of the Project is provided in **Section 4.11**, Threatened and Endangered Species.



Hemlock-hardwood-pine

Wet meadow/shrub wetland

Figure 4.9-1

The Manchester Landfill is designated by the NH WAP as Tier 1, Top Ranked Habitat in the State since it provides a large tract of grassland for bird habitat and other species.

The Manchester Cedar Swamp Preserve is the largest tract of wildlife habitat in the region and is identified in Figure 4.9-2 as containing all three habitat tiers. The Project Footprint overlaps with the Supporting Landscape of this habitat area. This extensive habitat is largely owned by the Nature Conservancy, whose property is located just outside of the Study Area. The conserved property contains the only Atlantic white cedar – giant rhododendron swamp occurring in New Hampshire, as well as several rare, threatened, and endangered species including the skillet clubtail (Gomphus venricosus).

4.9.3 Impacts

4.9.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, land use around the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no permanent impacts to wildlife habitat.

Proposed Action

The Proposed Action would be constructed primarily in developed and previously disturbed areas where important wildlife habitat is lacking; therefore, the Project would have only minor impacts on wildlife overall.

However, the proposed Exit 7 Interchange West Connector from I-293 to Dunbarton Road would bisect the southern portion of the Appalachian-oak-pine forest associated with the Hackett Hill habitat block. This connector road would reduce forest habitat adjacent to Hackett Hill and would cause some habitat fragmentation. The Exit 7 Interchange West Connector would also impact the Vernal Pool Envelope and Critical Terrestrial Habitat of certain vernal pools and potential vernal pools located adjacent to the proposed connector road (refer to Section 4.8.3.1 for additional information).

Although there would be no direct impacts to the grassland habitat associated with the Manchester Landfill, the Proposed Action would remove some of the buffer between the Landfill and the I-293 corridor.

No habitat types were identified by the WAP along the Merrimack River and Black Brook; however, portions of these areas are identified as Tier 1 or Tier 2 habitats. Most of these Tier 1 and 2 habitats are located within highly developed areas that provide little undisturbed habitat, however occurrences of threatened and endangered species have been recorded in this area. Impacts to rare, threatened, and endangered species are further evaluated in Section 4.11, Threatened and Endangered Species.

4.9.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, land use around the existing configuration of I-293 with Exits 6 and 7 would remain unchanged. Therefore, there would be no temporary impacts to wildlife habitats other than routine maintenance activities that occur along roadways and highways.

Proposed Action

Under the Proposed Action, temporary impacts to wildlife habitat, including habitat used by wildlife adjacent to the Merrimack River and Black Brook, are primarily related to temporary air quality and noise disturbance related to construction activities. Construction would take place in three phases, with each phase predicted to take approximately 2-3 years to complete. A discussion of potential noise impacts on wildlife is provided in **Section 4.11**, Threatened and Endangered Species.

4.9.4 Mitigation

Because wildlife impacts are considered minor, no specific mitigation is proposed. However, the following list of environmental commitments is intended to minimize potential impacts to wildlife.

- by the NHFG.
- wetlands, and vernal pools used by wildlife.
- wildlife habitat.

4.10 Fisheries

In the northeast, managed fish species predominantly include species which spend their entire life cycle in marine or estuarine environments. However, Atlantic salmon (Salmo salar) is an anadromous species, meaning that a part of its life cycle is spent in salt water habitat, and the other part is spent in freshwater rivers and streams. In New Hampshire, the Merrimack River, the Connecticut River, and the Lamprey River and their tributaries are known to support populations of Atlantic salmon. These rivers and their tributaries are considered Essential Fish Habitat (EFH). Since Black Brook is a tributary of the Merrimack River it is also considered EFH habitat, however the brook mainly supports freshwater fish populations, as discussed further below.

> Erosion and sediment control BMPs composed of wildlife friendly materials such as woven organic material would be used during the construction period, as recommended

> A stormwater treatment system would be implemented as part of the Proposed Action to mitigate any impacts the Project would have on the water quality of surface water,

> Tree clearing and ground disturbing impacts would be reduced to the extent practicable during the design and construction phases of the Project to limit unnecessary impacts on



Tier 1 - Top Ranked Habitat in the State

Tier 2 - Top Ranked Habitat in Biological Region

Tier 3 - Supporting Landscape

Building

own/City Boundary

Bridge

Surface Water

Stream

Figure 4.9-2 **Manchester Cedar Swamp Preserve** Milestone Brook AVETT Hooksett **3**A EXIT I CORALAY



I-293 Exits 6 and 7

NHFG Wildlife Action Plan Habitat Tiers

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) established a requirement to describe and identify EFH in each federal fishery management plan. The Magnuson-Stevens Act defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." (Public Law 94-265, May 2007) The Magnuson-Stevens Act can be found in federal regulations under Wildlife and Fisheries (50 CFR 600.920). Under these regulations (Subpart K), FHWA is required to notify the National Oceanic and Atmospheric Administration (NOAA) of the Proposed Action.

4.10.1 Methodology

The NHDES Biomonitoring Program and the NHFG collects fisheries data from surface waters within New Hampshire. To determine which fish species were present within the Study Area, the NHDES and NHFG were contacted regarding fisheries data for Black Brook, Milestone Brook, and the Merrimack River. Both agencies provided fisheries data for Black Brook, and the NHFG provided fisheries data for the Merrimack River (refer to Appendix E). The data provided by NHDES for Black Brook included individual count data collected in the years 2000 and 2016.56

Neither agency monitor fish populations in Milestone Brook.

Upon receipt of fisheries data from the NHDES and NHFG and correspondence with NOAA-National Marine Fisheries Service (NOAA – NMFS), it was determined that consultation with NOAA was required for the Proposed Action since the Merrimack River is considered EFH for Atlantic salmon. Consultation with NOAA – NMFS was initiated through the completion of the EFH Assessment Worksheet (refer to Appendix F). This worksheet assesses potential impact to EFH habitat that may occur from the Proposed Action by assessing impacts to the habitat's benthic community, presence or absence of certain community types, change in flow or sedimentation rates, or anticipated impacts to water quality or noise levels, among other factors.

4.10.2 Existing Conditions

For Black Brook, data collected by NHDES and NHFG was similar; however, NHDES also recorded creek chub, silvery minnow and American eel. In addition, two New Hampshire species of concern, the American eel and redfin pickerel, are known to occur within Black Brook. Both American eel and Atlantic salmon are New Hampshire species of concern that are known to occur within the Merrimack River. The information provided by NHDES and NHFG is summarized in **Table 4.10-1**.

Table 4.10-1 Agency Fisheries Data for Black Brook and the Merrimack River¹

Black Brook	Black Brook and Merrimack River	Merrimack River
Blacknose Dace (<i>Rhinichthys</i> <i>atratulus</i>)	American Eel (Anguilla rostrata) ²	Atlantic Salmon (<i>Salmo salar</i>) ³
Longnose Dace (<i>Rhinichthys</i> cataractae)	Bluegill (Lepomis macrochirus)	Alewife (Alosa pseudoharengus)
Creek Chub (Semotilus atromaculatus)	Brown Bullhead (Ameiurus nebulosus)	Rock Bass (Ambloplites rupestris)
Common Shiner (Luxilus cornutus)	Common Sunfish/Pumpkinseed (<i>Lepomis gibbosus</i>)	Yellow perch (Perca flavescens)
Redfin Pickerel (Esox americanus) ²	Chain Pickerel (<i>Esox niger</i>)	
Fallfish (Semotilus corporalis)	Golden Shiner (<i>Notemigonus</i> crysoleucas)	
Margined Madtom (Noturus insignis)	Largemouth Bass (<i>Micropterus</i> salmoides)	
Sea Lamprey (Petromyzon marinus)	Smallmouth Bass (<i>Micropterus dolomieu</i>)	
Spottail Shiner (Notropis hudsonius)	Redbreasted Sunfish (Lepomis auritus)	
Silvery Minnow (Hybognathus regius)	Tessellated Darter (<i>Etheostoma</i> olmstedi)	
	Yellow Bullhead (Ameiurus natalis)	
	Common White Sucker (<i>Catostomus commersoni</i>)	

Notes:

1 Data from NHDES and NHFG. September 2018.

2 NH state species of concern

EFH designated species. 3

4.10.3 Impacts

4.10.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 and Exits 6 and 7 would remain unaltered; therefore, no changes would occur to existing fish habitat.

Proposed Action

The Proposed Action avoids direct impacts to the bed of the Merrimack River, which limits the potential for fisheries impacts. The Proposed Action would not directly impact aquatic vegetation, hard bottom channels, salt marshes, mudflats, or Habitat Areas of Particular Concern. It would not change water flow or currents of in Black Brook or the Merrimack River, nor would it change water depth or increase turbidity. Some riparian buffer between

Both agencies were contacted in September 2018 for updated fisheries data; however, there was no change in the fisheries data since 2016
I-293 and the Merrimack River would be removed, but this indirect effect would have only minor impacts on the river and would not likely impact the fishery resource.

No permanent impacts are proposed to occur within Milestone Brook, since the brook is located approximately 800 feet north of the northern limits of the Proposed Action.

As part of the Proposed Action, the Black Brook Bridge would be replaced. This construction would temporarily impact the bed and bank of Black Brook. The improved crossing over Black Brook is required to accommodate the widening of I-293. However, the proposed conceptual plan for the new bridge would increase its span. This conceptual design complies with the NH Stream Crossing Guidelines⁵⁷ and would improve the geomorphic compatibility of the crossing, would improve wildlife passage conditions, and has the potential to increase in-stream habitat. These improvements to the Black Brook Bridge would have a net benefit on fish habitat.

Indirect permanent impacts from changes to the water quality of Black Brook and the Merrimack River would be managed through a stormwater detention and treatment system. For further information regarding the planned stormwater management system refer to Section 4.6.

Under the Proposed Action, no direct permanent impacts to EFH habitat would occur, since no work is proposed within the bed of the Merrimack River. Permanent impacts would be limited to sections of the bank of the Merrimack River from grading and slope shaping along I-293 and Front Street. As stated above, consultation with NOAA – NMFS regarding EFH habitat was conducted. NOAA - NMFS concurred with NHDOT's determination that there should be no adverse effects to EFH habitat for Atlantic salmon under the Proposed Action. (See Appendix F.)

4.10.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 and Exits 6 and 7 would remain unchanged. No temporary impacts would occur.

Proposed Action

The Proposed Action would cause temporary noise and vibration impacts during construction outside of the Merrimack River that are greater than current noise and vibration levels. However, these impacts are not anticipated to negatively impact the ambient noise levels within the waters of the Merrimack River.

The water quality of the Merrimack River would be protected through erosion and sediment control BMPs throughout the duration of the Project. This in turn would protect fisheries habitat as well as brook floater (Alasmidonta varicosa), which is known to occur in the

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Merrimack River. These BMPs would be maintained throughout the duration of the Project and would be removed once disturbed areas reach 75 percent vegetation.

4.10.4 Mitigation

Because no significant impacts to fisheries habitat would result from the Proposed Action, no mitigation would be required. However, BMPs to minimize potential temporary construction related impacts on fisheries, including EFH and associated designated species, would be employed. These BMPs would include appropriate sediment and erosion control measures during construction (especially work along the banks of the river) to protect the water quality of the Merrimack River and other nearby surface waters and wetlands.

4.11 Threatened and Endangered Species

Threatened, endangered, and special concern species and exemplary natural communities are natural resources that are historically known to occur within New Hampshire but are protected and given special consideration due to their declining presence in the State. Factors leading to a species' decline include development pressures, changes in foraging opportunities, and habitat fragmentation. Protecting these species and natural communities is critical to maintain their presence within the State and the region, and ultimately is an effort to protect the species from regional or global extinction. Threatened and endangered species considered in this EA include species and natural communities that are listed as threatened or endangered on a State and Federal level, and that have been identified as occurring within or near the Study Area.

State Regulations

The New Hampshire Endangered Species Conservation Act (RSA 212-A) delegates authority and responsibility for the listing and protection of threatened and endangered wildlife species in New Hampshire to the NHFG. The NHFG developed the Nongame and Endangered Wildlife Program in 1988 to manage and steward these species. Rare, threatened, and endangered species managed by the NHFG include invertebrate and vertebrate species of fish and wildlife. The NHFG manages threatened and endangered species cooperatively with the New Hampshire Natural Heritage Bureau (NHNHB).

The New Hampshire Native Plant Protection Act of 1987 (RSA 217-A), enacted by the New Hampshire Legislature in 1987, established the authority for the State to develop a list of rare plant species. The NHNHB was designated this authority and developed the list in NH Administrative Rules Res 1100, et seq. Plants deemed as rare in the State and in need of protection were listed as endangered, threatened, or special concern plant species in descending order of rarity.

Federal Regulations

The Endangered Species Act (ESA, P.L. 93-205), as amended in 1978, 1982, and 1988, recognizes the need and provides the means to protect rare plants and invertebrate and

University of New Hampshire. 2009. New Hampshire Stream Crossing Guidelines. Accessed from https://streamcontinuity.org/ pdf_files/nh_stream_crossing_quidelines_unh_web_rev_2.pdf. Accessed on May 31, 2016.

vertebrate species of fish and wildlife, and provides for the protection and/or acquisition of critical habitats and the management of endangered species. Section 7(a)(2) of the ESA dictates that all Federal agencies must consult the US Department of the Interior to ensure that actions taken under federal funding, federal assistance, or federal permits (e.g., Section 404 Wetland Fill Permits) do not jeopardize the existence of threatened or endangered species. Jurisdiction is given to US Department of the Interior to recommend changes to the Project to avoid such jeopardy (including impacts to the habitat as well as to the plants or animals themselves).

4.11.1 Methodology

Determining the presence of State rare, threatened, and endangered plant, animal, and natural communities within the vicinity of the Project Footprint was accomplished through the NHNHB's DataCheck tool. The DataCheck tool uses rare species data from NHNHB and NHFG to generate a report which produces a list of the known occurrences of the past, present, or probable existence of rare, threatened, or endangered species that occur within a 1-mile buffer of the Study Area. Once the DataCheck report was generated, consultation with the NHNHB and the NHFG determined potential impacts.

The presence of federally listed or proposed, threatened, or endangered species, designated critical habitat, or other natural resources of concern was accomplished through the USFWS Information Planning and Conservation (IPaC) System. The IPaC tool streamlines the USFWS coordination process regarding potential impacts to federally threatened or endangered species by producing a report of the known occurrences of federally threatened or endangered species that may be present within one mile of the Project Footprint, and then providing opportunities for online consultation for certain species rather than contacting the local USFWS office. In New Hampshire, state agencies may conduct consultation with the USFWS through the IPaC tool regarding potential impacts to the Northern long-eared bat (NLEB).

4.11.2 Existing Conditions

Below is a discussion of the rare, threatened, or endangered species known to occur within or near the Study Area.

4.11.2.1 NHNHB Species Occurrences

The NHNHB DataCheck report dated September 5, 2018, identified occurrences within the Study Area (refer to Appendix G). The records identified in the DataCheck report are provided in Table 4.11-1 below.

Table 4.11-1 **Documented Occurrences of State-Listed Species**

Species

Invertebrate Species

Brook floater (Alasmidonta varico Skillet clubtail (Gomphus ventrico Pine barrens Zanclognatha moth Rapids clubtail (Gomphus quadrie

Vertebrate Species

American eel (Anquilla rostrata) Bald eagle (Haliaeetus leucoceph Blanding's turtle (Emydoidea blan Eastern meadowlark (Sturnella m Grasshopper sparrow (Ammodra New England cottontail (Sylvilage Northern black racer (Coluber con Peregrine falcon (Falco peregrinu Redfin pickerel (Esox americanus Wood turtle (Glyptemys insculpto

Plant Species

Clasping milkweed (Asclepias am Downy false foxglove (Aureolaria Golden heather (Hudsonia ericoid Licorice goldenrod (Solidago odo Wild lupine (Lupinus perennis spr Sensitive species¹

Natural Communities

Rich red oak rocky woods

Acidic riverbank outcrop

High-gradient rocky riverbank system Note:

Appendix G).

Initial consultation with the NHNHB was conducted in a phone conversation on August 24, 2016, during which NHNHB shared available data for the licorice goldenrod

	State Status	Federal Status
osa)	Endangered	
osus)	Special Concern	
n (Zanclognatha martha)	Special Concern	
color)	Special Concern	
	Special Concern	
alus)	Special Concern	
ndingii)	Endangered	
nagna)	Threatened	
mus savannarum)	Threatened	
us transitionalis)	Endangered	
nstrictor constrictor)	Threatened	
ıs anatum)	Threatened	
americanus)	Special Concern	
2)	Special Concern	
nplexicaulis)	Threatened	
a virginica)	Endangered	
des)	Endangered	
ora spp. odora)	Endangered	
p. perennis)	Threatened	
	Threatened	Threatened

Identified as Small Whorled Pogonia per phone conversation with Amy Lamb on August 24, 2016 (refer to

populations. Within the Study Area, licorice goldenrod was transplanted as a mitigation effort to a site along Dunbarton Road. The NHNHB recommended that surveys be conducted for rare plant species within the Study Area where the plants are likely to occur (favorable habitat). Surveys were conducted for the following plant species in August of 2016:

> Clasping milkweed

- > Licorice goldenrod
- > Downy false foxglove > Wild lupine

During the rare plant survey, only licorice goldenrod was observed within and adjacent to the mitigation site. No other plant species were observed during the plant survey. Since rare plant populations fluctuate year-to-year due to weather, disturbance, and other factors, additional surveys for plant species are recommended prior to construction, which is currently several years away, to evaluate the status of these plant populations.

Bald eagles are known to be present along the Merrimack River within the northern section of the Study Area. Individual birds and multiple individuals have been observed along the river numerous times from 2002 to 2012. According to the NHNHB report for this project, bald eagle occurrences along the western side of the Merrimack River within or near the Project Footprint were identified along Front Street near the intersection with the proposed relocated Exit 7 Interchange East Connector, and along the I-293 corridor near the confluence of Black Brook with the Merrimack River. The Project Footprint also extends into the bank of the Merrimack River south of Exit 6, however no known occurrences of bald eagle have been recorded in this area.

4.11.2.2 USFWS Species Occurrences

The USFWSs IPaC tool was used to confirm the presence of any federally listed or proposed, threatened, or endangered species, designated critical habitat, or other natural resources of concern within the Study Area. The IPaC results letter dated August 29, 2018 indicated that small whorled pogonia (Isotria medeoloides) and northern long-eared bat (Myotis septrionalis) may occur within the Study Area. Refer to Table 4.11-2 below.

Table 4.11-2 **Documented Occurrences of Federally-Listed Species**

Species	State Status	Federal Status
Small Whorled pogonia (Isotria medeoloides)	Threatened	Threatened
Northern long-eared bat (Myotis septerionalis)		Threatened

The rare plant surveys conducted in August 2016 attempted to locate populations of small whorled pogonia within the portion of the Study Area along the proposed Exit 7 Interchange West Connector. This directed survey focused on soil types, landforms, and plant communities generally considered to be associated with the occurrence of this species in the northeast, including mature hardwood stands of beech, birch, maple, oak, and hickory that have an open understory. An effort was made to identify acidic soil occurrences, with a thick forest duff layer or near rock outcroppings. This search did not discover any populations of the species.

4.11.3	Impacts
4.11.3.1	Permanent Impacts

No-Build Alternative

and endangered species.

Proposed Action

and endangered species.

NH Natural Heritage Bureau (State-listed Plants)

Based on the plant surveys that have current been conducted within the Project Footprint to date, only licorice goldenrod is anticipated to be permanently impacted by the Proposed Action. A known occurrence of licorice goldenrod north of the Manchester Landfill and south of the Eversource ROW near Dunbarton Road was observed during the plant surveys conducted in August 2016. A segment of this population would be impacted by the Proposed Action. The mitigation site for licorice goldenrod was found to still contain some viable plants; however, the population is located on City-owned land near the proposed intersection of Dunbarton Road with the Exit 7 Interchange West Connector, and this population would not be directly impacted.

Based upon a letter received from Amy Lamb (NHNHB) on April 25, 2019, additional plant surveys for clasping milkweed, downy false foxglove, wild lupine, and licorice goldenrod are recommended prior to construction. Amy Lamb recommended that surveys be conducted in 2022 or 2023, based on the current anticipated construction start date. Prior to starting the surveys, NHNHB requested that a detailed map of the locations of the proposed rare plant survey extents be submitted to confirm correct locations would be surveyed for each plant based on habitat requirements. Refer to **Appendix G** for the correspondence documents with the NHNHB.

April 8, 2019:

- > High-gradient rocky riverbank system
- > Acidic riverbank outcrop
- > Red rich oak rocky woods
- ` Golden heather

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; there would be no direct or indirect permanent impacts to threatened

The following is a discussion of the permanent impacts of the Proposed Action to threatened

No impacts to the following three natural communities and one plant species are anticipated as a result of the Proposed Action, as explained in a letter to the NHNHB from NHDOT dated

In a response letter dated April 25, 2019, NHNHB concurred with NHDOT's assessment that these species and natural communities would not be impacted by the Proposed Action. Documentation is provided in **Appendix G**.

NH Fish & Game Department (State-listed Wildlife)

Bald Eagle. Project work includes tree clearing near the proposed reconfigured intersection of Front Street with Country Club Drive and the new proposed Exit 7 Interchange East Connector. The reconfigured intersection would require approximately 0.1 acre of tree clearing in this area, as well as slope impacts that extend beyond the existing road shoulder to the north and south of the intersection. Although no bald eagle perch or roost trees have been identified within this portion of the Project Footprint, this tree clearing may impact mature pinespines which may serve as perch/roost trees within this area.

Some tree clearing would also be required along the I-293 corridor near the confluence of Black Brook with the Merrimack River. Tree clearing would be limited to the I-293 corridor and would not extend to trees that are located along the edge of the Merrimack River near Riverside Drive, where there are documented occurrences of bald eagles. This tree clearing is required to widen the I-293 corridor as well as to construct a stormwater BMP along the highway. Because of the location of this clearing in relation to the Merrimack River, and the position of a developed area between this clearing and the adjacent river, this clearing would have only negligible impacts on bald eagle.

The Project Footprint extends south along the Merrimack River from the Exit 6 interchange to north of the Granite Street Bridge. Most of the widening along the I-293 mainline would extend to the west toward the Cotton Duck Building located at 195 Eddy Street to minimize impacts along the bank of the Merrimack River. However, approximately 1.8 acres of shrub and tree clearing would be required along the river bank for slope grading beyond the existing highway shoulder. Most of the trees along this corridor are hardwood and unlikely to be used by bald eagles due to the close proximity to the highway.

Brook Floater. Temporary bed and bank impact proposed with Black Brook is not anticipated to impact brook floater mussels. A freshwater mussel survey was completed in September 2015 in preparation for temporary bank stabilization work along the Black Brook Bridge (constructed in 2017, NHDOT Project #40367). The freshwater mussel survey did not identify any mussels in Black Brook. Based on these findings, work proposed to occur within Black Brook as part of the Proposed Action is not anticipated to impact brook floater. The freshwater mussel survey report conducted in 2015 is included in **Appendix G**, attached.

Tree clearing and bank impact along the Merrimack River is also not anticipated to impact brook floater, if present within the Merrimack River near the Project Footprint. The majority of the proposed tree clearing would occur within tree buffer areas between I-293 and the Merrimack River ranging from 10 to 130 feet wide. The width of proposed tree clearing along this segment ranges from 10 to 50 feet wide, leaving an approximately 0 to 80-footwide buffer of trees intact between the widened NHDOT ROW corridor and the Merrimack River. The Proposed Action would completely remove the buffer of trees between I-293 and the Merrimack River for a length of approximately 300 feet, primarily along the "S-curve" near the I-293 southbound on-ramp from Eddy Street, south of Exit 6.

While trees along river banks provide refuges in the warm summer months for aquatic species due to the shade and cooler temperatures, completely removing the existing vegetated buffer along the river within the vicinity of the "S-curve" for a length of approximately 300 feet would still retain a sufficient buffer of trees and vegetation along the remaining length of the Project. Therefore, this tree clearing is not anticipated to result in a negative impact to aquatic species in the Merrimack River including the brook floater, if present.

Along the Merrimack River, out of approximately 7.2 acres of existing riparian buffer within or adjacent to the Project Footprint, approximately 1.8 acres would be cleared. This represents 25 percent of the total existing buffer. However, a buffer would remain along most of the corridor, and direct effects on brook floater are therefore not expected, even if present within this segment of the river. The existing substrate within the Merrimack River is not anticipated to be impacted since no work would extend below ordinary high-water. Appropriate sediment and erosion control BMPs would be implemented prior to, during, and after construction to reduce the risk of erosion along the western bank of the Merrimack River and sedimentation within the river. Additionally, while the Proposed Action would increase the amount of paved areas within the vicinity of the Merrimack River and Black Brook, the use of stormwater BMPs such as detention basins and vegetated swales would decrease the amount of pollutant loading to surface waters, thus mitigating water quality impacts the Proposed Action may have on these resources.

Rapids Clubtail & Skillet Clubtail. Rapids clubtail and skillet clubtail are two dragonfly species of special concern that were observed along the Merrimack River north of Black Brook near Stark Lane. Both species prefer habitats near mud or silt-bottomed, slow-moving rivers. Adults are often found in forested habitats adjacent to these kinds of rivers. Under the Proposed Action, limited work is anticipated near known occurrences of these dragonflies, as work in this area would include improving the entrance of Delia Drive where it intersects Front Street and connecting Delia Drive with the condominiums located to the north. This area is heavily developed and previously disturbed by residences and condominiums. Greater construction disturbance could occur to the north where the intersection of Front Street with Country Club Drive and the Exit 7 Interchange East Connector would be constructed. Therefore, no direct, permanent impacts to these two dragonfly species are anticipated by the Proposed Action. Temporary indirect impacts due to noise and construction may occur within areas of known occurrences of this species.

Additional Species. American eel and redfin pickerel are not anticipated to be impacted by the Proposed Action since no work is anticipated to occur within the bed of the Merrimack River. Additionally, no impacts are anticipated to occur to New England cottontail, peregrine falcon, Blanding's turtle, wood turtle, northern black racer, and Zanclognatha moth since they are known to occur within areas that are located well outside of the Project Footprint. Habitats that contain these species are not anticipated to be impacted. For example, NHNHB DataCheck identified Blanding's turtle along the Piscataqua River, which is outside the Study Area, and the northern black racer was identified as being near Rock Rimmon Park, which is

also located outside of the Study Area and well away from any proposed construction. Peregrine falcon is known to occur east of the Merrimack River; however, this species is known to roost on man-made structures in this area and is not known to occur on the western side of the Merrimack River. Since these species are known to occur outside of the Project Footprint, they are not anticipated to be impacted by the Proposed Action.

Refer to correspondence with NHFG in **Appendix G** for further information.

US Fish and Wildlife (Federally-listed Plants and Wildlife)

Construction of the Proposed Action would involve tree clearing both within and outside of the tree clearing time-of-year restriction for NLEB in Manchester (April 15th – September 30th). Therefore, coordination with the USFWS is required to assess potential impacts to the NLEB. Since the Proposed Action involves tree clearing greater than 300 feet away from existing roadways, the Proposed Action does not qualify under the FHWA Programmatic Agreement. In accordance with the procedures contained in the FHWA/FRA Range-wide Programmatic Informal Consultation for Indiana Bat and Northern Long-eared Bat, December 2016, a Streamlined Consultation Form was submitted to the USFWS on October 9, 2018 with a determination that the Proposed Action is "likely to adversely affect" NLEB, but any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. Since the NHDOT did not receive a response to this submittal within the 30-day review period, which ended November 12, 2018, NHDOT assumes that the submittal was based on the best information possible and that Section 7 requirements of the ESA have been met. Section 7(a)(2) requirements state that "At least 30 days in advance of funding, authorizing, or carrying out an action, the federal agency must provide written notification of their determination to the appropriate Service Field Office." 58 Based on correspondence received from Susi von Oettingen (USFWS) dated April 9, 2019, Susi von Oettingen confirmed that the Proposed Action is in compliance under the Section 4(d) rule per the Streamlined Consultation Form (does not occur within a hibernacula, does not occur within 0.25 mile of a known, occupied hibernacula and does not impact any known, occupied maternity roost tree or trees within a 150-foot radius of a maternity roost tree), which allows for incidental take, and no further consultation is required at this time (refer to **Appendix G**).

Additionally, the state endangered little brown bat (Myotis lucifugus) is included in the USFWS National Listing 7-Year Workplan for assessment of the status of the species to determine if listing the bat as either threatened or endangered is warranted.⁵⁹ The plan projects that the listing determination would be undertaken in Federal Fiscal Year 2023. Little brown bat is currently listed as a State of NH endangered species. The tricolored bat

(Perimyotis subflavus) is a State endangered bat that is being reviewed for federal listing based on a petition for a status review of the species to determine if listing is warranted.⁶⁰

The NHNHB DataCheck results did not indicate any known occurrences of the little brown bat or the tricolored bat within the Study Area. However, the DataCheck results did not assess if the Study Area would include potential habitat for a species. Should the little brown bat or tricolored bat become a federally listed species in New Hampshire prior to the Proposed Action construction, the Proposed Action would be evaluated at that time to determine whether or not the Proposed Action would negatively impact these species.

The Proposed Action is not anticipated to negatively impact small whorled pogonia. Small whorled pogonia grows in mature hardwood forests composed of birch/beech/maple/oak/hickory with acidic soils and an open understory. Habitat for the small whorled pogonia is present in the northwestern portion of the Study Area near Hackett Hill, as well as around Country Club Drive. However, a systematic survey for small whorled pogonia was conducted in August 2016, during which no small whorled pogonia plant populations were observed. Based on the results of this field survey, NHDOT anticipates the Proposed Action would not impact this species.

4.11.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no direct or indirect temporary impacts to threatened and endangered species.

Proposed Action

Grasshopper sparrow and Eastern meadowlark may be temporarily impacted by the Proposed Action. These species are known to occur in the vicinity of the Manchester Landfill. The Project Footprint runs east of the Manchester Landfill where the I-293 mainline would be widened, and to the north where the Exit 7 southbound on- and off-ramps and associated Exit 7 Interchange East-West Connector are proposed. Tree clearing would occur between I-293 and the Manchester Landfill, and slope grading would extend toward the Landfill within this area. To the north, a buffer of trees would remain between the Manchester Landfill and the Exit 7 Interchange West Connector. Due to the close proximity of the Project Footprint to the northern boundary of the Manchester Landfill, grasshopper sparrow and eastern meadowlark using the grassland habitat within this area may be temporarily disturbed due to construction impacts, such as noise.

Additionally, temporary construction noise impacts may affect bald eagles that use perch and roosting trees along the Merrimack River. Some of these roost trees are located directly adjacent to the Project.

US Fish and Wildlife Service, National Archives and Records Administration. 2017. Endangered and Threatened Wildlife and Plants; 90 Day Findings for 5 Species. Accessed from https://www.federalregister.gov/documents/2017/12/20/2017-27389/endangered-and-threatened-

⁵⁸ US Fish and Wildlife Service. 2016. Optional Framework to Streamline Section 7 Consultation for the Northern Long-Eared Bat. Accessed from https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/S7FrameworkNLEB17Feb2016.pdf. Accessed on December 19, 2018.

⁵⁹ US Fish and Wildlife Service. 2016. National Listing Workplan, 7-Year Workplan. Accessed from https://www.fws.gov/endangered/esalibrary/pdf/Listing%207-Year%20Workplan%20Sept%202016.pdf. Accessed on December 19, 2018.

wildlife-and-plants-90-day-findings-for-five-species. Accessed on December 19, 2018.

Environmental Assessment

4.11.4 Mitigation

The following mitigation measures are proposed to be implemented during construction to reduce or eliminate potential impacts to threatened and endangered species and natural communities that are known to occur within and near the Proposed Action.

- > Plant surveys for clasping milkweed, downy false foxglove, wild lupine, and licorice goldenrod are required prior to construction. Surveys are recommended to be completed in 2022 or 2023, based on the current anticipated construction start date for the Project. Prior to starting the surveys, NHDOT would submit a detailed map of the locations of the proposed rare plant survey extents to the NH Natural Heritage Bureau (NHNHB) for confirmation.
- If a threatened, endangered, or rare plant species is encountered during construction that > was not documented prior to construction, construction activities in that area would temporarily cease until the plant has been relocated.
- Standard BMPs would be applied prior to, during, and after construction in accordance with Volume 3 of the NHDES New Hampshire Stormwater Manual and NHDOT Erosion Control Strategies to reduce the risk of erosion and sediment-laden run-off from entering surface waters and wetlands.
- Wildlife friendly erosion control methods would be implemented during construction such as woven organic material for erosion control blankets. Additionally, welded plastic, biodegradable plastic, or threaded erosion control materials would not be used as part of construction.
- > The little brown bat and tricolored bat are being assessed for listing as federally endangered species. The status of these species will be re-evaluated, in consultation with USFWS, closer to the date of construction to determine whether or not tree clearing impacts from the Proposed Action would negatively impact the little brown bat and tricolored bat.

4.12 Parks, Recreation, and Conserved Lands

The following is a discussion regarding the various parks, recreation and conservation lands existing within the Study Area (see Figure 1.1-2), including Manchester City Parks, the Amoskeag Fishways Visitors Center, and the Nature Conservancy's Manchester Cedar Swamp Preserve. This review includes properties that may be protected under Section 4(f) of the Department of Transportation Act of 1966 and Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965.

The NH Office of Strategic Initiatives manages certain conservation programs within the State of New Hampshire, including the Conservation Land Stewardship Program (CLS) and the Land Conservation Investment Program (LCIP).⁶¹ LCIP, under NH RSA 162-C:6, is responsible for monitoring the condition and status of state held conservation easements

acquired through the program. The CLS program manages LCIP properties to streamline the program, providing a main point of contact for all easement property holders and supplying information about these properties to the public.

The Land and Community Heritage Investment Program (LCHIP), funded by the State of New Hampshire, conserves "land and cultural resources, or interests therein, with local, regional, and statewide significance" across the state of New Hampshire through matching grants.

Section 6(f) of the Land and Water Conservation Act of 1965 protects outdoor resources that have received funding resources from the Act. Provisions for Section 6(f) of the LWCF Act "ensure that Federal investment in LWCF assistance are being maintained in public outdoor recreation use. This section of the Act assures that once an area has been funded with LWCF assistance, it is continually maintained in public recreation use unless [the National Park Service] approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value." 62

4.12.1 Methodology

Desktop analyses were completed to inventory parks, recreation and conservation lands within the Study Area. This analysis used data from New Hampshire GRANITView,⁶³ the City of Manchester Public GIS Map Viewer,⁶⁴ and GIS. In addition, coordination with state agencies was completed to confirm the presence or absence of Section 4(f) or 6(f) properties within the Study Area.

As the Proposed Action would involve partial and complete property acquisition, potential direct impacts to parks, recreation and conservation lands were assessed by overlaying the Proposed Action conceptual design plans and data layers in ArcGIS. The overlap of the conceptual design plans and recreational or conservation properties were calculated, when applicable.

4.12.2 Existing Conditions

4.12.2.1 Public Parks and Recreation Lands

Physical features in the Study Area include ledges and exposed bedrock, forested lands, and water features, including the Merrimack River and Black Brook. These physical features create opportunities for parks, green spaces, and recreational areas within the City of Manchester. These areas include seven municipal or privately-owned parks and recreation areas located within the Study Area, as depicted on Figure 4.12-1.

GRANITView. Undated. Conservation and Public Lands. Accessed from http://www.granit.unh.edu/. Accessed on September 10, 2018. City of Manchester. Undated. Public GIS Map Viewer – Parks Facilities data layer. Accessed from http://208.82.76.123/pubgis/. Accessed on

State of New Hampshire, Office of Energy and Planning. 2013. About Us: History and activities of the Conservation Land Stewardship Program. Accessed from https://www.nh.gov/osi/planning/programs/clsp/about.htm. Accessed on July 8, 2016.

US Department of Transportation. 36 CFR 59. Section 6(f) – Land and Water Conservation Act.

September 10, 2018.





Manchester 16099





I-293 Exits 6 and 7

Parks and Conservation Lands

Martineau Park, Lafayette Park, & Simpson Park

Martineau Park, Lafayette Park, and Simpson Park are located along the southwestern portion of the Study Area within the vicinity of West Bridge Street. Martineau Park, the smallest of the three, is located between Montcalm Street and Dionne Drive, and offers walkways, shade trees, and benches on the approximately one-third of an acre manicured lawn. The park is named after Albert R. Martineau of Manchester who was a Ward 12 Alderman before and after serving in World War II beginning in 1943.

Lafayette Park is located on Notre Dame Avenue and totals approximately 2 acres. The park is named after Gilbert du Motier, the Marguis de Lafayette (1757-1834), a French aristocrat who served as Major General during the American Revolution. The park features several sculptures including a statue of Ferdinand Gagnon which was created by sculptor Joseph A. Coletti in 1949. In addition, benches, walkways, and shade trees provide areas for picnicking and relaxation within the well-maintained grassy lawn.

Simpson Park is slightly smaller than Lafayette Park and is located between Coolidge Ave and Notre Dame Ave, just north of Lafayette Park. This park features a small playground and picnic area and well-maintained, sloping grassy lawns.

Blodget Park and Black Brook Park

Blodget Park, located on Front Street, provides a nature trail and fishing opportunities along Black Brook. The park extends northeast along the Black Brook corridor until just north of Mt. Calvary Cemetery. Black Brook Park begins further north from Blodget Park to the north of Ruta Circle and extends northeast along the Black Brook corridor through city-owned land until the intersection of Goffstown Road with Straw Road.

Amoskeag Fishways Visitors Center

The Amoskeag Fishways Visitors Center is located on Fletcher Street off Amoskeag Street near the Amoskeag Circle. In addition to educational exhibits, the visitor's center provides public programs and events.

Amoskeag River Walk

The Amoskeag River Walk, a paved recreational trail maintained by the Manchester Parks Department, runs through the Millyard and is part of the Heritage Trail and provides views of the river and historical mill buildings along the western bank of the Merrimack River. The Heritage Trial Network (managed by the State of New Hampshire) is a network of trails that provide an important system linking communities, recreation and historical corridors in New Hampshire. Future phases of the River Walk include developing a paved recreational trail from North to South in Manchester, this portion of the trail is important for providing trail users increased access to amenities in downtown Manchester.

Manchester Cedar Swamp Preserve

The Nature Conservancy's Manchester Cedar Swamp Preserve (the 'Preserve')⁶⁵ is located north of Hackett Hill, just outside of the northwestern portion of the Study Area. Approximately 42 acres of the 642-acre conserved property contains the only Atlantic white cedar - giant rhododendron swamp occurring in New Hampshire, and one of only ten in New England. This type of swamp is globally rare and in New England is mainly composed of giant rhododendron (Rhododendron maximum) within the understory and Atlantic white cedar (Chamaecyparis thyoides) within the canopy layer, some as old as 450 years. Atlantic white cedar swamps are rare in New Hampshire, totaling less than 500 acres, with only four swamps greater than 40 acres.⁶⁶

The Preserve is the largest tract of conserved land in Manchester and contains one of the largest and most ecologically valuable cedar swamps in the state. Several trails maintained by The Nature Conservancy run through the eastern portion of the property, and the trailhead to the preserve can be accessed from Countryside Boulevard in Manchester. These trails are open to the public. Other wetland features within the Preserve include a portion of Milestone Brook and its associated tributaries and marsh areas.⁶⁷

4.12.2.2 Section 4(f) Properties

Potential impacts of USDOT-funded projects on publicly-owned parks and recreation areas; waterfowl and wildlife refuges; and private or publicly-owned historic resources must be addressed under Section 4(f) of the Department of Transportation Act of 1966. Of the recreational properties identified above, the following are publicly-owned and therefore subject to protection under Section 4(f):

- > Martineau Park,
- > Lafayette Park,
- > Simpson Park,
- > Amoskeag River Walk
- > Blodgett Park, and
- > Black Brook Park.

The Manchester Cedar Swamp Preserve, the Amoskeag Fishways Visitors Center are privately-owned resources and therefore not considered Section 4(f) resources.

The Nature Conservancy. Undated. Places and Preserves, Manchester Cedar Swamp. Accessed from https://www.nature.org/en-us/getinvolved/how-to-help/places-we-protect/manchester-cedar-swamp-preserve/. Accessed on July 8, 2016.

⁶⁶ New Hampshire Division of Forests and Lands. Undated. *Visiting New Hampshire's Biodiversity: Manchester Cedar Swamp*. Accessed from https://www.nhdfl.org/Natural-Heritage/Visiting-NH-s-Biodiversity. Accessed on July 8, 2016.

⁶⁷ The City of Manchester owns a large tract of land abutting the southern side of the Preserve. The City of Manchester parcel (766-15M) is bounded to the north by the Preserve, to the southwest by Dunbarton Road, and to the east by I-293. This parcel is not conservation land and encompasses approximately 432 acres.

4.12.2.3 Section 6(f) Properties

The New Hampshire Department of Natural and Cultural Resources (NHDNCR), Division of Parks and Recreation, was contacted regarding LWCF properties. In an email response dated September 26, 2018, NHDNCR indicated that no such Section 6(f) properties are located within the Study Area (see **Appendix H**).

4.12.2.4 State Conservation Properties

The NH Office of Strategic Initiatives (NHOSI) was contacted on September 14, 2018 regarding CLS and LCIP properties acquired by these programs within the Study Area. After consulting their files, NHOSI indicated in an email response dated September 21, 2018 that there are no CLS or LCIP properties within the Study Area.

LCHIP was also contacted on September 14, 2018 regarding associated properties within the vicinity of the proposed Project. In their email response dated September 20, 2018, they confirmed there are no LCHIP supported properties in the Study Area.

Refer to **Appendix H** for agency correspondence.

4.12.3 Impacts

The Proposed Action was evaluated for potential permanent and temporary impacts on parks, recreation and conservation lands, including properties protected under Section 4(f) and Section 6(f). This analysis is intended to ensure that the aesthetic, recreational and ecological value of these lands is not substantially impacted, and that the persons or visitors who utilize these lands are not impacted.

4.12.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no permanent impacts to parks, recreational areas, conservation lands, Section 4(f) properties or Section 6(f) resources.

Proposed Action

The Proposed Action would not result in the acquisition or direct, permanent impacts to parks, recreation, or conservation lands, including those subject to Section 4(f) or Section 6(f) protections.

Under the Proposed Action, land owned by the City of Manchester (Parcel 766-15M) would be partially acquired for the Exit 7 improvements. The Proposed Action would move Exit 7 to a location north of the MCC and would construct the Exit 7 Interchange West Connector to Dunbarton Road. Parcel 766-15M lies adjacent to the Manchester Cedar Swamp Preserve. However, while the Proposed Action would move the ROW and the associated roadway improvements closer to the Preserve, no land acquisition or direct impacts to the Preserve would occur.

The partial acquisition of City land is not anticipated to impact the recreational activities on the Preserve (e.g., hiking). Nor would the functions and values of the habitats within the Preserve (e.g., wetland hydrology) be impacted as all construction would occur on property owned by the City of Manchester located downslope of the Preserve.

Indirect impacts to the Preserve would include additional traffic along the Exit 7 Interchange West Connector, potential increase of traffic along Dunbarton Road, and potential future development on Parcel 766-15M as planned by the City of Manchester.⁶⁸ Improved access to City-owned land not acquired for the Exit 7 Interchange West Connector could increase the development potential of this currently undeveloped area. Improved mobility around the relocated Exit 7 and the adjacent roadways may beneficially impact Preserve attendance. Section 4.17, Socioeconomic Conditions and Section 4.19, Indirect Effects and Cumulative Impacts include additional discussion of the potential direct, indirect and cumulative effects on the City-owned land and the Preserve.

Relative to potential noise indirect effects, a noise analysis (Section 4.3) identified current and future noise levels under the No-Build and Build Alternative. Lafayette Park, and Simpson Park, and the Nature Conservancy's Manchester Cedar Swamp are approximately 1,000 feet or more from I-293, which is outside the noise Study Area. At these distances, traffic noise levels from the Proposed Action would be well below the Noise Abatement Criteria (NAC) and there is no potential for adverse noise impact.

Traffic noise levels have been predicted around Martineau Park and Blodget Park along Front Street. No-Build noise levels at Martineau Park would be approximately 68 dBA (Leo) and the Proposed Action noise levels would be 64 dBA (Lea), which is below the NAC. The Proposed Action would reduce noise levels at this location due to reduced traffic volumes on McGregor Street. Noise levels at Blodget Park would be 67 dBA (Lea) for the No-Build and 64 dBA (Leg) for the Proposed Action. Noise levels would be reduced at this location with the Proposed Action due to lower traffic on Front Street. Since the Proposed Action noise levels at these parks would be below the NAC, noise abatement such as sound walls are not warranted.

4.12.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no temporary impacts to parks, recreational areas, conservation lands, Section 4(f) properties or Section 6(f) resources.

Proposed Action

Although the Study Area may experience an increase in temporary noise and vibration impacts and increased construction vehicle traffic, these activities are not expected to have

City of Manchester. Undated. Current Projects. Accessed from https://www.yourmanchesternh.com/Plans-Projects/Current-Projects.

Accessed on January 11, 2019

measurable impacts on the parks identified in the Study Area. Parks and recreational areas near Exit 5 and 6 are within the Manchester Urbanized Area which is regularly subjected to construction noise. There are no temporary noise impacts anticipated on the Amoskeag Fishway Visitors Center, as this facility provides indoor educational opportunities. Users of the River Walk would experience increased ambient noise levels from construction activities occurring across the Merrimack River. However, these impacts are not anticipated to decrease visitor experience or use of either facility.

Construction activities would result in temporary road closures and potentially increased truck traffic throughout the Study Area. The four parks located between Exits 5 and 6, which are Blodget, Lafayette, Simpson and Martineau Park, are located on the west side of the Study Area (nearest I-293 SB barrel). There would be temporary road closures and diversions along roadways in the Study Area including along Eddy Road during reconstruction of the SB on-ramp to I-293. At times, these road closures may increase traffic volumes on other nearby roads. However, public access to the parks mentioned above would not be prevented while construction activities occur, as there are several points of access to Blodget, Lafayette, Simpson, and Martineau Park. The Amoskeag Fishways Visitors Center, located on Fletcher Street, would maintain visitor access, but visitors may experience some delays associated with construction activities on Amoskeag Street. The entrance to the Hackett Hill Preserve is outside the Study Area, therefore traffic control measures used during the construction of the project would not inhibit access to the Preserve.

4.12.4 Mitigation

The conceptual design plans do not require the acquisition of any park, recreation or conservation land. The ecological, recreational, and aesthetic value of the parklands within the Study Area would not be adversely impacted by the Proposed Action. Temporary impacts resulting from construction are not anticipated to have substantial adverse impacts on parklands, as the parks would remain accessible to the public during the construction period. Because no substantial permanent or temporary impacts are anticipated, no mitigation for these resources is proposed.

4.13 Cultural Resources

Cultural resources include archaeological and historic architectural resources. These resources provide insight into local, regional, and national history including the built environment, cultural patterns, and events. Historic architectural properties and archaeological resources that are listed in, or are eligible for listing in, the National Register of Historic Places (National Register or NRHP) are afforded protection by federal and state laws.

National Historic Preservation Act (NHPA)

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their activities and programs on historic properties, which includes any historic district, site, building, structure, or object that is included in, or is determined

eligible for inclusion in, the National Register. For this Project, historic resources and effects on identified resources are evaluated by the New Hampshire State Historic Preservation Officer (NHSHPO) and FHWA, the lead federal agency. The NHSHPO is the Director of the NHDHR. Prior to the approval of the undertaking, the Advisory Council on Historic Preservation (ACHP) must be provided with a reasonable opportunity to comment on the undertaking.

The ACHP established regulations to carry out Section 106 of the NHPA, referred to as the "Section 106 process." Archaeological investigations undertaken for the Project are also authorized under Section 106 of the NHPA (P.L. 89-665), as amended. Section 106 is not an approval mechanism and cannot halt or terminate a project; rather, the regulations emphasize consultation among responsible Federal agencies, NHSHPO, and consulting parties to identify and evaluate potential effects on historic properties, and identify ways to avoid, minimize, or mitigate adverse effects.

RSA 227-C. NH Historic Preservation Act

NHDHR, under RSA 227-C:9, Directive for Cooperation in the Protection of Historic Resources, coordinates the identification and evaluation of cultural resources in the State of New Hampshire, which includes review of historical resources under Section 106 and under RSA 227-C:9 for all state agency projects that may affect these resources.

Section 4(f) of the Department of Transportation Act

Pursuant to Section 4(f) of the Department of Transportation Act of 1966, 49 USC 303(c), and Section 18(a) of the Federal Highway Act of 1968, 23 USC 138 (as amended by the Federal-Aid Highway Act of 1983), the Secretary of Transportation shall not approve any program or project which requires the use of "any land from a historic site of national, state, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreation area, wildlife and waterfowl refuge, or historic site resulting from such use."

4.13.1 Methodology

The Section 106 process for the Project was initiated through the submission of a Request for Project Review (RPR) to NHDHR in November 2012. Following this submittal, the Study Area (for cultural resources, known as the "Area of Potential Effect" or "APE") was surveyed for historic architectural and archaeological features as discussed below.

Development of the APE for above-ground historic structures considered both potential direct and indirect impacts, including potential visual impacts. Because several different alternatives were being evaluated during the preparation of the cultural resource surveys, the APE consisted of a combination of all potential alternatives, resulting in an APE as comprehensive as possible. The APE used for the survey phase is depicted on **Figure 4.13-1**.

In general, for historic structures, the APE included a 200-foot buffer from the outer work limits of the potential direct impact area for all alternatives. The APE was adapted as

necessary to account for more/less intensive Project elements, such as repaving, exit construction, or increased Project visibility due to the proximity to the river or a lack of vegetation. In these areas, the APE was expanded up to 400 feet from the potential direct impact area for all alternatives, or to the opposite riverbank, as appropriate.

For archaeological resources, the APE generally considered only direct impacts – areas which would be excavated or filled during construction. Like the APE used for survey of historic structures, the archaeological survey APE considered a composite footprint of all alternatives under consideration during the survey phase. As the project progressed and a Proposed Action was identified, archaeological surveys focused on the direct impacts of the Proposed Action.

Agency coordination meetings among NHDOT, NHDHR, and FHWA occurred on December 13, 2012, July 11, 2013, June 8, 2017, October 11, 2018, and July 11, 2019, to facilitate in-person consultation regarding the identification and evaluation of historic architectural and archaeological properties and potential effects to these properties, and supplement the submission and reviews of the RPR, Project Area Form (PAF), and Individual Inventory Forms. Public informational meetings were held on August 10, 2016, June 7, 2017, and June 13, 2018. During these meetings, information was presented regarding the Section 106 process and the role of consulting parties, and public outreach materials were offered. No consulting parties have been identified.

4.13.1.1 Historic Architectural Resources

Initial reconnaissance surveys for historic properties within the APE were conducted in April and June of 2016; these surveys were reported in a PAF, which was submitted to NHDHR in September 2016. Following NHDHR's comments on the PAF, dated October 13, 2016, an updated PAF addressing these comments was submitted in February 2017.

Research and Survey

A site file search at NHDHR was initially conducted prior to submission of the RPR in 2012 and was updated in January 2016. Research focused on historical contexts relevant to the area and histories of specific groups of resources that characterize the evolution of development, especially in West Manchester, through the present day. Additional targeted research was conducted in 2017 and 2018 for the preparation of area and individual inventory forms. A combination of online resources and local repositories was utilized to understand the context of the built environment. City directories, census records, deeds, and maps available through paid membership websites such as Ancestry.com were consulted, along with a variety of books and published sources available through websites such as Google Books and library collections. These were supplemented by research at the Manchester City Library, the Manchester Historic Association, the Hillsborough County Registry of Deeds, and the New Hampshire State Library, as well as information from

previous NHDHR forms and reports and National Register nomination forms for properties and surveys within the area and for comparable properties.

The methodology for the survey of historic properties was designed to identify properties within the APE that are listed in, or may be eligible for listing in, the National Register,

including districts, buildings, structures, objects, and sites. A reconnaissance survey for the PAF was conducted to photograph all buildings and structures within the APE, as well as streetscapes. Basic information was collected for each resource, to identify patterns of settlement and understand the relationships between the current built environment and its historical development. The location and information for each resource was recorded in the field using the Esri Collector mobile application, which allowed for simultaneous collection of gualitative and guantitative data. Geographical data informed the preparation of the PAF maps through ArcGIS, while the gualitative information was exported to Excel for categorical analysis.

Nearly 200 resources were identified, located wholly or partially within the APE. Properties were cross-referenced throughout the PAF by street address, district name (when applicable), and photograph numbers. Photograph location keys, a property matrix, and a photograph index were used for further cross-reference. Estimation of construction dates to identify resources over 50 years old were based on visual observation, supplemented by available historic maps, aerial images, and assessor's information.

Additional survey was conducted in September 2017 and June and November 2018, associated with the preparation of NHDHR area and individual inventory forms (and form updates) for two potential historic districts and six individual properties. These intensive-level surveys concentrated on recording the integrity of specific resources, as well as the identification and photography of comparable properties for context purposes in the evaluation.

Evaluation of National Register Eligibility

Recommendations regarding whether a property or area is eligible for the National Register utilizes a set of standard eligibility criteria. Established by the National Park Service, the criteria are broadly defined to encompass the wide range of resources and kinds of significance that gualify properties for listing in the National Register. Under Section 106, the criteria serve as a guide for federal agencies in their evaluation of historic properties that may be affected by a proposed undertaking. The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and meet one or more of the following criteria:

- the broad patterns of our history.

> Criterion A. That are associated with events that have made a significant contribution to

> **Criterion B.** That are associated with the lives of persons significant in our past.

Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values,





Potential Historic District -

Area of Potential Effect

listoric District

Inventory Form Completed

Building

Bridge

Town/City Boundary

Stream

City Park Land

Conservation/Public Land

- Amoskeag Corporation Housing Historic District
- Inventory Form Completed Determined NR Eligible \mathbf{x}
- Amoskeag Millyard Historic District

I-293 Exits 6 and 7

Historic Properties Survey

- > or that represent a significant and distinguishable entity whose components may lack individual distinction.
- > **Criterion D.** That have yielded, or may be likely to yield, information important to prehistory or history.

Ordinarily, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years are not eligible for the National Register. However, such properties would qualify if they are integral parts of districts that do meet the criteria or if they meet special requirements called Criteria Considerations, as follows:

- Criteria Consideration A. A religious property deriving primary significance from architectural or artistic distinction or historical importance.
- > Criteria Consideration B. A building or structure removed from its original location but which is primarily significant for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
- > Criteria Consideration C. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building associated with his or her productive life.
- **Criteria Consideration D.** A cemetery that derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.
- **Criteria Consideration E.** A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.
- Criteria Consideration F. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance.
- > Criteria Consideration G. A property achieving significance within the past 50 years if it is of exceptional importance.

4.13.1.2 Archaeological Resources

A Phase IA Archaeological Sensitivity Assessment of the Study Area was conducted to identify areas of archaeological sensitivity (i.e., areas with a potential to contain Pre-Contact Native American and/or Post-Contact Euroamerican archaeological resources).⁶⁹ The following resources were reviewed to complete the Phase IA assessment:

- > Known archaeological resources inventoried in NHDHR files;
- > Cartographic analysis of landform, topography, soils, and proximity to water;

- Secondary historic resources; and

During the Phase IA assessment, archaeologists divided the Study Area into 25 management units (MUs) and identified portions of 21 MUs as sensitive for Pre-Contact and/or Post-Contact archaeological resources. Archaeologically sensitive areas were determined to comprise 38 percent of the overall survey area, or 198 of 520 acres.

Following review and approval of the Phase IA assessment by NHDHR, a Phase IB Intensive Archaeological Investigation of archaeologically sensitive areas was conducted during the summers of 2016, 2017, and 2018 to establish the presence or absence of archaeological resources.

The Phase IB archaeological testing began by placing 1.6-foot by 1.6-foot (0.5-meter by 0.5-meter) shovel test pits (STPs) into linear transects using a measuring tape and compass across archaeologically sensitive landforms, with testholes spaced at 26-foot (8-meter) intervals except where landscape features forced a divergence from this standard. STPs that contained Pre-Contact cultural material were bracketed with four additional testholes located at 6.6-foot (2-meter) or 13.1-foot (4-meter) intervals to each of the cardinal directions (if possible) in order to better sample and define cultural deposits. Archaeologists also excavated 1.6-foot by 3.3-foot (0.5-meter by 1.0-meter) test trenches and 3.3-foot by 3.3-foot (1.0-meter by 1.0-meter) test units. At one site (known as the McGregor Street I site), archaeologists used a small tracked excavator to strip away thick fill deposits and expose intact natural soils for systematic hand excavation.

Existing Conditions 4.13.2

4.13.2.1 Historic Architectural Resources

The PAF identified 170 properties wholly or partially within the APE, approximately 105 of which were estimated to be at least 50 years old. Four properties in the APE had been previously recorded on NHDHR inventory forms or through a National Register nomination. The PAF recommended two potential historic districts for further survey and evaluation through NHDHR area forms, and 12 individual properties for evaluation through NHDHR individual inventory forms. For two additional individual properties, NHDHR forms were previously completed, but because more than 10 years had elapsed since the evaluation, form updates were recommended to reevaluate their integrity and historic significance. All surveyed properties in the APE are included in the *Property Matrix* in **Appendix I**, which includes property names and addresses, approximate construction period, previously-assigned inventory numbers, designations, resource type, and whether the property was recommended for further study.

The properties recommended for further study through the PAF were further refined following the identification of the Proposed Action. Once the appropriate work limits and elements of the Proposed Action were identified, only properties that had been both recommended for further survey in the PAF, and that had the potential for indirect or direct effects were evaluated for National Register eligibility via NHDHR inventory forms.

> A walkover (inspection) survey and limited subsurface testing to establish soil conditions.

Independent Archaeological Consulting, LLC (IAC). 2016. IAC Report No. 1219, Phase IA Archaeological Sensitivity Assessment, NHDOT 16099: I-293 Exits 6 & 7 (Manchester 16099). Because this report contains sensitive information on the location of archaeological resources, it is not for public distribution.

In 2018 and 2019, inventory forms were completed for the following individual properties and areas:

- > Front Street Historic District- determined not eligible
- > Goffstown Road Historic District- determined not eligible
- > 333 Front Street (MAN1089) determined not eligible
- > 367 Front Street (MAN1088) determined not eligible
- > 121 Front Street, Amoskeag School (MAN0507) determined eligible
- > 737 Coolidge Avenue, Langlois House (MAN0514) determined eligible
- > 763 Coolidge Avenue (MAN0513) determined not eligible
- > 1824 Front Street, Landry House (MAN1274) determined eligible⁷⁰

Based on a review pursuant to 36 CFR 800.4 and 36 CFR 67.8 of the architectural and/or historical significance of resources in the APE, one district and three properties were determined eligible for listing in the National Register.⁷¹ The Determination of Eligibility (DOE) letters from NHDHR are provided in Appendix I. The following summarizes each of the historic properties assessed in detail for potential impacts.

Amoskeag Millyard Historic District

This district was determined eligible for listing in the National Register in 2000, following the preparation of an NHDHR area form. The complex was also included in the 2007 National Register Multiple Property Documentation Form, "Textile Mills of New Hampshire." In 2012, the Millyard received district certification status from the National Park Service, based on information adapted and updated from the 2000 area form and the boundary of the local historic district established to encourage continued rehabilitation in the Millyard. As a result, a small number of the resources included in the 2000 eligible district were not included in the 2012 certification (such as the Amoskeag Dam and Hydroelectric Station, and the Pattern House at 333 Allard Drive). As all of the district's contributing resources are considered historic based on the 2000 eligibility determination, the maps and discussion in this form do not distinguish between the eligible and certified districts, because for planning purposes the historic district boundary is the same. The Millyard is significant under Criterion A, Industry, and under Criterion C, Architecture and Planning. Parts of the district may also be significant under Criterion D, archaeology.

Amoskeag School

In July 2018, NHDHR concurred with the finding that the Colonial Revival-style Amoskeag School at 121 Front Street in Manchester (MAN0507) is eligible for listing in the National Register under Criterion A for its association with education in Manchester, and under

Criterion C for architecture. The period of significance is 1891 to 1968, covering the period of time between the building's construction and the last year in which it is known to have functioned in an educational capacity.

Langlois House, 737 Coolidge Avenue

In September 2018, NHDHR concurred with the finding that the property at 737 Coolidge Avenue (MAN0514), a dwelling constructed in 1952, is eligible for the National Register. The property is significant under Criterion C for embodying the distinctive characteristics of a mid-20th century Ranch house in both form and style, and for exhibiting features indicating it was one of the earliest constructed Ranch examples within the neighborhood.

Landry House, 1824 Front Street

In January 2019, NHDHR concurred with the finding that the property at 1824 Front Street (MAN1274) is eligible for listing in the National Register. This intact, late Tudor Revival style house constructed in 1948 is eligible under Criterion C for architecture.

4.13.2.2 Archaeological Resources

Archaeologists conducted Phase IB Intensive Archaeological Investigations in 2016, 2017, and 2018, identifying 15 sites, of which 13 comprise Pre-Contact archaeological resources.⁷² These sites are listed in **Table 4.13-1**.

Table 4.13-1 Site Name Mar Milestone Brook Site MU-Milestone Brook V Site MU

Country Club Site I MU Country Club Site II MU Country Club Site III MU Narrow Camp Site MU Straw Road Mill MU Exit 6 Site MU

McGregor Street I Site MU McGregor Street II Site MU Eddy Site MU Milestone Brook II Site MU

nagement Unit	Site Number ²	Site Affiliation/Type
-1	27-HB-454	Pre-Contact lithic workshop
-3	27-HB-498	Pre-Contact habitation
-4	27-HB-488	Pre-Contact lithic workshop
-4	27-HB-489	Pre-Contact habitation
-4	27-HB-490	Pre-Contact habitation
-4	27-HB-491	Pre-Contact habitation
-9	27-HB-448	Post-Contact mill
-18	27-HB-455	Unidentified Pre-Contact & Post-Contact
-19	27-HB-452	Pre-Contact habitation
-19	27-HB-453	Pre-Contact habitation
-19	27-HB-78	Pre-Contact habitation
-21	27-HB-495	Pre-Contact lithic workshop

Identified Archaeological Sites¹

Independent Archaeological Consulting, LLC (IAC). End-of-Field Summary Report, IAC Report No. 1405 Phase IB Intensive Archaeological Investigation, NHDOT 16099: I-293 Exits 6 & 7 (Manchester 16099). Because this report contains sensitive information on the location of

The property at 1824 Front Street was among those evaluated and determined eligible for listing in the National Register. However, potential impacts to this property were eliminated as the Proposed Action design was refined; therefore, an effects assessment was unnecessarv

⁷¹ The Amoskeag Millyard Historic District was certified as an eligible historic district by the US Department of the Interior on May 31, 2012.

archaeological resources, it is not for public distribution.

Front Street Overlook Site MU-23

Site Name	Management Unit	Site Number ²	Site Affiliation/Type
Milestone Brook III Site	MU-21	27-HB-496	Pre-Contact lithic workshop
Milestone Brook IV Site	MU-21	27-HB-497	Pre-Contact lithic workshop

27-HB-499

Pre-Contact habitation

Table 4.13-1 Identified Archaeological Sites (Cont.)

Notes

This table includes results of the Phase IB testing as of March 15, 2019. 1

Site number refers to archaeological sites and are assigned by the NHDHR. 2

Additional description for sites potentially impacted by the Proposed Action is provided in Section 4.13-3, Impacts, below.⁷³

4.13.3 Impacts

As the State Historic Preservation Office in New Hampshire, NHDHR is responsible for administering federal preservation programs. When a publicly-assisted project may affect historical or archaeological resources, the federal and state agencies in coordination with NHDHR are responsible for reviews, recommendations, and approvals related to Section 106 compliance, as discussed above in Section 4.13.1 and Section 4.13.2.

Following the identification of National Register-listed or eligible properties, the federal agency in consultation with NHDHR applies the Section 106 criteria of adverse effect (36 CFR 800.5). Project consultation among FHWA, NHDOT, and NHDHR developed the Determination of Effect for historic properties and archeological resources, which is summarized in this section. If a project results in a finding of Adverse Effect to a National Register-listed or eligible property, Section 106 consultation addresses potential ways to resolve adverse effects through avoidance, minimization, or mitigation.

4.13.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged; therefore, there would be no permanent impacts to existing historic architectural or archeological resources.

Proposed Action

Historic Architectural Resources

FHWA, in consultation with the NHDOT and NHDHR, determined that the Proposed Action would result in a finding of No Historic Property Affected for 1824 Front Street, and No

Amoskeag Millyard Historic District

The Proposed Action would require relocation of the Valve House and the acquisition of approximately 20,500 square feet of property adjacent to the Cotton Duck Building for the highway widening and construction of two water quality treatment basins. Although the Proposed Action would result in acquisition of property associated with the Cotton Duck Building, the Proposed Action was developed to avoid direct impacts to the Cotton Duck Building itself.

The Valve House was previously moved c. 2000 to its present location at the request of the Manchester Heritage Commission to prevent its likely demolition, however the move shifted the building from one corner of the storehouses to the other, retaining the building within its historic setting in the Millyard. The 2012 certification for the National Register included the Valve House, in its new location, as a contributing building to the Amoskeag Millyard Historic District. The current plan is to move the Valve House within the Historic District and retain its association and spatial awareness to the Cotton Duck Building, resulting in a finding of No Adverse Effect on the Amoskeag Millyard Historic District. The NHDOT will work with the property owner on the location and will ensure that prior to and following the move the building is structurally stable and weather tight.

There are two proposed water quality treatment basins located adjacent to the Cotton Duck Building. The layout and specifications for the basins are still under design, however given the low impact to the already disturbed Millyard setting the addition of the treatment basins will not adversely impact the Amoskeag Millyard Historic District.

Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303) also requires consideration of historic properties. The Adverse Effects Memo signed by FHWA, NHDOT, and NHDHR on August 13, 2019 (refer to Appendix I) documents the finding of de minimis impact to the Amoskeag Millyard Historic District, as proposed easements and ROW acquisition would result in no adverse effects under Section 106. Therefore, the requirements of Section 4(f) have been satisfied.

Amoskeag School

Indirect visual effects to the Amoskeag School, due to the reconfiguration and reconstruction of the access ramps west of the property boundary, are not considered adverse effects because the setting has been previously compromised. In the 1950s, the construction of I-93 (presently I-293) through Manchester and the Exit 6 Amoskeag Circle eliminated a section of Front Street, severing the connection between the area surrounding the Amoskeag School and the rest of the Amoskeag Village, most of which is not extant. Buildings located opposite the school were demolished for the construction of the interchange, which the school building presently overlooks. The Amoskeag School does not retain integrity of setting or association.

Adverse Effect to the Amoskeag Millyard Historic District, the Amoskeag School, and the

⁷³ Location information for archeological sites is omitted from this document to protect confidentiality per NH RSA 227-C:11.

737 Coolidge Avenue

For the property at 737 Coolidge Avenue, indirect effects would result from the removal of trees at the bottom of the slope behind the property, along approximately 100 feet of the rear property boundary. The property is located within a suburban residential neighborhood set on a hill, with a densely-wooded slope marking the separation between the neighborhood and the Exit 6 interchange below. Removal of a portion of the trees from the slope behind the property at 737 Coolidge Avenue has been minimized through project design, and there would only be negligible impacts to this visual barrier resulting in a finding of no adverse effect.

1824 Front Street

For the property at 1824 Front Street, no effects will occur as the property is located 650 feet north of the Project Footprint, resulting in no encroachment or visual impacts to the property.

Archaeological Resources

Based on review of the Proposed Action, nine of the fifteen archaeological resources identified would be subject to permanent impacts due to disturbance from grading and other ground work. These nine sites are indicated by gray shading in Table 4.13-2. The Milestone Brook site, Narrow Camp site, Straw Road Mill site, Milestone Brook II Site, Milestone Brook III site, and Milestone Brook IV Site are located outside the Project Footprint and would not be impacted.

Table 4.13-2 Impact Status for Fifteen Identified Sites

Site Name	Management Unit	Impact Status
Milestone Brook Site	MU-1	Outside Project Footprint, no impacts
Milestone Brook V Site	MU-3	Permanent Impacts
Country Club Site I	MU-4	Permanent Impacts
Country Club Site II	MU-4	Permanent Impacts
Country Club Site III	MU-4	Permanent Impacts
Narrow Camp Site	MU-4	Outside Project Footprint, no impacts
Straw Road Mill	MU-9	Outside Project Footprint, no impacts
Exit 6 Site	MU-18	Permanent Impacts
McGregor Street I Site	MU-19	Permanent Impacts
McGregor Street II Site	MU-19	Permanent Impacts
Eddy Site	MU-19	Permanent Impacts
Milestone Brook II Site	MU-21	Outside Project Footprint, no impacts
Milestone Brook III Site	MU-21	Outside Project Footprint, no impacts
Milestone Brook IV Site	MU-21	Outside Project Footprint, no impacts
Front Street Overlook Site	MU-23	Permanent Impacts

Due to the presence of these potentially eligible sites within or adjacent to the Project Footprint, Phase II DOE investigations would be completed to define site limits and establish eligibility for the National Register prior to project construction. Description of each of the nine affected sites is provided below.

- stone-tool production or maintenance.
- although likely for a relatively short duration.

Milestone Brook V Site. MU-3 is located along the eastern edge of I-293 across from MU-2 and west of Country Club Drive. The management unit encompasses several terrace landforms suitable for Pre-Contact land use from ephemeral activity episodes to long-term habitations. Within this site, archaeologists collected Pre-Contact artifacts included an assemblage dominated by fire-cracked rock with just three debitage specimens. Additionally, the site limits encompass a dense fire-cracked rock deposit that likely marks a roasting platform or other Pre-Contact thermal features. The artifacts and feature in natural soil strata are consistent with a Pre-Contact occupation site.

> **Country Club I Site.** MU-4 includes a large segment of the northern portion of the Study Area. Archaeologists collected lithic flakes from five positive test holes, both STPs and larger test units, designated as the Country Club I site. The artifact assemblage consists entirely of non-diagnostic waste flakes and the era of occupation remains undetermined. The type and distribution of lithics suggests a short-term occupation devoted to

> Country Club II Site. Also in MU-4, the Country Club II site encompasses eight positive test holes (both STPs and test units) that contained lithic flakes as well as specimens of fire-cracked rock, heat-fractured stones associated with Pre-Contact Native American use as boiling stones, roasting platforms or other fire-related feature components. In addition, archaeologists identified two hearth features at the site. Ongoing lab processing of samples from the hearths may produce sufficient charcoal to radiocarbon date the features and establish the period of occupation. The presence of the hearth features indicates the Country Club II site served as a campsite for Pre-Contact occupants,

> Country Club III Site. Phase IB testing in MU-4 also resulted in the identification of the Country Club III site via the collection of lithic flakes, pottery and fire-cracked rock from 10 positive test holes. Although the presence of fire-cracked rock suggests thermal features exist at the site, testing thus far has exposed no hearths or other cultural features. The Pre-Contact pottery present at the site indicates a short-term Woodland-period occupation sometime between 3,000-400 years B.P.

> Exit 6 Site. Management Unit 18 (MU-18) encompasses the Exit 6 interchange system and surrounding areas along the west bank of the Merrimack River. Although Phase IB testing exposed evidence for significant disturbance across much of the tested area, archaeologists collected Pre-Contact artifacts from buried but undisturbed natural soils and registered the deposit with NHDHR as the Exit 6 site. Five positive test holes yielded Pre-Contact lithic and ceramic (pottery) artifacts, the latter of which indicates a Woodland-period occupation after about 3,000 years B.P. (Before Present).

> **McGregor Street I Site.** MU-19 encompasses a segment of the Project Footprint along the west bank of the Merrimack River. Eleven test holes, including both STPs and larger test units, contained Pre-Contact lithics, ceramics and fire-cracked rock from intact

natural soils beneath modern fill deposits. In addition to the artifacts, a concentration of fire-cracked rock at the base of one test unit marks the edge of a possible roasting platform or other Pre-Contact feature. These cultural deposits have been registered with NHDHR as the McGregor Street I site.

- > Archaeologists used a small excavator to strip away the overlying fill deposits and allow hand testing of the buried natural soils. The deep excavations confirmed the presence of layered artifact deposits down to the limits of excavation at over 230 cm (7.5 ft) below the modern ground surface. The layered deposits indicate repeated occupation by Pre-Contact peoples over multiple periods of regional prehistory that extend across several thousand years. The McGregor Street I site is a Pre-Contact cultural resource with the potential to greatly augment current understanding of Native American lifeways in the Merrimack River Valley.
- McGregor Street II Site. Phase IB testing in MU-19 established the presence of a second Pre-Contact archaeological site south of the McGregor Street I site and separated by a sizable area of negative test holes. Five positive test holes - both STPs and larger test units – contained Pre-Contact lithic and ceramic artifacts, and exposed a cultural feature composed of heat-altered soil, ash and burned logs over 10 cm (4 in) in diameter. Considering the observed differences in soil stratification and distance from the McGregor Street I site, archaeologists registered the cultural deposit with NHDHR as the McGregor Street II site. The presence of Pre-Contact pottery indicates an occupation during the Woodland period between 3,000-400 years B.P., however, forthcoming ceramic analysis and radiocarbon dating of the feature charcoal should provide a more precise date for human activity at the site.
- Eddy Site. The western edge of MU-19 encompasses a narrow strip of landscape along the western edge of Eddy Road/McGregor Street and stretches east across I-293 to the western bank of the Merrimack River. Considering the known importance and data potential of the multi-component deposit, archaeologists excavated most testholes only deep enough to confirm the presence of Pre-Contact artifacts within natural soils and delineate rough site boundaries. Despite this minimally invasive Phase IB testing strategy, archaeologists still collected large amounts of Pre-Contact artifacts composed of debitage, tools, fire-cracked rock and pottery, and documented three thermal features.
- Front Street Overlook Site. MU-23 stretches west from the northwestern corner of MU-18 at the Goffstown Road/Front Street/Eddy Road intersection to its terminus at Provencher Street. Most test pits at this site revealed significant ground disturbance from road, utility, or home construction and archaeologists collected five Pre-Contact artifacts from fill layers along Goffstown Road. Although excavations exposed artificial topography across much of the management unit, crewmembers identified a pocket of intact natural landscape in the site that encompasses the Front Street Overlook Site. Archaeologists collected Pre-Contact artifacts from natural soils at the site, including lithic debitage and cores, fire-cracked rock, calcined bone and guartz biface. In addition to the artifacts, testing confirmed the presence of at least two hearth features indicative of a campsite and an occupation tenure that likely seems at least several days.

Based on the proposed project plans and the known locations of highly sensitive archaeological sites, a consensus determination was made that the project would result in an Adverse Effect to archaeological resources.

4.13.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged, therefore there would be no temporary impacts to existing historic architectural or archaeological resources.

Proposed Action

Historic Architectural Resources

No temporary impacts associated with construction or traffic are anticipated within or near historic resources. Potential impacts to historic properties (*i.e.*, the Amoskeag Millyard Historic District, the Amoskeag School, and 737 Coolidge Avenue) resulting from construction are limited to short-term noise, vibration, and traffic impacts, none of which would impact the character-defining features of these properties.

Archaeological Resources

The nine archaeological resources located within the Project Footprint would be subject to permanent impacts. Temporary impacts would not affect any archaeological resources identified thus far.

4.13.4 Mitigation

4.13.4.1 Historic Architectural Resources

The Adverse Effect Memo signed by FHWA, NHDOT, and NHDHR on August 13, 2019 determined that the Proposed Action would have No Adverse Effect on the Amoskeag Millyard Historic District. This finding was based on the relocation of the Valve House out of the impact area to minimize adverse effects. Thus, to ensure no adverse effect, NHDOT will coordinate with FHWA, NHDHR, and the owner of the Cotton Duck property to move the Valve House within the Historic District and retain its association and spatial awareness to the Cotton Duck Building. NHDOT will work with the property owner on the location and will ensure that prior to and following the move the building is structurally stable and weather tight.

4.13.4.2 Archaeological Resources

Following notification of the Adverse Effect to the ACHP, the details of an Archaeological Discovery Plan would be outlined in a Memorandum of Agreement (MOA) among FHWA, NHDOT, and NHDHR, and any Consulting Parties that may be identified.

Table 4.13-3 presents proposed additional investigations for known archaeological resources. Excavation and analysis have not been completed to the degree that archaeologists can determine eligibility for the National Register, although a consensus determination was made that the project would result in an Adverse Effect to archaeological resources.

Site Name	Results	Likely Action (Mitigation)
Milestone Brook V Site	Likely to recommend eligible	Phase II DOE
Country Club Site I	Likely to recommend eligible	Phase II DOE
Country Club Site II	Likely to recommend eligible	Phase II DOE
Country Club Site III	Likely to recommend not eligible	Phase II DOE
Exit 6 Site	Potentially eligible for NRHP	Phase II DOE
McGregor Street I Site	Potentially eligible for NRHP	Phase II DOE
McGregor Street II Site	Potentially eligible for NRHP	Phase II DOE
Eddy Site	Potentially eligible for NRHP	Phase II DOE
Front Street Overlook Site	Potentially eligible for NRHP	Phase II DOE

Table 4.13-3 Mitigation Measures for Known Archaeological Resources.

Note: Data from IAC, 2019.

For the nine sites that are potentially eligible, a Phase II DOE would be completed to develop more information to determine whether the resources retain sufficient archaeological integrity and research potential to warrant listing on the National Register. Following the Phase II investigations, if necessary, a Phase III Data Recovery Plan would be developed in consultation with NHDHR, and all necessary phases of archaeology would be completed. Other mitigation measures may include development of further archaeological context/reporting and educational outreach.

4.14 Hazardous Materials and Contamination

As defined by the USEPA, hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. The NHDES defines hazardous waste as a waste which may pose a present or potential threat to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Federal polices, regulations, and guidance that may pertain to hazardous materials include:

- Toxic Substances Control Act Polychlorinated Biphenyl regulations, Title 40 CFR 761;
- > Toxic Substances Control Act, 15 USC 2601-2692 including the Asbestos Hazard Emergency Response Action;
- > Occupational Safety and Health Administration (OSHA) Lead in Construction Standard, Title 26 CFR 1926.62:
- > OSHA Standards for Hazardous Materials. Title 29 CFR 1910 and 1926;

- > Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended, 42 USC 9601 et seg.; and RCRA and Superfund Amendments and Reauthorization Action, 42 USC 6901 et seq;
- > USDOT Hazardous Materials Transportation Act of 1975 as amended, 49 USC 5101-5127.

- > New Hampshire RSA 147-A, Hazardous Waste Management > New Hampshire RSA 146-A, Oil Discharge with Spillage and Surface Water or Ground
- > NHDES Administrative Rule Env-Hw 100 to 1200, Hazardous Waste Rules > NHDES Administrative Rule Env-Or 300 to 800, Oil & Remediation Program Rules
- > New Hampshire Env-A 1800, Asbestos Management and Control

potential to impact construction activities (See Figure 4.14-1).

4.14.1 Methodology

Water

For purposes of identifying contaminated sites, the Study Area included a one-mile buffer from the Project Footprint. This search radius was used to ensure all contaminated properties in the vicinity of the Project were identified; however, only properties within or directly abutting the Project Footprint were further analyzed for their potential to impact the Project.

An environmental database report was obtained from Environmental Data Resources, Inc., which summarized state and federal environmental records available within the Study Area.⁷⁴ A detailed review of the NHDES OneStop Database (available online) was also conducted. Database listings for parcels located within the Project Footprint and select abutting parcels are summarized on **Table J-1**, Summary of Hazardous Materials Review, provided in Appendix J. Based on these evaluations, additional investigation or mitigation strategies were recommended.

Field reconnaissance of the Study Area and properties adjacent to the Project Footprint was performed on March 31, 2016 to observe for overt evidence of oil and/or hazardous materials. It should be noted that the interiors of structures were not observed. Adjacent properties were also observed from publicly accessible exterior areas. Notes taken during the site reconnaissance were collected via a field screening form, included as Table J-2 in Appendix J.

- State polices, regulations and guidance that may pertain to hazardous materials include:

This section reviews known sites with contaminated soil or groundwater within the Study Area and identifies sites that would be impacted by the Proposed Action or which have the

⁷⁴ The report by Environmental Data Resources, Inc., dated September 19, 2018, can be provided upon request to the NHDOT.



City Park Land Conservation/Public Land

Stream

Bridge

Town/City Boundary

Assessed Parcels

Potential to Impact the Project

Hazardous Materials Review

4.14.2 Existing Conditions

Several sites that may have the potential to impact environmental media within the Project Footprint were noted. These sites include active gas stations, electrical substations, industrial manufacturers, a capped unlined landfill, and active NHDES remediation sites. Properties that are likely to impact the Project are based on a review of data in available NHDES reports are highlighted in red in Table J-1 in Appendix J. Of note are the following active NHDES cases:

- > Parcel TPK5-2, Mill West (Former Elbes Associates) at 195 McGregor Street (NHDES) Master ID 3351): A plume of chlorinated solvents in groundwater exists within the Study Area at this location. The contaminant concentrations exceed the Ambient Groundwater Quality Standards (AGQS), and a Groundwater Management Permit (GMP) has been assigned to this site. Groundwater at this site is located at depths ranging from 0.04 to 15.67 feet below the tops of well casings. Indoor air concentrations of contaminants measured in a nearby building have been detected above commercial screening levels.
- Parcel 768-38, Manchester Municipal Landfill at 625 Dunbarton Road (NHDES Master ID 3593): Groundwater at this property has been impacted by landfill leachate, which is in direct contact with the groundwater. Metals, volatile organic compounds (VOCs), and per- and polyfluoroalkyl substances (PFAS) are the primary contaminants at the remediation site, which is managed under a GMP. The Groundwater Management Zone (GMZ) extends from an area south of Dunbarton Road in a northeast direction to the Merrimack River, crossing the existing I-293 corridor. The limits of landfill waste are believed to be beyond the limits of construction, but due to the historical nature of the facility operations and lack of records, further research may be required as part of final design and construction.
- Parcel TPK7-26A, Gasoline Filling Station at 493 Front Street (NHDES Master **ID 3488):** A portion of this property is located adjacent to the Project Footprint. A GMP is in place at the property due to a gasoline release and select petroleum constituents have been measured in groundwater in excess of AGQS. Groundwater at the property is located at depths ranging from approximately 10 to 18 feet below the tops of well casings.
- Parcel TPK6-6, Gasoline Filling Station at 245 Eddy Road (NHDES Master ID 3651): A gasoline release at the property has impacted groundwater, which ranges from approximately 7 to 10 feet below the tops of well casings. VOCs have been detected in excess of AGQS, and the property has a current GMP. Under the Proposed Action, this parcel would be acquired in full.

In addition to the sites listed above, per- and polyfluoroalkyl substances (PFAS) have been found to be present in groundwater within the Study Area. PFAS are a very large group of man-made chemicals that are prevalent in many commercial products, including stain- and water-repellent or nonstick products. They are also used in industrial and manufacturing processes, and certain types of fire-fighting foam. These chemicals do not break down in the environment and are persistent in the human body causing substantial concerns about potential adverse health effects.

In 2018, NHDES initiated rulemaking to establish Maximum Contaminant Levels (MCLs) and AGQS for four PFAS: perfluorooctanioic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA) and perfluorohexane sulfonic acid (PFHxS). The current standards, ranging from 11 to 18 nanograms per liter, became effective on September 30, 2019.

PFAS sampling results have been reported by NHDES at several locations within the Study Area according to the NHDES public GIS data management system, ⁷⁵ including adjacent to the West Bridge Street Bridge, abutting the Project Footprint to the east. According to the NHDES online GIS map, PFAS were reported at this location exceeding the NHDES September 30, 2019 AGQS at 15.2 ng/L (PFOA) and 39.3 ng/L (PFOS). In addition, according to the August 3, 2017 Annual Sampling Summary Report for Mill West (Former Elbes Associates), three groundwater monitoring wells were sampled in June 2017 on the property and along the east side of I-93. The results in two wells (one on the property, and one in the NHDOT right-of-way) exceeded the NHDES September 30, 2019 AGQS for PFOA and PFOS with maximum results reported at 15.2 nanograms per liter (ng/L) and 39.3 ng/L, respectively.

According to the December 18, 2018 Annual Groundwater Monitoring Report for the Manchester Landfill, eleven groundwater samples were collected in November 2018 from within the landfill limits and the Project Footprint, and the maximum results exceeding the NHDES September 30, 2019 AGQS included 532 ng/L (PFOA), 48.8 ng/L (PFOS), and 25 ng/L (PFHxS). The general location of the PFAS sampling associated with these sites are depicted in Figure 4.14-2.

Although not specifically noted in the reports reviewed for the Mill West and Manchester Landfill, groundwater that has the potential to have PFAS impacts may be subject to management through a GMP to comply with recently implemented AGQS. Additionally, a current state legislative bill identified as SB309 would require the development of surface water quality standards for PFOA and PFOS by 2020. A discussion of management considerations for construction-related dewatering effluent associated with the Proposed Action is further discussed in Section 4.14.4.

4.14.3 Impacts

This section provides analysis of direct and indirect impacts the Proposed Action may have relative to contaminated properties known to exist within the Study Area. Also discussed are provisions for preventing additional contamination as a result of disturbing known areas of contamination during construction or introducing additional contaminants from construction equipment.

Refer to http://nhdes.maps.arcgis.com/apps/View/index.html?appid=66770bef141c43a98a445c54a17720e2&extent=-73.5743,42.5413,-

^{69.6852,45.4489}



Conservation/Public Land

Locations and PFAS Concentrations

4.14.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, documented contaminated properties within the Study Area would continue to be assessed and/or remediated per NHDES regulations. Because the No-Build Alternative would not change current infrastructure or operations, it would have no permanent impact to contaminated properties.

However, traffic volume within the Study Area is anticipated to increase over time. Under the No-Build Alternative, there would be higher potential for vehicular collision, which could result in small releases of vehicular fuels or fluids. These releases have the potential to impact environmental conditions. Since these releases are required to be reported to the NHDES and cleaned up, these impacts are anticipated to be minor.

Proposed Action

Properties that have the potential to impact the Project based on regulatory listings, field observations, or current or historical use are highlighted in red in Table J-1 (Appendix J). If a property did not have sufficient data to determine whether impacts to environmental media within the Project Footprint had occurred (inconclusive), it was listed in orange. Remaining properties in green are not expected to impact the proposed Project based on their location relative to the Project Footprint, lack of active status, groundwater flow direction, or current property use. Although all abutting properties were reviewed for potential environmental concerns, only abutting properties that were deemed to have some potential to impact the Project are listed in **Table J-2**. Active known sites will continue to be addressed per NHDES regulations and the Proposed Action will not hinder active assessment and remediation of these known sites. New drainage systems and utilities must be evaluated prior to construction to ensure that they do not create a preferential pathway for the movement of contaminants away from active NHDES Remediation Sites.

In addition to known sites, previously undiscovered spills of oil and/or hazardous materials may also be discovered during construction. If encountered, these materials would be handled appropriately and managed in accordance with local and state regulations. The removal of a percentage of the contaminated soil and/or groundwater would likely have a beneficial effect on confirmed areas of soil and groundwater contamination.

The effects of hazardous materials to humans and the environment resulting from roadway operations would not likely vary substantially from current conditions. However, under the Proposed Action, traffic would operate in a way that should lower the potential for automotive collisions when compared to the No-Build Alternative. This change is considered a beneficial effect since it should decrease the chance for contaminant releases to the environment.

4.14.3.2 Temporary Impacts

No-Build Alternative

contaminated properties.

Proposed Action

Contaminated soil and groundwater may be encountered during construction of the Proposed Action, particularly in areas of known contamination. As noted in Section 4.14.2, a total of four active NHDES case sites are located either within or abutting the Project Footprint. PFAS has also been identified in groundwater within the Project Footprint, and may potentially be found in saturated soils. The presence of contamination triggers the need for proper handling, management, and disposal procedures for soil and groundwater.

Groundwater impacted with chlorinated solvents located within the GMZ associated 195 McGregor Street will require treatment prior to being infiltrated under a temporary discharge permit or will require disposal at a licensed wastewater treatment facility. The contractor must ensure that the dewatering efforts do not cause migration of this existing plume towards the excavation area (or potentially sensitive areas) via modeling or other studies. Additionally, the elevated concentrations of PFAS identified above AGQS in the vicinity of the Project will trigger the need for proper management of saturated soils and groundwater during construction as noted in **Section 4.14.4** so as to not accidentally exacerbate plumes of contaminants or cross-contaminate saturated soils.

The Proposed Action would require excavation within the GMZ associated with the closed Manchester Landfill. In preparation for construction phases of the Project, NHDOT and its consultant prepared an analysis which outlines an approach to managing impacts from the Manchester Landfill. ⁷⁶ According to this analysis, dewatering would be required in three areas within the Project Footprint that fall within the boundaries of the Manchester Landfill GMZ. Groundwater generated from these areas would require treatment prior to reinfiltration and/or discharging to the municipal sewer, which includes PFAS impacted groundwater.

Soils and groundwater generated from these excavations would be managed in accordance with a Project-specific Soil & Groundwater Management Plan (SGMP) as described in Section 4.14.4 below.

The Project would also require excavation of Limited Reuse Soils (LRS), which are soils that are likely (based on "generator knowledge") and/or demonstrated (through laboratory analyses) to contain contaminant concentrations in the range of the NHDOT specific

Under the No-Build Alternative, the existing configuration and operation of I-293 within the Study Area would remain unchanged, and there would be no temporary impact to

Sanborn, Head & Associates, Inc. 2019. Unpublished Technical Memorandum entitled, Preliminary Opinion of Cost, Manchester, 16099

Project, I-293 Exits 6 and 7, Manchester, New Hampshire, dated January 2019.

Acceptable Reuse Concentrations. Roadside LRS commonly encountered at NHDOT construction projects include:

- > Soils with elevated concentrations of several polynuclear aromatic hydrocarbons and a few common metals; and
- > Soils with petroleum residue (total petroleum hydrocarbons (TPH) related to the normal operation of motor vehicles and asphalt pavement.

The NHDOT has determined that roadside LRS may be encountered in all topsoil within the limits of the existing NHDOT ROW, regardless of its depth. In instances where topsoil is not present, soil from the top of ground to a depth of 6 inches is considered to be LRS. Soils excavated from beyond and/or below the specified LRS limits that do not exhibit visual or olfactory evidence of potential contamination shall not require handling as impacted material. Material generated from catch basin cleanouts, street sweeping, and ditching efforts are also considered LRS.

A moderate amount of construction debris would potentially be generated during construction of the Proposed Action. Asbestos-containing materials may be encountered if demolition disturbs unidentified conduits beneath the roadway, depending on their age. In addition, lead-based paint, mercury, polychlorinated biphenyls (PCBs), and other special wastes may also be present in conduits and bridge structures. The abatement of these materials would be performed in accordance with appropriate regulations to ensure that there would be no adverse effect such as releases or misdirected wastes.

Construction-related equipment contains mechanical fluids that have the potential to results in spills or leaks when not maintained in good working order. Contractors may also employ the use of supplies containing hazardous materials to conduct their work. The spill or release of oil and/or hazardous materials in the process of construction is an unlikely event; spill prevention plans, which dictate spill prevention and mitigation measures (*i.e.*, spill kits, emergency response procedures, etc.) would be required. Therefore, construction-related equipment being used during construction phases of the Proposed Action is not anticipated to result in an adverse effect.

4.14.4 Mitigation

As noted throughout this section, impacts associated with the No-Build Alternative and Proposed Action stem from excavation within contaminated soils or groundwater, releases from potential vehicular collisions, constructed-related equipment spills, and hazardous building debris abatement.

Spills and leaks associated with vehicles and heavy machinery may be appropriately mitigated through the implementation of spill response programs that specify procedures for emergency response in the event a spill or leak occurs. Depending on the nature of the spill or discharge to the environment, it may also be necessary to contact regulatory agencies. The agency to be contacted would depend on the nature and amount of the spilled material and the location of the spill.

Hazardous building materials (asbestos, lead-based paint, PCBs, mercury, and others) would be inventoried prior to any structural demolition or renovation work. If these hazardous materials are found to be present in the structures, then they would be properly abated by a licensed contractor in accordance with state and local regulations and shipped to a receiving facility licensed to handle the specific type of solid waste under the appropriate shipping documents such as manifests.

If groundwater impacted by oil and/or hazardous materials, such as chlorinated solvents and/or PFAS, is encountered during construction phases, dewatering activities shall be conducted in accordance with applicable federal and state regulations (including NHDES rules and/or Groundwater Management Plans) and coordinated with NHDES and the City of Manchester. Groundwater within these GMZs will be treated using a conventional water treatment system and based on the assumption that liquids are treated to less than AGQS for all parameters, infiltrated under a temporary discharge permit. Groundwater generated from within the GMZ associated with the Manchester Landfill may also be discharged to the City of Manchester sanitary sewer following treatment. If contaminant concentrations in the treated effluent cannot be lowered below AGQS, then treatment may not be feasible.

If saturated soils located within the GMZ adjacent to the Manchester Landfill require removal, these saturated soils will be excavated, stockpiled, drained of free liquids, and tested to determined leachability concerns. The drained free liquids will be treated as dewatering liquids and disposed or infiltrated accordingly. Based on the analytical results, if leachability is a concern, then the soil cannot be reused within the Project Footprint and may require disposal at a permitted landfill or treatment at a permitted incinerator. If there are no leachability concerns, then soils should be reused within the GMZ area. Soil that cannot be re-used and requires disposal at a landfill or incinerator treatment will increase Project impacts due to the limited facility options available for managing PFAS-impacted soils, and may result in cost premiums and construction delays.

A project SGMP would be developed in accordance with NHDOT specifications, based upon the results of subsurface investigations for the Proposed Action, with special attention to areas where excavation within contaminated soil or groundwater would occur. These investigations would be conducted in order to pre-characterize soils that are designated for excavation during construction phases of the Project. A SGMP typically outlines standards and procedures for the identification, handling and disposal of contaminated materials that may be encountered during construction. Soil tracking protocols would be detailed from the point of excavation to designated testing areas and to the ultimate disposal site. Fugitive dust would be controlled through wetting, sweeping, and other suppression techniques. The SGMP would include analytical data for the Contractor to develop a comprehensive health and safety plan.

Contractors would be advised that roadside LRS have been identified within the Study Area. The SGMP would provide guidance for the identification, handling, storage, reuse, and disposal of LRS soils generated during construction activities.

The Project would require the Contractor to develop a Project Operations Plan (POP), which would specify the Contractor's means and methods for handling and managing LRS and

Contaminated Soil and Groundwater. This would include the implementation of the BMPs described in the SGMP. No excavation would take place until the POP has been approved by the NHDOT. In addition, following approval of the POP, the Contractor would be required to notify the NHDOT's Bureau of Environment at least two weeks prior to beginning excavation.

In general, the SGMP would require that LRS be reused, with priority, within the Project Footprint if feasible. Reuse restrictions would require that LRS placement be in accordance with the BMPs described in the SMP and with applicable federal, state, and local regulations. If reuse within the foregoing restrictions is not possible, alternative disposal options would be identified in the SGMP. LRS would not be disposed of on non-NHDOT property.

Because the Proposed Action may impact active groundwater monitoring wells located on both public and privately-owned properties as depicted in Figure 4.14-2, these groundwater monitoring wells will need to be decommissioned and relocated as necessary in coordination with the well owner and NHDES.

4.15 Visual and Aesthetic Resources

Visual and aesthetic resources include naturally occurring landscape features as well as man-made resources or structures. FHWA's Guidelines for Visual Impact Assessments of Highway Projects states that "Roads... are extensions of a community's values and aesthetic preferences."77 The anticipated visual and aesthetic impacts of the Project – both beneficial and adverse - are discussed in this section. Both impacts to visual resources (the affected environment) and viewers (the affected population) are considered. The visual impact assessment is consistent with the following list of laws, regulations, guidance and plans pertaining to the protection and enhancement of scenic qualities.

- > Federal-aid Highway Act of 1970
- > FHWA's Guidelines for Visual Impact Assessments of Highway Projects (2015)
- > FHWA's NEPA procedures codified in 23 CFR 771
- > Intermodal Surface Transportation Efficiency Act of 1991
- > Wild and Scenic Rivers Act of 1968
- > National Trails Systems Act of 1968
- Antiquities Act of 1906
- > Section 106 of the National Historic Preservation Act of 1966⁷⁸
- > Section 4(f) of the Department of Transportation Act of 1966
- Section 6(f) of the Land and Water Conservation Fund (LWCF)
- > City of Manchester's Master Plan (2009)

State public land management programs and plans may contain measures to protect the visual quality of protected areas (e.g., forests and parks, public landscapes, restoration areas, and others). Refer to Section 4.12, Parks, Recreation, and Conserved Lands, for information on these protected areas.

4.15.1 Methodology

A field review of the Study Area was completed in the summer of 2016 in accordance with FHWA's Guidelines for Visual Impact Assessments of Highway Projects. Additional visual assessment was completed using photographs and aerial mapping programs. The visual Study Area was identified through these efforts, and includes adjacent areas visible from the highway corridor, and areas from which the highway can be seen by viewers.⁷⁹ The visual inventory within the Study Area includes existing buildings and infrastructure, visually sensitive resources, as well as the general components that form the basis of all landscapes. The inventory includes:

- residential areas, and utilities lines.
- 6(f).
- byways, routes, and vistas.

This visual impact assessment identifies areas along the Project corridor that would be impacted by the proposed changes along I-293 and adjacent roadways. In addition, the assessment accounts for seasonally changing views (leaf-on versus leaf-off).

4.15.2 Existing Conditions

4.15.2.1 Views from the Highway Corridor

The I-293 corridor serves as the principal arterial highway providing access to the most populated city in the state. Located in the Merrimack River floodplain, this area is also the location of the historic Amoskeag Mill complex on both the east and west side of the river. To the east views of the Merrimack River and downtown Manchester from the roadway are limited throughout the corridor during the summer months by a narrow but dense buffer of natural vegetation between the roadway and the Merrimack River. During the winter and early spring, good views of downtown and the Amoskeag Mills on the east side of the river exist throughout the southerly end of the corridor (south of Exit 7).

> Landscape features - such as topographic features, vegetation, wildlife, ecological communities and landscapes such as wetlands and farmlands.

> Manmade development – such as urban centers, industrial, commercial, institutional and

> Parks and recreation facilities – including properties protected by Section 4(f) and Section

> Historic and archaeological resources – such as properties protected under Section 106. > Other protected or iconic cultural resources – such as scientific or natural areas, scenic

⁷⁷ US Department of Transportation, Federal Highway Administration. 2015. *Guidelines for the Visual Impact Assessment of Highway Projects*, FHWA-HEP-15-029.

⁷⁸ Visual impact to historic resources is discussed under **Section 4.13**, *Cultural Resources*.

Travelling southbound along I-293, there is a brief but comprehensive view of the Merrimack River downstream of the Amoskeag Falls and the mill buildings adjacent to the river, just south of Exit 6. Traveling northbound along I-293, there are views of MCC and a few buildings in the Hilltop Ridge Apartments at 22A Country Club Drive. In the western portion of the proposed Exit 7 interchange and Connector Road along Dunbarton Road, roadway users traveling east view existing blocks of forest to the north. In the portion of the Study Area north of Exit 7, dense vegetation largely screens the views from the roadway.

4.15.2.2 Views toward the Highway Corridor

Views of the highway corridor from the surrounding community are limited during the summer months by dense vegetation. Across the Merrimack River to the south there are views from Arms Park toward the highway at all times of the year. During the winter months, the highway and portions of the related roadway network can be seen from Stark Park and from the surrounding residential neighborhoods on the eastern side of the Merrimack River. From Stark Park, there are long views with the Merrimack River in the foreground and buildings between the river and the highway. Additionally, there are a few buildings in the Hilltop Ridge Apartments that provide views of the northerly portion of the Study Area, but dense vegetation largely screens the views of the highway.

4.15.2.3 Visual Resources

No Wild and Scenic Rivers are within the Study Area; therefore, there are no locations subject to the Wild and Scenic Rivers Act of 1968.⁸⁰ In addition, there are no National or State Scenic Byways or routes in the Study Area; therefore, there are no locations subject to the Intermodal Surface Transportation Efficiency Act of 1991.⁸¹

There are no nationally significant scenic trails designated under the National Trails Systems Act of 1968⁸² located in the Study Area. However, the Riverwalk, a paved recreational trail maintained by the Manchester Parks Department, runs through the Millyard and is part of the Heritage Trail. The Riverwalk trail begins near Textile Court to the south and continues for 0.5-mile along the Merrimack River, offering views of the river and historic mill buildings to the west.

According to the National Park Service, there are no national monuments within the Study Area that are established under the Antiguities Act of 1906 within the State of New Hampshire,⁸³ nor are there any Section 6(f) properties. Existing Section 4(f) resources include the public parks described under Section 4.12, Parks, Recreation, and Conserved Lands, as well as properties eligible for listing under the NRHP (see Section 4.13, Cultural Resources).

4.15.3 Impacts

The following sections discuss potential permanent and temporary visual impacts of the Proposed Action in comparison with the No-Build Alternative. According to the FHWA's Guidelines for Visual Impact Assessments of Highway Projects, permanent impacts are those resulting from the Proposed Action, or construction activities lasting for two or more years, or the operations and maintenance associated with the Proposed Action. Temporary impacts are those impacts that would end with construction activities.

4.15.3.1 Permanent Impacts

No-Build Alternative

from existing conditions.

Proposed Action

Under the Proposed Action, new construction and substantial reconstruction would occur to the Exit 6 interchange and Exit 7 interchange, causing noticeable changes to visual resources, viewers, or visual quality. In general, views from the highway would be affected by additional pavement, highway widening, construction of the Exit 6 and 7 interchanges, installation of sound walls, and loss of natural vegetation buffers. The alterations of views would occur between the highway, the reconfigured and relocated Exits 6 and 7, and existing urban development. Views toward the highway would change through the installation of sound walls, elevation of the Exit 6 interchange, construction of the relocated Exit 7 interchange, removal of trees, and addition of pavement for new or existing roadways. The impact assessment below is divided into six Visual Impact Area (VIA) sections, each corresponding to specific segments of the Study Area, as depicted in Figure 4.15-1.

VIA Section 1

From the southernmost limits of the Study Area to the nose of the Exit 6 on-ramp on the SB lanes, minor visual changes would occur to roadway users. Minor changes to roadway views would occur through the widening of I-293 from two lanes to three lanes in either direction. Minor visual changes would occur for roadway users due to the construction of a vegetated swale adjacent to the west of the Exit 5 SB off-ramp at a point approximately 780 feet from the southern Study Area limits.⁸⁴

Under the No-Build Alternative, the Proposed Action would not be constructed. Therefore, there would be no impacts to visual and aesthetic resources. No visual changes would occur

US Department of the Interior, National Park Service. 2016. National Wild and Scenic Rivers System. Accessed from https://www.nps.gov/ orgs/1912/plan-your-visit.htm. Accessed on September 18, 2018.

⁸¹ US Department of Transportation, Federal Highway Administration. Undated. America's Byways – New Hampshire. Accessed from https://www.fhwa.dot.gov/byways/states/NH. Accessed on September 18, 2018.

⁸² US Department of the Interior, National Park Service. Undated. National Trails System. Accessed from https://www.nps.gov/subjects/ nationaltrailssystem/maps.htm. Accessed on September 18, 2018.

US Department of the Interior, National Park Service. Undated. National Monuments List. Accessed from https://www.nps.gov/archeology/ sites/antiquities/MonumentsList.htm. Accessed on September 25, 2018.

⁸⁴ A vegetated swale is a manmade wetland typically in a long, narrow, low-lying ditch that is planted with native wetland vegetation.





Manchester 16099





I-293 Exits 6 and 7

Visual and Aesthetic Resources

Similarly, minor visual changes for roadway users would occur from the construction of an extended detention basin adjacent the SB lanes at a point approximately 80 feet north of the West Bridge Street overpass.⁸⁵ Approximately 0.15 acre of vegetation would be cleared in this area and a retaining wall constructed along the southern and western perimeter.

On the east side of the NB lanes between the mainline and the Merrimack River, approximately 1.0 acre of trees would be cleared, also constituting a benefit to viewers because of the increase in key viewpoints of the Merrimack River along this stretch of I-293 for SB travelers. Elevated views from the developments to the west of the SB lanes would also benefit from the increased visibility of the Merrimack River and buildings across the river to the east.

A minor visual change for roadway users and views from commercial developments would be introduced from approximately 0.5 acre of tree and vegetation clearing just south of the I-293 SB on-ramp off of Eddy Road. An extended detention basin would be constructed in this location and the on-ramp slightly reconfigured to allow traffic heading south on Eddy Road to turn left onto the SB on-ramp. These minor visual infrastructure changes would be consistent in character with the existing built, urban setting.

VIA Section 2

From the nose of the Exit 6 on-ramp on the SB lanes to the northern limit of the Exit 6 SPUI, moderate to substantial visual changes would occur to roadway users and residences. Minor changes to roadway views would occur through the widening of I-293 from two lanes to three lanes in either direction. The mainline would travel underneath the new Exit 6 SPUI and associated south- and northbound on- and off-ramps. Travelers on the SB and NB lanes would experience moderate visual changes due to the construction of two extended detention basins (one on either side of the mainline), reconfiguration of the Exit 6 ramps, construction of retaining walls adjacent to either side of the mainline, and tree clearing to the west and east of the mainline.

To the south of Goffstown Road and west of the mainline, approximately 0.8 acre of trees would be cleared, constituting a moderate visual change to residences along Coolidge Avenue and roadway users of Eddy Road. Viewers in this area would also experience a minor visual change from the reconfiguration of the Exit 6 SB and NB ramps. The changes in this area would be consistent with the visual character of the existing built, urban environment.

The western portion of Goffstown Road that lies within the Study Area would be widened slightly, resulting in a minor visual change for roadway users and residences in the immediate area. To the west of the Exit 6 SPUI, approximately 1.4 acres of trees would be cleared directly adjacent to the SB lanes and north of Goffstown Road. Three properties would be acquired to accommodate the construction of an emergency-responder access roadway, constituting a visual change to nearby residences on Front Street and Goffstown Road. A moderate visual change would occur for roadway users and residences due to the

reconfiguration of Eddy Road and Front Street, which would pass beneath Goffstown Road via a new underpass. The Proposed Action would not alter any key viewpoints or scenic resources in this area, and all changes would be consistent with the visual character of the existing built, urban environment.

The Exit 6 SPUI elevation would be approximately 5 feet higher than the existing Exit 6 interchange configuration. The increase in elevation of the Exit 6 SPUI would introduce a minor visual change for roadway users and residences to the west and east. However, these infrastructure changes would be consistent with the visual character of the existing built, urban setting. Key viewpoints would remain unaltered. Roadway users of the I-293 NB lanes would still experience key views of the Merrimack River to the east.

In the area south of the Exit 6 SPUI and east of the NB lanes, approximately 1.6 acres of trees would be cleared from the construction of the new Exit 6 NB off-ramps, introducing a minor visual change for roadway users and viewers to the south and north of Amoskeag Street. Widening Amoskeag Street would also constitute a minor visual change, as the visual character would be consistent with the urban setting that already exists in this area. At the easternmost portion of the Study Area at a point approximately 90 feet west of the Amoskeag Bridge abutment, an extended detention basin would be constructed, introducing minor visual changes to roadway users or viewers from nearby developments. Key viewpoints of the Merrimack River would remain unaltered, as the area is generally clear of vegetation and the roadway is at a higher elevation than where the basin would be constructed.

VIA Section 3

Starting just north of the Exit 6 SPUI to a point approximately 160 feet north of the Stark Way underpass, moderate visual changes would occur from the construction of sound walls. (see Figure 4.3-2 for the location of sound walls.) The sound walls would introduce a moderate visual change for residences to the west and east of the mainline. The sound walls would mitigate highway noise and benefit these residences and provide a visual screen of the highway in winter months. Installation of the sound walls would not alter any key viewpoints of the Merrimack River for residences.

A moderate visual change would occur to the condominium residences at 55 Riverfront Drive due to tree clearing of approximately 0.4 acre of forested area. An extended detention basin would be constructed between the NB lanes and the northernmost condominium. Roadway users of I-293 NB would not experience a visual change due to construction of the extended detention basin. As with the sound walls, the extended detention basin would not alter any key viewpoints of the Merrimack River.

Roadway users would experience a minor visual change from the sound walls, as existing trees and buildings currently block all but one momentary view of the Merrimack River and Black Brook (just after I-293 NB mile marker 8). The speed limit is 55 miles per hour, which only allows for a fleeting view of the Merrimack River and Black Brook tributary to the east.

Travelers on I-293 SB would experience a minor visual change from the construction of a vegetated swale to the west of the SB lanes, approximately 370 feet south of the Stark Way

An extended detention basin is a permanent, manmade pond with native vegetation planted around the perimeter. The extended detention basins proposed as part of the Project would be fenced, which is typical of NHDOT highway projects. For additional information on the extended detention basins, refer to Section 4.6, Water Quality.

underpass. Viewers from the commercial property at 599 Front Street would also experience

a minor visual change due to the introduction of the swale.

Minor changes to roadway views would occur through the widening of I-293 from two lanes to three lanes in either direction. The Proposed Action would not alter any key viewpoints or scenic resources in this area, and all changes would be consistent with the visual character of the existing built, urban environment.

VIA Section 4

Minor visual changes would occur from the Stark Way underpass to the southern limit of the new Exit 7 interchange underpass. I-293 mainline travelers would experience more open views of the Manchester Landfill to the west due to approximately 3.7 acres of tree clearing adjacent to the SB lanes.

Minor visual changes would occur from approximately 3.3 acres of tree clearing to the east of the NB lanes between the Stark Way underpass to the southern limit of the new Exit 7 interchange underpass. To the east of the NB lanes just before the Front Street underpass, an extended detention basin would be constructed. Travelers on I-293 NB would experience a minor change in views due to the basin, which would only be momentarily visible, if at all.

Minor changes to views would also occur through the widening of I-293 from two lanes to three lanes in either direction. With these changes, the Proposed Action would not alter any key viewpoints or scenic resources in this area, and new infrastructure would be consistent with a built, urban environment.

VIA Section 5

Minor changes to views would occur from just south of the Exit 7 interchange underpass to the nose of the Exit 7 on- and off-ramps on the NB and SB lanes (respectively) through the widening of I-293 from two lanes to three lanes in either direction. Construction of the new Exit 7 interchange underpass would cause substantial visual changes. Travelers on the I-293 mainline would view new infrastructure to the west and east, as the existing undeveloped, forested setting would be altered to the characteristics of a built, urban environment. Visual impacts of the Exit 7 interchange East-West Connector are discussed in more detail below.

VIA Section 5: West

Approximately 18.5 acres of forested area west of the Exit 7 on-ramp on the NB lanes to just south of the Exit 7 interchange underpass would be cleared and altered to a built, urban environment. Along Dunbarton Road, residences located northwest of the Study Area would experience a minor visual change. The majority of land to the north of Dunbarton Road would remain forested and unaltered.

Roadway users would experience substantial visual changes from the introduction of new roadway infrastructure and tree clearing. Dunbarton Road would be reconfigured to intersect with the new Exit 7 Interchange West Connector, shifting the existing Dunbarton Road approximately 260 feet to the northeast. Views of Aggregate Industries, a concrete mix supplier at 888 Dunbarton Road, would be reduced due to the reconfiguration of Dunbarton

Road to the north. A gravel wetland would be constructed just west of this new intersection and would be visible to roadway users.⁸⁶ Although substantial, these infrastructure changes would provide roadway users with new views of forested areas adjacent to the roadway. Additionally, as roadway users travel east along the Exit 7 Interchange West Connector, a portion of cleared utility ROW would be visible midway between Dunbarton Road and Exit 7 interchange underpass. The approximately 230-foot wide utility ROW generally runs north to south in this section of the Study Area, and currently intersects Dunbarton Road to the south, just west of the Manchester Landfill.

Travelling east along the Exit 7 Interchange West Connector, roadway users would experience views of the Manchester Landfill to the south, and mostly uncleared forest to the north, except for the cleared utility ROW. Roadway users would also view the new Exit 7 interchange infrastructure to the northeast, comprised of the Exit 7 SB on- and off-ramps, an extended detention basin, retaining walls, and an approximately 0.8-acre forested area between the Exit 7 SB off-ramp and on-ramp. Roadway users would view the area east of the Exit 7 interchange (described in VIA Section 5: East below) upon crossing underneath the I-293 mainline.

VIA Section 5: East

New sound walls would continue from the north, adjacent to the NB lanes, ending at a point approximately 320 feet southeast of roadway Sta. 24015 then continuing east for approximately 175 feet. The sound walls would introduce a moderate visual change for roadway users as well as residences to the east of the I-293 mainline, particularly the third-floor residences in the apartment complex along southwestern side of Country Club Drive in winter months. The sound walls would mitigate highway noise and benefit most of the apartment complex residences by providing a visual screen of the highway. For roadway users traveling along the I-293 mainline, the addition of sound walls would be consistent with that of an expanding, urban environment and would not alter any key viewpoints or scenic resources.

A total of approximately 11 acres of forested area to the east of the nose of the Exit 7 off-ramp on the SB lanes to just south of the Exit 7 interchange underpass would be cleared and altered to a built, highway environment. Roadway users traveling east along the Exit 7 Interchange East-West Connector would experience substantial visual changes because of the introduction of new roadway infrastructure and tree clearing.

Other altered viewpoints would be from the northwest and northeast facing sides of MCC, and from the north facing side of the Regency Place apartment complex. The cleared forested area to the northwest of MCC would be a moderate visual change, as the area east of the mainline and west of the new MCC Drive would largely remain screened by vegetation. The cleared forested area to the northeast of MCC would be a substantial visual change due to the introduction of the Exit 7 Interchange East Connector and the roadway entrance to MCC off Front Street. Views to the northwest from the Regency Place apartment

A gravel wetland is a manmade structure, typically consisting of two gravel-bottom basins that hold water during storm events only. The perimeter of the wetland may be planted with native wetland grasses or other vegetation.

complex would be substantially altered from forested area to cleared land with an extended detention basin.

Along Front Street, scenic views of the Merrimack River would not be altered for either roadway users or residences, as only minor tree trimming would occur which would increase views of the Merrimack River. A moderate visual change for roadway users would occur due to the approximately 370-foot long retaining wall that would be constructed along the west side of Front Street in front of the Regency Place apartment complex. The Proposed Action includes tree trimming in this area with tree removal to construct the retaining wall.

Roadway users continuing north along Front Street would experience a moderate visual change from clearing an approximately 0.5-acre sparsely vegetated area for roadway and infrastructure reconfiguration at the intersection of Front Street with Country Club Drive and the Exit 7 Interchange East Connector. Currently, Country Club Drive intersects Front Street as a T-Intersection layout. The new roadway and infrastructure reconfiguration would replace the T-Intersection with a stoplight controlled four-way intersection. The immediate area surrounding the T-Intersection is mostly cleared and landscaped, as Country Club Drive serves as the entrance to the residential apartment complexes: Washington Park and Regency Place.

The new stoplight controlled four-way intersection would be located approximately 150 feet northwest of the existing T-Intersection of Front Street and Country Club Drive. Roadway travelers would experience a visual change from the introduction of a new four-way intersection, specifically, the addition of the Exit 7 Interchange East Connector to the west. As stated in the text above, roadway users traveling along the Exit 7 Interchange East-West Connector would experience substantial visual changes because of the introduction of new roadway infrastructure and tree clearing. The northwest facing side of the Regency Place apartment complex would be highly visible to roadway users heading east along the Exit 7 Interchange East Connector, toward Front Street.

Three residences along the existing configuration of Front Street (houses at 1164, 1369, and 1385 Front Street) would experience a visual change to the west due to reconstruction of Front Street, including introduction of a new stoplight controlled four-way intersection, as described previously. A private shared driveway would also be constructed to serve these three residences, replacing the current access from Front Street. Additionally, key viewpoints of the Merrimack River to the east from these residences would remain unaltered.

VIA Section 6

From the nose of the Exit 7 off-ramp on the SB lanes to the northernmost limits of the Study Area, minor changes to views would occur through the widening of I-293 from two lanes to three lanes in either direction. Views to and from the roadway would remain screened by vegetation, although the vegetation would be less dense due to approximately 3.8 acres of tree clearing adjacent to the SB lanes and approximately 6.9 acres of tree clearing adjacent to the NB lanes. New sound walls adjacent to the NB lanes would introduce a moderate visual change for roadway users as well as residences to the east of the I-293 mainline. For roadway users, the addition of sound walls would block views of the dense trees adjacent to the I-293 mainline; however, these changes would be consistent with that of an expanding,

urban environment and would not alter any key viewpoints or scenic resources as described in Section 4.15.2.3 (*i.e.*, wild and scenic rivers, national or state scenic byways, nationally significant trails, or any national monuments). In addition, sound walls are conventional design elements of highways and therefore would not impact the visual quality or character of the area. The sound walls would mitigate highway noise and benefit residences to the east of I-293 by providing a visual screen of the highway. One extended detention basin would be constructed on the east side of the NB lanes past the sound walls. Roadway travelers on the I-293 mainline and residents would likely see the extended detention basin, however the visual impacts would be minor and dense vegetation would persist after construction.

4.15.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the existing configuration of I-293 with Exits 6 and 7 would remain unchanged, therefore there would be no visual changes along the roadway and no temporary impacts.

Proposed Action

Temporary visual impacts associated with the Proposed Action would occur during the construction period. Roadway users and residences would view various highway construction activities, including the presence of construction vehicles, equipment, raw materials, and staging areas, during the different phases within the 5-year construction period. Throughout the 5 years of construction, viewers would see temporary, minor visual changes throughout the duration of construction as different phases begin or end. Roadway users and residences would see typical progression of roadway construction milestones, which may include but would not be limited to:

- various sites and locations;
- > Fluctuating volumes of truck traffic, which would depend on the construction phase and location within the Project Footprint;
- roadway markings; and

permanent diminution or loss of key viewpoints.

> Changing construction equipment and materials, including small and heavy machinery, at

> Periodic detours or other traffic control measures, including new signage and temporary

> Temporary fencing installed for public safety to enclose construction areas, as needed.⁸⁷

Construction equipment, vehicles, raw materials, fencing, and temporary traffic detours would be removed from the area once construction is complete. These temporary construction-related components in the visual setting of the Study Area would not result in a

⁸⁷ For additional information on construction of the Proposed Action, refer to Section 4.18, Construction.

4.15.4 Mitigation

Although visual characteristics of the Proposed Action are similar to the urban character that exists within the Study Area, the viewshed would be altered by the Project because forested areas would be cleared and altered to a built, urban environment. Table 4.15-1 below presents mitigation measures and best practices which could lessen visual impacts associated with construction and final design of the Proposed Action. Mitigation measures for the Proposed Action would be selected during final design. The suggested mitigation measures discussed below may not fully rectify all visual impacts but may serve to reduce the overall effect of the Proposed Action.

Visual Impact	Mitigation Measure/Best Practice
Land uses adjacent to construction areas may have sensitivity to night time lighting.	Limit construction-related artificial light to safety and security requirements while providing minimum impact to the surrounding environment.
The Proposed Action involves site grading and vegetation removal.	Plantings will be within NHDOT specifications for areas that are justified and warrant plantings. Plantings of trees, shrubs, and an herbaceous understory of varying heights, as well as both evergreen and deciduous will be selected, if necessary, to mimic natural surrounding vegetation.
The Proposed Action involves construction of sound walls adjacent to the ROW line.	Minimize the removal of trees and shrubs and pruning needed to accommodate sound walls.
The Proposed Action involves the reconfiguration of the Exit 6 interchange, and the construction of the new Exit 7 interchange and connector road.	In coordination with the City of Manchester, a variety of improvements could be considered including such items as flower beds, landscaped areas, wayfinding signage, or welcome signs. It is assumed the City would retain ownership and responsibility for the maintenance of these visual improvements.

Table 4.15-1 **Mitigation Measures and Best Practices to Minimize Visual Impacts**

4.16 Environmental Justice

Environmental Justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies. FHWA is guided by the following Environmental Justice principles, provided by US DOT Order 5610.2(a):

- > To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- > To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- > To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects on the health or environment of minority and low-income populations to the greatest extent practicable. Title VI of the Civil Rights Act 1964 prohibits discrimination by recipients of federal financial assistance on the basis of race, color, and national origin, including matters related to language access for those persons with limited English proficiency (LEP). Executive Order 13166 requires Federal agencies examine the services they provide, identify any need for services to those with LEP, and develop and implement a system to provide those services so LEP persons can have meaningful access to them. FHWA Order 6640.23A establishes policies and procedures for FHWA to use in complying with Executive Order 12898, while the CEQ provides guidance on NEPA and Environmental Justice analysis in their publication Environmental Justice: Guidance Under the National Environmental Policy Act. These regulations and associated guidance provide the foundation for the Environmental Justice analysis detailed below.

4.16.1 Methodology

The following sections identify and discuss the presence of minority populations, low-income populations, elderly populations and LEP persons. To document the presence of minority populations, low-income populations, elderly populations, and LEP persons, this analysis utilized data from the 2011-2015 American Community Survey 5-year Estimates from the US Census Bureau, as documented in the Environmental Justice Population Analysis produced by NHDOT (provided in **Appendix K**). Drawing on the CEQ Guidance, the analysis identifies Census Tracts or Block Groups that satisfy the Environmental Justice criterion. The criteria for determining Environmental Justice populations include areas where the proportion (percentage) of the minority or below-poverty population in an area is "meaningfully greater" than the percentage in the broader, surrounding area. As determined by the NHDOT's Office of Federal Compliance, low-income population for this analysis is defined as household income of less than \$25,000. When a LEP language group constitutes 5 percent of the impacted population, NHDOT is required to translate public information meeting notices and take appropriate measures to ensure language access.

4.16.2 Existing Conditions

The Study Area is comprised of Census Tracts within the "Impacted Area" (the population within a 1-mile radius of the Project limits of work) and the "Surrounding Area" (the population within a 3-mile radius from the Project limits of work, excluding the impacted area). The 3-mile surrounding area includes Census Tracts in the towns of Bedford, Goffstown, Dunbarton, and Hooksett, NH. Data pertaining to minority populations, median income, LEP, and age were averaged within the Impacted Area and Surrounding Area and is presented in Table 4.15-2 below.

Table 4.15-2 **Population Characteristics within the Environmental Justice Study** Area¹

Avg % Minority	Avg % Low-income	Avg % Elderly	Avg % LEP
16.59	29.72	12.60	4.47
10.51	17.07	14.26	2.35
	Avg % Minority 16.59 10.51	Avg % Avg % Minority Low-income 16.59 29.72 10.51 17.07	Avg % Avg % Avg % Minority Low-income Elderly 16.59 29.72 12.60 10.51 17.07 14.26

Note

Analysis from Inter-Office Communication from Jav Ankenbrock, NHDOT to Marc Laurin, NHDOT entitled "Environmental Justice Population Analysis, Project: Manchester Turnpikes 16099; I-293 Reconstruction and Expansion," dated March 26, 2018. See Appendix K.

The above analysis documents minority populations, low-income populations, elderly populations and LEP persons based on established thresholds applied to identified geographic units (*i.e.*, Census Tracts). The population of minority and low-income residents within the Impacted Area constitutes an Environmental Justice population, as the population percentage identified is meaningfully greater than the surrounding area.

4.16.3 Impacts

4.16.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative, the I-293 mainline expansion, Exit 6 interchange, and Exit 7 interchange would not be expanded, replaced, or relocated (respectively). There would be no permanent impacts to Environmental Justice populations.

Proposed Action

Under the Proposed Action, permanent impacts of the Project include property acquisitions, changes to land use, and changes to transportation infrastructure.

None of the businesses which would be fully acquired specifically serve Environmental Justice communities (e.g., food pantries, low-income and family housing, or homeless population services). Changes to land use include the conversion of undeveloped, commercial, and residential properties to transportation ROW. The Proposed Action provides a permanent benefit by improving traffic conditions within the City of Manchester and surrounding municipalities. For these reasons, the Proposed Action is not expected to cause disproportionately high or adverse effects on any minority or low-income populations in accordance with the provisions of Executive Order 12898.

4.16.3.2 Temporary Impacts

No-Build Alternative

Under the No-Build Alternative, the I-293 mainline expansion, Exit 6 interchange, and Exit 7 interchange would not be expanded, replaced, or relocated (respectively). There would be no temporary impacts to Environmental Justice populations.

Proposed Action

Under the Proposed Action, direct and indirect construction impacts would be temporary and short-term. During construction of the Project, temporary impacts would result from the use of construction equipment, earthmoving, and other activities which would cause increases in truck traffic, increased emissions, and noise and vibration causing activities. Construction of the Project, with implementation of mitigation measures, is not anticipated to result in substantial adverse effects. Therefore, it would not cause a disproportionately high and adverse impact on any minority or low-income populations as defined by Executive Order 12898. No further Environmental Justice analysis is required pertaining to the Project's construction period.

4.16.4 Mitigation

Since the Proposed Action is not expected to cause a disproportionately high and adverse impact on such populations, no mitigation is required. However, because NHDOT's analysis shows the presence of protected groups within the Study Area, special considerations related to the planning and design of the Project [i.e., American with Disabilities Act (ADA) compliance] and public outreach for future meetings are recommended. Public involvement efforts would accommodate and encourage participation by traditionally underserved groups, where substantial, to ensure program access and minimize the potential for disproportionate impacts on protected groups. A list of contact information for known agencies and subsidized housing units serving these groups are provided in the NHDOT Environmental Justice Population Analysis, contained within Appendix K. These contacts would be included in the notification list for public information meetings and hearings related to the Project.

4.17 Socio-Economic Conditions

Socioeconomic conditions were analyzed at the local and community scales; analyses were completed for individual parcels within the Study Area while also considering impacts to Hooksett, Goffstown, and Manchester. The socioeconomic section presents the findings of the economic analyses used to determine existing and future conditions, and potential beneficial or adverse impacts that may result from the Proposed Action.

4.17.1 Methodology

The Socioeconomic Study Area is located within Manchester and Goffstown, New Hampshire (refer to Figure 1.1-1 – USGS Project Location Map). The City of Manchester and Goffstown

are located in Hillsborough County within the southern-central portion of the state, known as the Merrimack Valley Region. Hooksett is located in Merrimack County. The Study Area encompasses roadways and parcels where construction would occur and extending approximately 500 feet from the centerline. According to the US Census Bureau, the Study Area lies within the Manchester Urbanized Area (NH53740). Primary and secondary data sources for the socioeconomic analysis included:

- > US Census Bureau Data
- > National vendors (private sector) of proprietary modeling economics
- > Published real estate materials
- > Market data from national brokerage firms
- > Local Tax and Assessor's Office Data

Stakeholder interviews were conducted with public/municipal officials of the surrounding communities (as well as their counties, Hillsborough and Merrimack) in January 2017. Conversations with local area real estate professionals and/or developers was conducted as needed, as was an in-field "windshield" survey and assessment of market characteristics.

Included is the baseline and projected socioeconomic metrics of the towns and counties potentially impacted by the Proposed Action. In addition, direct and indirect economic impacts were analyzed, considering preliminary parcel acquisitions (either in full or partial) that may be associated with the Proposed Action, along with construction expenditures, changes in tax revenues, and commercial business impacts. Temporary direct impacts were estimated based on a review of the approximated construction costs and timing of the Proposed Action and impact of ROW acquisitions.

4.17.2 Existing Conditions

The Study Area is predominately single or multi-family residential, commercial, and industrial properties, which are consistent for urbanized areas that the Project overlaps. The most prevalent land uses south of Exit 6 on either side of the mainline are single family residential, followed by apartments and condominiums, and commercial properties. This area includes Goffstown Road, Coolidge Avenue, McGregor Street, and West Bridge Street. These land use trends continue north on the mainline to Exit 7 south of Front Street. Several City and State-owned parcels are located here, including the undeveloped land on Dunbarton Road and MCC.

The socioeconomic metrics include a 2000 to 2010 census time frame as well as a 2015 to 2020 estimation/forecast. Analyses was conducted for Goffstown, Hooksett and Manchester, as well as Hillsborough and Merrimack counties.88

> **Population**. For all areas the total population has grown since 2000 and is projected to continue to grow through 2020. Communities (and parent counties) most directly impacted by the Proposed Action are projected to increase in population and it is

reasonable to assume that increases in the resident populations of the impacted communities would also result in increased utilization of the road network. Population growth is projected within the 25 to 45-year old cohort for all areas, albeit at a rate less than the population as whole, except for Manchester. Persons in this cohort are typically considered to be in their family formation and home buying years. Manchester has the highest population of the three municipalities, equaling 109,565, followed by Goffstown and Hooksett, 17,651 and 13,451 respectively. The population aged 65 and older continues to grow for all areas at rates of 15 percent or greater.

- and Hooksett (27.4 percent) work in Manchester.

Characteristics for the office and the industrial market over the 2011 to 2016 time-period, summarized as follows:

> *Housing*. The number of housing units for all areas has grown since 2000 and is projected to continue through 2020, often with the greatest projected percent growth in vacant or seasonal units. All areas are predominately owner-occupied except for Manchester, approximately 52 percent of units in Manchester are renter-occupied. Manchester is heavily urbanized, as compared to Goffstown and Hooksett, meaning there is significantly more housing units in Manchester (49,468 units) than Goffstown (6,456 units) and Hooksett (5,342 units). Similar to increases in population, increases in the number of households may also result in increased utilization of the area road network.

Income. While the median household income increased for all regions, and is projected to continue to increase, the rate of growth for Manchester and Hillsborough County did not keep pace with inflation. The forecasted 2015 median household income is highest in Hooksett (\$81,766), then Goffstown (73,527) and Manchester (\$52,214). The greatest projected increase for all areas is among households earning \$100,000 or more. Typically, growth in household incomes equals growth in consumer spending demand, which in turn could result in a need for additional retail and other development.

Projected Employment and Space Needs. Employment across a wide variety of industry sectors was measured for 2014 and was projected to 2022 for each of the three communities. This change in employment, by industry sector, was then converted into an estimate of demand for additional space or facilities. The estimated demand for annual square footage is highest in Manchester (260,558 square feet) for all employment or industry sectors. Goffstown and Hooksett both have much smaller estimated demand of annual square footage, equaling 6,439 square feet and 11,994 square feet, respectively. In summary, the projected employment for each community is approximately 18 percent, with each exhibiting a strong rate of growth in the health sector and in the professional services sector. In Manchester, high employment growth is also projected for transportation and warehousing services. Employment declines are projected for a limited number of sectors in Hooksett including manufacturing and information services.

> **Commuting**. Average commuting patterns (2006 through 2010) were provided by the American Community Survey. In summary there is a high interdependency among these communities in terms of where workers live and where workers work, with the City of Manchester predominant. Most of the workers who reside in Manchester also work there (approximately 47 percent), about a guarter of the residents in Goffstown (30.3 percent)

Much of the data and analysis discussed in this section is presented in greater detail in a technical report by RKG Associates entitled, "Manchester 16099, I-293: Exits 6 and 7, Socio-Economic Conditions – Technical Appendix," dated October 2018.

- > Office Sector. All areas measured exhibited a decline in vacancy although vacancy was still relatively high in most areas. Average asking lease rates increased, with the I-93/Route 3 Corridor and Manchester markets surpassing the statewide average. The locational advantages of the state's largest city, including an available workforce, diversity of businesses and interstate access should continue to present favorable and improving metrics for Manchester as well as enhance its attractiveness for growth and expansion.
- Industrial Sector. The industrial inventory increased, and average vacancy decreased for the state, the I-93/Route 3 corridor, Hooksett and Manchester. The average asking lease rates increased for all areas measured. For Hooksett and Manchester, they exceeded the statewide average. The 2016 industrial vacancy in Manchester represents a three-year supply for the annual industrial demand. Considering that much of the growth in industrial occupancy in Manchester is from reuse of existing space.

The residential building permit activity from 2010 to 2015 for each municipality, as well as their parent counties were analyzed. Residential building permit activity has generally shown signs of improvement in both counties as the economy/market continues to recover from the Great Recession (2007-2010).

- > Single-Family. Merrimack County permits in 2015 increased by 29 percent over 2010. Permits in Hooksett increased by 100 percent over the same time-period but reflect a much smaller base, averaging 21 permits annually. The average permit value in the county increased by 24 percent and averaged \$211,660/unit in 2015. The average single-family permit value increased by 126 percent in Hillsborough County but declined by 12.5 percent in Manchester, averaging \$206,200/unit annually for the former and \$179,900/unit annually for the latter. For Goffstown, the average permit value increased by 17.5 percent and averaged \$231,450/unit. Over the 2010 to 2015 time-period the average permit value in Goffstown was 112 percent of Hillsborough County and 87 percent in Manchester.
- *Multi-Family.* Permit activity was nominal in Merrimack County over the 2010 to 2013 time-period until 91-units were permitted in 2014 and 151-units in 2015. Permit activity was basically non-existent in Hooksett except for the permits issued for four-units in 2014. In contrast, the increase in Hillsborough County was 15.6 percent over the 2010 to 2015 time-period, averaging permits for 318-units annually with a per unit value of \$98,900. The growth in Manchester was slightly stronger at 20 percent over the same time-period and averaging permits for 110-units annually, or a little more than one-third of the county activity. The average per unit value in Manchester was also modestly higher at \$102,000 per units.

4.17.3 Impacts

Based on the baseline conditions described above, the following is a discussion of the Proposed Action's potential socioeconomic impacts. Permanent socioeconomic impacts include one-time property acquisitions, and temporary socioeconomic impacts include property impacts that take place for a set period of time, including construction impacts.

4.17.3.1 Permanent Impacts

No-Build Alternative

Under the No-Build Alternative there are no permanent direct impacts. Some indirect economic impacts may result from increased traffic congestion; see Section 4.1 for an analysis of No-Build transportation conditions.

Proposed Action

The Proposed Action would require both complete and partial acquisitions of real estate to construct the various improvements. (See **Figure 4.17-1**). This would result in the displacement of business and households, or loss of portions of properties. These impacts include six complete acquisitions (three commercial and three residential) totaling 2.6 acres. Additionally, 69 properties would have some type of partial acquisition, either through fee acquisition or via an easement, totaling approximately 35.5 acres.⁸⁹ Therefore, a total of 75 individual parcels would be impacted by the Proposed Action (full and partial acquisitions).

A majority of the acquisitions occur near the proposed relocation of Exit 7; of the total 38.1 acres needed for acquisition, approximately 25.8 acres occur within two parcels necessary for the construction of the relocated Exit 7. These two parcels are owned by the City of Manchester and the MCC.

Figure 4.17-1 shows partial acquisition of Parcel 150 along Delia Drive. In fact, this area is intended to depict the current alignment of Delia Drive. Record deeds show the ROW for Delia Drive, but it appears the actual roadway was constructed outside of the easement depicted on record plans. Thus, this acquisition is intended to correct the record so that final plans show Delia Drive in the correct location. There are minor direct impacts on private property for this correction, as a result of minor permanent and easement acquisitions.

The acquisition of privately-owned parcels would result in a loss of taxable valuation for the City of Manchester. Many of the partial acquisitions are small – for example, strips of property along the street for a new sidewalk and relate to the widening or re-alignment of I-293, while others are more extensive, such as the property required for construction of the new Exit 7. Table 4.17-1 summarizes the total impacted properties.

The total area of the 75 parcels impacted by the Proposed Action is 558.0 acres; of this amount 38.1 acres would be acquired, or about 6.8 percent. This includes 2.6 acres of complete acquisitions and 35.5 acres of partial acquisitions. The total estimated assessed value (2016) of the impacted properties is approximately \$142 million, of which \$2.5 million is tax-exempt. The total value of the acquired land is \$5.8 million, approximately 4.1 percent of the total 2016 valuation. The permanent loss of tax revenue from the full and partial acquisitions is projected to be negligible, since acquired lands equal a small percentage of the Total Valuation of properties impacted. The minor loss in tax revenue is anticipated to be

would be subject to verification and updating during final design.

⁸⁹ All ROW impacts discussed in this section are based on conceptual design. The analysis should therefore be considered preliminary and





Manchester 16099



Manchester, NH

I-293 Exits 6 and 7

ROW Impact Areas



Town/City Boundary

Conservation/Public Land





Manchester 16099



Figure 4.17-1 Sheet 3 of 4

New Hampshire

Manchester, NH

I-293 Exits 6 and 7

ROW Impact Areas




Manchester 16099

Manchester, NH

I-293 Exits 6 and 7

ROW Impact Areas

mitigated by the increase in development opportunities in and around Manchester from the improved roadway conditions and reconfiguration of Exits 6 and 7.

Other direct impacts include the partial acquisition of a parcel containing a multi-tenant industrial mill building at 97 Eddy Road (Cotton Duck Building), that would reduce the amount of parking and require removal or relocation of a large two-sided electronic billboard attached to the building that extends between the building and the highway. While the economic impact of the partial land acquisition is included in the above estimates, the costs associated with acquisition or moving the billboard are not and would be added to the total cost of property impacts shown above and in Table 4.17-1. The value associated with the billboard and subsequent impacts to the owner would be calculated at a later date.

Table 4.17-1 **Summary of Property Acquisitions**

Land Use / Type	Number of Parcels	Value (\$)	Acres
Residential	44	\$1,122,139	5.9
Commercial	19	\$2,019,105	3.1
Industrial	5	\$43,547	1.4
School	2	\$1,531,506	9.0
Public/Utility	5	\$1,094,615	18.7
Total	75	\$5,812,629	38.1

Note: VHB analysis of ROW, City of Manchester Tax Parcel Data.

For this analysis, the fair market value of the impacted property is based on assessed value determined by the City of Manchester. Assessed values for all properties were obtained for 2015 (based on the City's last revaluation in 2011) and 2016 (most recent revaluation). These were then inflated to 2018 values based on the actual change in parcel values between the 2011 and 2016 revaluations. Separate land values were only available for 2015, so the proportional share from that year was carried over to 2016 and 2018 to estimate the partial land acquisition cost. Additional relocation and moving costs would be estimated at the time of final design.

Indirect effects are caused by the action and are later in time or further removed in distance (from the Project) but are still reasonably foreseeable (40 CFR § 1508.8). Examples of indirect effects from the Proposed Action include realignment of existing roads, unforeseen costs associated with acquired properties, and changes in local traffic patterns. Outlined below are specific examples of potential indirect effects on socioeconomic resources.

> Included among the full acquisitions are two service/convenience stations. There may be additional costs associated with the removal of underground fuel tanks and any required remediation, although the land will likely be retained for highway purposes and not resold for future private development. While any costs associated with fuel tank removal are subject to separate study, their possibility is worth noting here. The acquisition of

these stations may also result in a loss of convenience for motorists currently using Exit 6 or transiting this part of the City of Manchester.

- local consumer base, would be less impacted.
- side of Manchester.
- and a developer's internal capacities.

> The Proposed Action is projected to reduce the number of vehicles per day passing by the remaining commercial properties located along Eddy Road, proximate to Exit 6, as the road transitions to a local access roadway once the Proposed Action is complete. Traffic counts are typically an important consideration in some retailer's location criteria. Those businesses along Eddy Road which accommodate drive-thru customers would likely be impacted by reduced daily traffic, although it is unknown to what extent. Other businesses, which perhaps have a membership driven customer base, or cater more to a

> The Proposed Action may inconvenience travelers who currently take Front Street southbound and turn left onto Goffstown Road to go across the Amoskeag Bridge to downtown Manchester or to get onto I-293. However, travelers from Front Street will still have access to downtown Manchester and I-293 from McGregor Street and West Bridge Street. Once the Proposed Action is complete, Front Street would cross under Goffstown Road and continue as Eddy Road to the south. Traffic going south on I-293 from Front Street can then enter the highway at the reconfigured Exit 6 ramp across from Lorraine Street. Traffic headed to downtown Manchester from Front Street would continue south onto McGregor Street and then left onto West Bridge Street. Travelers heading northbound on Front Street towards I-293 or Downtown would be required to access the on-ramps at Exit 7 or Exit 5 for I-293, or use McGregor Street and West Bridge Street for access to downtown Manchester. The changes in access from Front Street would result in minor inconveniences to drivers who normally take the existing route.

> A gated emergency access road connection would be constructed on the north side of Goffstown Road between the Front Street/Eddy Road bridge and the Coolidge Avenue intersection. This access would allow emergency vehicles to continue to access Front Street/Eddy Road across the Amoskeag Bridge from the Fire Station located on the east

> The Exit 7 Interchange West Connector to Dunbarton Road that would cross City-owned land would improve access to the Hackett Hill area, a master-planned business and residential development, currently in public (City) and private ownership and accessed from Hackett Hill Road. This improved access is likely to enhance the general site, which could result in accelerated development of this regional employment center (see Section 4.19, Cumulative Effects for more discussion). Similar locational benefits may accrue to properties along Dunbarton Road, Front Street, and Country Club Drive for example, Manchester Community College, and residential properties and vacant land on Front Street and Country Club Drive. Presently these areas are required to access I-293 northbound from Front Street at Exit 10 on I-93, which causes minor inconveniences and congestion on Front Street. However, despite improved access, future development for these areas would be dictated by market supply/demand indicators, financial feasibility

Several properties in the Study Area would indirectly benefit from the construction of sound walls along the I-293 ROW. These would shield many of the residential properties from traffic noise, thus benefitting residents and adding an indeterminate amount of

value (potentially by way of increased rents and/or prices over the long term). Three sound walls were recommended for construction, on the east side of I-293 at Exit 6 along Riverside Drive and Stark Lane, on the west side of I-293 mainline near Front Street, and on the east side of I-293 Exit 7 northbound near Country Club Drive/Old Hackett Hill Road.

4.17.3.2 Temporary Impacts

No-Build Alternative

The No-Build Alternative would not result in any short-term economic impacts, either direct or indirect.

Proposed Action

The construction activities related to the Proposed Action would temporarily increase employment, earnings, and construction materials purchasing throughout the duration of the Project. Indirect temporary impacts involve re-circulation of a direct dollar spent throughout the economy because of the construction. These beneficial impacts are short-term, coincidental with the actual phasing and construction of the Proposed Action. There are no temporary adverse economic impacts anticipated to occur from the Project.

The estimated and preliminary construction costs total \$130.0 million,⁹⁰ which has been phased for this analysis over the 2024 to 2028 time-period in annual percentage increments consistent with those proposed by NHDOT⁹¹ and includes the following components (in constant 2018 dollars):

- > Materials purchases at \$55.9 million (43 percent of total);
- > Labor costs at \$48.1 million (37 percent of total);
- > Mobilization costs of \$10.4 million (8 percent of total); and
- > Contingency costs of \$15.6 million (12 percent of total).

The analysis was used to estimate the economic impact of constructing the Proposed Action, see Table 4.17-2. The average annual wage for a construction worker is \$50,860 (2017), as reported by New Hampshire Employment Security - Economic and Labor Market Information Bureau. In this analysis the total direct construction full-time equivalent employment is estimated to be 946 jobs (these are short-term during the construction activity). Total direct and indirect employment impacts equal 1,395 jobs. Total direct and indirect (as adjusted) wage impacts equal \$68.2 million over the construction term. This analysis uses constant 2018 dollars unless otherwise noted (and rounded in the narrative).

4.17.4 Mitigation

Full and partial land acquisitions necessary for the Proposed Action would be completed in accordance with federal and state laws. These parcels would be acquired at fair-market value. Any property acquisitions would be completed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970⁹² which establishes the minimum standards for the acquisition of properties for federally-funded programs and projects. These standards ensure fair compensation and assistance for persons whose property is acquired (full or partial) for public use.

The planned phased construction of the Proposed Action, coupled with adequate signage and traffic management, is not projected to substantially disrupt traffic flow as a result of detours or re-routing on I-293 or the adjacent roadways. As a result, no mitigation for socioeconomic impacts are deemed necessary for the commercial businesses on these roadways.

The billboard currently located on the building at 97 Eddy Road (Cotton Duck Building) would be removed due to roadway design requirements and acquisition of ROW. Compensation for the value of the billboard would be determined and included in the ROW cost for this property. The relocation of the billboard would be the responsibility of the billboard owner based on property owner/management guidelines and City officials regarding any zoning ordinances or permits, as applicable.

4.18 Construction

Construction activity has the potential to create impacts by exposing adjacent populations to impacts or hazards they are otherwise not regularly exposed too. Potential construction impacts include noise, air quality, truck traffic, construction staging areas, and traffic control. Construction activities that could potentially impact these resources include increased diesel and gasoline-powered equipment operation affecting air quality, traffic detours and road closures affecting traffic congestion, and increased noise and vibration impacts affecting public health. This section describes anticipated construction period impacts and discusses construction sequencing and schedule.

The Proposed Action would be completed in several phases over a five-year span. Anticipated construction activities and the approximate years they would take place are described below. A Traffic Control Phasing plan would be developed for the Proposed Action due to the complexity of the SPUI proposed at Exit 6, and the important connection to Goffstown Road and downtown Manchester. This plan would allow for continued access to either side of I-293 for commercial and residential properties through the duration of construction. The Proposed Action is divided into three main components; by constructing the Project in stages, the sequence of construction can be used to alleviate potential congestion or impacts to access. For example, building Exit 7 first will help alleviate

Uniform Relocation Assistance and Real Property Acquisition Act of 1970. Accessed from http://uscode.house.gov/view.xhtml?path=/

⁹⁰ Estimated costs of roadway and bridge improvements only, does not include possible ROW acquisitions or utility impacts.

⁹¹ New Hampshire Department of Transportation. 2018. Ten Year Transportation Improvement Plan 2019 – 2028.

prelim@title42/chapter61&edition=prelim. Accessed on September 10, 2018.

Table 4.17-2 Estimated Economic Impacts¹

Proposed Action	Estimated Annual Phasing and Impacts					
NH Exit 6/7 Fee Turnpike	2024	2025	2026	2027	2028	Total
Costs						
	tc 001 100	¢10,110,510		¢11,112,220	t 1 1 1 2 2 2 0	
Materials	\$6,001,193	\$12,113,519	\$15,558,648	\$11,113,320	\$11,113,320	\$55,900,000
Labor	\$5,163,817	\$10,423,260	\$13,387,674	\$9,562,624	\$9,562,624	\$48,100,000
Mobilization	\$1,116,501	\$2,253,678	\$2,894,632	\$2,067,594	\$2,067,594	\$10,400,000
Contingencies	\$1,674,751	\$3,380,517	\$4,341,948	\$3,101,392	\$3,101,392	\$15,600,000
Total	\$13,956,262	\$28,170,974	\$36,182,903	\$25,844,930	\$25,844,930	\$130,000,000
Wage Impacts						
Direct ²	\$5,163,817	\$10,423,260	\$13,387,674	\$9,562,624	\$9,562,624	\$48,100,000
Indirect ³	\$2,157,443	\$4,354,838	\$5,593,370	\$3,995,264	\$3,995,264	\$20,096,180
Employment Impacts						
Direct ⁴	102	205	263	188	188	946
Indirect ⁵	48	97	125	89	89	450
New Economic Output						
Wage ⁶	\$7,321,260	\$14,778,099	\$18,981,044	\$13,557,889	\$13,557,889	\$68,196,180
Employment ⁷ (Number)	150	302	388	277	277	1,395
Construction ⁸	\$8,812,752	\$17,788,702	\$22,847,875	\$16,319,911	\$16,319,911	\$82,089,150
Estimated Adverse Impacts	\$0	\$0	\$0	\$0	\$0	\$0
Net New Economic Output	\$16,134,012	\$32,566,801	\$41,828,919	\$29,877,800	\$29,877,800	\$150,285,330

Notes:

1 Analysis by RKG Associates, Inc., based on data from VHB, NH Employment Security, US Department of Commerce (Regional Input-Output Modeling System II Type 1 for NH), and NHDOT.

2 Labor Costs = Direct Wages

3 Direct Wages X Wage Multiplier (0.4178) = Indirect Wages

4 Direct Wages ÷ Average Annual Wage (\$50,860 for 2017) = Direct Employment

5 Direct Employment X Employment Multiplier (0.4755) = Indirect Employment

6 Direct + Indirect = Total

7 Cost of Materials X Final Demand Multiplier (1.4685) = New Economic Output

8 New Economic Output from Construction – Adverse Impact to Existing Conditions = Net NEW Economic Output

congestion and access impacts caused by subsequent construction activity at Exit 6. The following outlines the two main components for the Proposed Action and anticipated years of construction:

Relocation and Construction of Exit 7 (2024-2026)

- > Exit 7 would be relocated 0.5 miles north of its current location, just north of MCC.
- > A 1.2-mile long Exit 7 Interchange East-West Connector would be constructed that would pass under I-293 and the existing Eversource ROW and provide new connections at Dunbarton Road/Front Street/Country Club Drive.
- > Existing I-293 Northbound and Southbound lanes would be widened to three lanes in each direction with 10-foot inside and outside shoulders beginning north of Stark Way and extending to the northern project terminus.
- > The northbound ramps and the southbound off-ramp would be constructed in a diamond interchange configuration while the southbound on-ramp would be configured in a loop layout.
- > As part of widening the Exit 7 segment, bridge replacement will take place over Front Street and new bridge construction over the new Exit 7 Interchange East-West Connector.

Reconstruction and Widening of Exit 6 and Southern Mainline Segment (2025-2028)

- > Work at Exit 6 would involve the construction of the new SPUI interchange and improvements to adjacent roadways.
- > The Goffstown Road/Eddy Road/Front Street intersection would be reconfigured to allow connection via Goffstown Road directly to the SPUI.
- > Front Street would be realigned and the direct access from Front Street to Goffstown Road and Amoskeag Street would be eliminated. This work will include construction of a new bridge over Front Street.
- Existing I-293 Northbound and Southbound lanes would be widened to three lanes in each direction with 10-foot inside and outside shoulders beginning north of Stark Way and extending to the southern project terminus.
- > As part of the reconstruction and widening of Exit 6, bridge replacement will take place over Goffstown Road, Black Brook, and Stark Way.

4.18.1 Impacts

4.18.1.1 No-Build Alternative

No construction would take place under the No-Build Alternative; therefore, no construction related impacts would occur.

4.18.1.2 Proposed Action

All construction-related impacts are temporary impacts, since construction would be of a limited duration. While construction phasing and contractor access would be further defined outlines likely impacts.

Land Use

Construction staging areas would be placed within the proposed ROW including two primary staging areas, the Amoskeag Traffic Circle (Exit 6) and the MCC (near Exit 7). Additionally, several vacant parcels within the Study Area near I-293 that are owned by the City of Manchester could be used for construction staging, if needed. Construction staging areas would generally store construction equipment and materials, including hand tools and small and heavy machinery.

Temporary earthworks activities (excavation and embankment) are necessary to complete the construction of the Proposed Action. Earthwork activities include grading, excavation, and the creation of embankments for the expanded sections of I-293 and roadway improvements at Exits 6 and 7. Excavated material would be re-used for embankments or grading necessary to complete the Proposed Action. Any excess materials from earthwork activities would be disposed of off-site or recycled as appropriate. During earthwork activities, if contaminated soils are anticipated or encountered the proper procedures and measures will be utilized to mitigate any potential impacts and material will be handled appropriately. Please refer to the Section 4.14 Hazardous Materials and Contamination for more information. The approximate amounts of earthwork activities are provided in **Table** 4.18-1.

Table 4.18-1 **Estimated Earthwork Activities**

Project Component	Excavation (cy)	Embankment (cy)	Excess Material (cy)
Mainline	34,000	15,000	19,000
Exit 6	185,000	146,000	39,000
Exit 7	500,000	265,000	235,000
Total	719,000	426,000	293,000
Note: VHB, I-293 Conceptual Engineering Calculations, April 2019.			

Transportation

The Proposed Action involves several temporary traffic control measures to ensure continued access to parcels located adjacent to I-293. Current draft plans anticipate roadway closures or diversions along several roadways leading to and from Exit 6, therefore a Traffic Control Phasing Plan would be developed. During phasing and construction, temporary closures and diversions would be needed to expedite construction. The SPUI at Exit 6 would be completed over a four-phased approach due to the complexity of the Proposed Action and land use constraints in the area. Overall, two lanes of northbound and southbound traffic would be maintained along I-293 at all times throughout the duration of construction, appropriate signage and measures would be used where applicable. The following outlines the anticipated traffic control and phasing schedule for Exit 6 during the construction of the SPUI.

during the final design and construction phases of the Project, the following discussion

- Phase 1 involves constructing a new bridge over I-293, Front Street and the southbound on-ramp for I-293 and Goffstown Road. No traffic diversions would be necessary in Phase 1.
- Phase 2 removes parts of the Exit 6 on- and off-ramps, while constructing the SPUI at Exit 6 (on- and off-ramps) and widening of I-293 South, Goffstown Road and Amoskeag Street. Traffic would be diverted to the new bridge over I-293, new on- and off-ramps on I-293, and Front Street.
- Phase 3 involves constructing the new on- and off-ramps and widening I-293 (interior lanes). During Phase 3, two lanes would be functional on I-293 North and South. Traffic diversions during Phase 3 include Front Street connecting to Goffstown Road and Amoskeag Street, improved Goffstown Road interchange and the functioning single point interchanges at Exit 6.
- > Phase 4 would continue to work on I-293 North, Eddy Road, and the sound wall at Exit 6.

A majority of the Exit 7 interchange can be built without disturbing the existing traffic patterns, however some traffic control measures would be needed to complete the Proposed Action. Traffic control measures needed on adjacent roadways during the realignment, widening and construction of Exit 7 are discussed below.

- I-293 During the widening and construction on I-293, the Contractor would be required to keep two lanes (in both directions) operational at all times.
- Front Street Located to the east of I-293 may need the use of one lane during construction of the intersection with the new Exit 7 Connector Road, which would require alternating two-way traffic during construction as needed.
- Country Club Drive Currently located to the east of I-293 off Front Street, Country Club Drive has two connections to Front Street. Under the Proposed Action, the southern intersection would be reconstructed at its new connection with the Exit 7 Interchange East Connector. This would require closure of the southern portion of Country Club Drive. The northern connection with Front Street would be unaffected during construction, and all traffic would be directed to that intersection for a period.
- Delia Drive Located to the east of I-293 off Front Street is a local roadway that provides access to three residential properties. The Contractor would maintain access to the existing drive(s) during the short construction timeframe necessary to connect the Drive to the Regency West parking lot.
- Dunbarton Road Located to the west of I-293, the two new connections from the Exit 7 Interchange West Connector to Dunbarton Road would be constructed under current traffic conditions. This would require alternating two-way traffic during construction as needed.

Air Quality

Impacts to air quality from construction activities can affect natural communities, public health, and greenhouse gas emissions. As described in **Section 4.2**, *Air Quality*, temporary air quality impacts could result from construction activities associated with the Proposed Action. Construction activities such as grading, hauling, excavating and blasting operations

may release or suspended fugitive dust. Emissions from construction equipment may result in elevated ambient concentrations within the immediate vicinity of construction operations for short periods of time. Air pollutants directly emitted from diesel and gasoline powered construction equipment include oxides of nitrogen and sulfur, carbon monoxide, and particulate matter.

Noise

Construction of the Proposed Action would introduce new sources of noise and vibration that have the potential to temporarily impact businesses and residents. Noise levels in the vicinity of construction activities would vary depending on the type and number of active construction equipment used at any one time. It is likely that to complete the Proposed Action, construction equipment that produces noise above ambient conditions would be used. Increased construction truck traffic on I-293 and adjacent roadways may contribute to increased noise levels, along with the use of construction equipment for the duration of construction activities. Truck trips would be concentrated on roadways connecting to Exits 6 and 7, including Dunbarton Road, Front Street, Eddy Road, and Goffstown Road.

There are no statewide noise regulations that pertain to construction activities in New Hampshire. The City of Manchester Noise Ordinance prohibits the operation of any construction equipment or any construction activities between the hours of 9:00 PM and 7:00 AM that exceed noise levels specific to zoning or land use, the source of sound and where it is received. The Department is not subject to local restrictions related to construction noise, but would coordinate construction activities with the City of Manchester. Best Management Practices will be incorporated into the contract documents to reduce potential construction noise impacts; examples of specific mitigation strategies are described below.

Water Resources

Temporary impacts to water resources such as siltation and erosion could result from construction activities for example roadway grading and excavation. Due to the proximity of surface waters (*i.e.*, Merrimack River and Black Brook) to the Project Footprint, BMPs would be utilized including sediment and erosion controls to limit erosion and sedimentation discharge off-site. See **Section 4.8**, *Wetlands and Surface Waters*, for more detail.

Hazardous Materials and Contamination

Construction materials may include gasoline or diesel fuel for machinery, effluents, and solvents. Some of these materials may be considered hazardous to the general public and construction workers. Temporary impacts from construction include the potential spill or accidental release of on-site construction effluents, gas, or solvents. Typically, these substances are kept on-site during long-term construction projects.

Construction activities would also generate a moderate amount of construction debris that may include asbestos-containing materials, lead-based paint, mercury, PCBs, and other special wastes. Contaminated materials such as soil and groundwater may be generated

during construction in areas of known construction or if undiscovered spills are encountered. See Section 4.14 for more details on their proper handling.

Socioeconomic Conditions

The commercial properties that are concentrated along Amoskeag Street, Eddy Road, and Front Street would experience various disruptions from the proposed construction work. Several businesses and their customers may experience inconveniences primarily due to construction activities within the vicinity of these businesses. The development of the Traffic Control Phasing plan at Exit 6 and traffic control measures would maintain access to businesses and residences throughout construction.

4.18.2 Mitigation

Construction activities are not anticipated to result in permanent direct impacts to any of the above-mentioned resources. The Proposed Action incorporates mitigation measures to minimize or eliminate construction-related impacts to nearby natural, cultural, and social resources, and are discussed in the resource-specific sections of this EA. The example mitigation measures outlined below are for potential temporary impacts from construction activities. The mitigation measures and BMPs described below would be implemented, in accordance with applicable laws and regulations, during the multi-phased construction process. As needed, mitigation measures would be incorporated into the contract documents. The following mitigation strategies will be employed to the extent practicable:

- > Wetting soils during excavation to prevent air quality impacts;
- > Covering trucks that carry materials or waste;
- > Utilizing erosion and sediment control measures around construction areas;
- > Managing construction stormwater runoff to prevent pollution of nearby surface waters;
- > Developing spill prevention plans and following proper protocol for emergency on-site responses during construction;⁹³ and;
- > Implementation of the Traffic Control Phasing plans.

Additionally, mitigation measures will be incorporated into the contract documents to lessen potential construction noise impacts. The following mitigation strategies will be employed to the extent practicable to limit the potential impact of noise:

- > Source Control
 - All exhaust systems in good working order, also using properly designed engine enclosures, and intake silencers.
 - Regular equipment maintenance.
- > Site Control

- > Time and Activity Constraints
- affected.
- > Community Awareness
- Public notification of construction operations.
- Methods to handle complaints.

4.19 Indirect Effects and Cumulative Impacts

Cumulative impacts are defined as "impacts that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, without regard to the agency (Federal or non-Federal) or individual who undertakes such other actions" (40 CFR 1508.7). Cumulative impact analyses capture the effects resulting from the Proposed Action in combination with the effects of other actions completed or future actions in the same geographic area. Cumulative impacts "can result from individually small or minor impacts but collectively equal more significant adverse impacts over time" (40 CFR 1508.7). Reasonably foreseeable actions include federal and non-federal activities not yet undertaken, but sufficiently likely to occur; reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite (43 CFR 46.30).

Cumulative impacts from the Proposed Action can include both direct and indirect effects. Direct effects caused by the Proposed Action occur at the same time and place as when the Proposed Action is being implemented (40 CFR 1508.8). These effects may include noise impacts from construction equipment, traffic disruptions or detours, changes in traffic configurations, or property impacts. Indirect effects (or secondary impacts) are caused by the action and are later in time or further removed in distance (from the Project) but are still reasonably foreseeable (40 CFR 1508.8). Examples of indirect effects include growth-inducing impacts, changes in land use patterns, increased population density or growth rates, and impacts on natural resources (40 CFR 1508.7).

The evaluation of indirect and cumulative effects encompasses the study areas used for other resources, including the project Study Area (see **Figure 1.1-2**) and the more expansive socio-economic Study Area including the communities of Goffstown, Hooksett, and Manchester. The 2010 US Census Urbanized Area for Manchester was also considered

 Placement of stationary equipment as far away from sensitive receptors as possible (e.g., pumps, compressors, aggregate crushers, AC plants, operators).

Choice of disposal sites and haul routes thereto.

Employing shielding where possible.

Schedule of operations to coincide with periods when people would least likely be

• Limiting working hours and work days to least noise-sensitive times.

New Hampshire Department of Environmental Services. Undated. Reporting a Spill. Accessed from https://www.des.nh.gov/organization/ divisions/waste/orcb/srcis/reporting.htm. Accessed on April 5, 2019. See also Section 4.14, Hazardous Materials and Contamination, for a discussion of additional mitigation measures to minimize risk of construction-related contamination releases.

because it includes vital roadway connections to the town centers of Goffstown and Hooksett.94

This analysis of indirect effects and cumulative impacts⁹⁵ focuses on current and reasonably foreseeable trends, events, actions, and projects and the potential cumulative impacts to natural, social and cultural resources. The purpose of this section is to focus on impacts from induced growth effects which are changes in location, magnitude or pace of future development that result from the changes proposed by the project. The impacts from past and reasonably foreseeable future actions are discussed in terms of projects, plans and trends that were identified through online databases, mapping services, and input from municipal officials in Goffstown and Manchester. "Encroachment alteration effects" are indirect effects on physical, chemical, or biological changes that occur as a result of the Project but are removed in time or distance; the discussion of these encroachment alteration effects is included each of the above resource-specific sections.

4.19.1 Historical Development Context

Running west of the Merrimack River, I-293 is a major north-south arterial circumferential highway extending through and around Manchester. The highway also functions as a local connection to I-93 (north and south), NH Route 101 (east and west), and US Route 3 (F.E. Everett Turnpike south to Nashua and into Massachusetts) and thus provides critical accessibility and mobility within the greater Manchester area, as well as throughout southern New Hampshire. The improvements to I-293 and other roadways in Manchester have been major drivers of economic and residential development in the area by improving access to and from Manchester.

The total population for the municipalities of Goffstown, Hooksett and Manchester have experienced steady growth since the 2000 Census; these trends continue into the year 2020 for all three communities.⁹⁶ This is also a county-wide trend, with Hillsborough County and Merrimack County both increasing by over 10,000 people from the 2000 to 2010 Census. Projected 2020 population growth shows a continued rise in both Hillsborough County (417,625 people) and Merrimack County (152,166 people). An increase in population translated to an increase in housing units and residential building permit activity, between 2010 and 2015 Hillsborough County saw an increase in permit activity of 52 percent, during that same time period Merrimack County saw an increase in 29 percent. Approximately 30 percent of Goffstown residents and 28 percent of Hooksett residents commute to Manchester for work.

Along with residential and commercial permit activity, another factor in the development within the region is the growth of the Manchester economy. Total Employment and the necessary building/office space (Estimated Gross Annual Demand in square feet) is projected to grow in Goffstown, Hooksett, and Manchester. Hillsborough County is expected to see an increase in the workforce (from 2014 to 2022) of approximately 19,823 people. The rise in population and economic opportunities resulted in development and redevelopment occurring within the Study Area.

4.19.2 Past or Present Actions

The following past and present actions were identified from online resources (The City of Manchester⁹⁷ and the Manchester Housing and Redevelopment Authority⁹⁸) and information obtained during community interviews with municipal leaders in Manchester and Goffstown in January 2017. The interviews with local officials supplied high-level information on the approved or planned development. (Figure 4.19-1 shows the location of the projects discussed in this and other sections.)

4.19.2.1 Past Residential Development

The increase in economic opportunities and growth of Manchester has brought several residential developments to the greater Manchester area. The area north of Countryside Road is zoned as the Residential-Suburban Multifamily (R-SM) while the Hackett Hill parcels are zoned as a Research Park, per the City of Manchester Zoning Map.⁹⁹ The density of single-and multi-family homes has increased greatly since 1998 with the construction of homes and units in 2003, 2005, 2012, and 2015. Residential developments in the Study Area include:

- near the nursing home, which is still in progress.
- Way.
- constructed since 2003.
- > 2003 on the west bank of the Merrimack River.

- redevelopment-activity/. Accessed on January 20, 2019.
- City of Manchester. 2015. Official Zoning Map, City of Manchester, NH. Accessed from https://www.manchesternh.gov/Portals/2/ Departments/pcd/OFFICIAL_ZONING_MAP_OF_MANCHESTER.PDF. Accessed on February 1, 2019.

> On Countryside Blvd and Waterford Way, the construction of several large multi-family residential complexes. The most recent addition in 2017 is the construction of 400 units

> Adjacent to the Manchester Cedar Swamp on Hackett Hill Road, approximately 152 townhouses were constructed in 2015, situated on Cedar Creek Way and Hidden Oak

> Extensive single-family development occurred on Sylvan Lane, Blueberry Lane, Pleasant Pond Way, and Teaberry Place, approximately 70+ single-family homes have been

On Riverfront Drive near Exit 6, 68 waterfront condominiums (The Pointe) were built in

⁹⁷ City of Manchester. Undated. *Current Projects*. Accessed from https://www.yourmanchesternh.com/Plans-Projects/Current-Projects.

98 Manchester Housing and Redevelopment Authority. 2017. Redevelopment Activity. Accessed from https://manchesterhousing.org/

US Department of Commerce, Economics and Statistics Administration, US Census Bureau. 2012. 2010 US Census Urbanized Area Reference Maps – Manchester. Accessed from https://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/ua53740_manchester_nh/ DC10UA53740.pdf. Accessed on January 20, 2019.

⁹⁵ The CEQ regulations use the terms "indirect effects" (40 CFR § 1508.8) and "cumulative impacts" (1508.7). This terminology is a matter of convention and does not reflect a substantive distinction between the meaning of "effects" and "impacts," which are described as synonymous in the CEO regulations.

See Section 4.17, Socio-Economic Conditions, and the technical report by RKG Associates entitled, "Manchester 16099, I-293: Exits 6 and 7, Socio-Economic Conditions - Technical Appendix," dated October 2018.

Accessed on January 18, 2019.





Manchester 16099



Manchester, NH

I-293 Exits 6 and 7

Cumulative Impacts - Past, Present and Reasonably Foreseeable Future Actions

4.19.2.1 Job Corps Center - Manchester

A major development located on Dunbarton Road was the construction of the New Hampshire Job Corps Center on 20 acres adjacent to the Manchester Cedar Swamp Preserve. The Job Corps Center provides job training in several high-growth industries to disadvantaged youth in New Hampshire. The \$30 million campus features seven buildings including a dormitory, cafeteria, and wellness and fitness centers. The Center has a residential capacity of 300 residents.

4.19.2.2 River's Edge – Elliot Hospital Development

The River's Edge – Elliot Hospital Development includes a three-story residential building, 13,000 square feet of commercial buildings, and over 350,000 square feet of urgent care facilities and medical offices. The entire site equals approximately 550,000 square feet of new development and resulted in the redevelopment of a 17-acre former packaging plant into the new Elliot Hospital. The redevelopment of this site created several short and long-term employment opportunities for residents of the greater Manchester area, for example, construction and medical professional positions.

4.19.3 Reasonably Foreseeable Future Projects

Impacts from the construction of other projects proposed for development within the vicinity of the Proposed Action are important to the consideration of cumulative impacts. Discussions were held with planning officials in Manchester and Goffstown to determine what development projects are being planned or anticipated within their communities, as well as any changes to the land use planning or zoning in each community. Some projects identified were either too small to include in this analysis or were still in the early speculative stages of development and would not be considered reasonably foreseeable. Additionally, although market conditions cannot be predicted, the improved access from repositioning or reconfiguring Exits 6 and 7 may invigorate development along adjacent roadways which were previously not feasible due to economic and real-estate factors. Increased access to the MCC may present an opportunity for on-campus development, although this would be off-set by the acquisition of a portion of the campus for the Exit 7 Interchange East Connector. Larger and more advanced projects include the development of the Northwest Business Park at Hackett Hill and the proposed "Millyard People Mover." These projects and their anticipated cumulative impacts in conjunction with the Proposed Action are discussed further below.

4.19.3.1 Hackett Hill/Northwest Business Park¹⁰⁰

Under the Proposed Action, the new Exit 7 Interchange West Connector would provide direct access from I-293 to the Hackett Hill area, one of the largest undeveloped areas in Manchester. The relocated interchange is anticipated to substantially improve the marketability of the southern portion of the parcel. The 2009 City of Manchester Master Plan calls for a through road within the parcel to connect to Hackett Hill Road, and it outlines a

conceptual plan for development on this parcel. The improved access would potentially enhance the attractiveness of this parcel to developers. However, development is still reliant on the broader market supply and demand characteristics, financial feasibility, and developer capacities.

The property is currently under considerations as a public-private partnership with the City for a corporate campus development. Currently, limited access to the highway system may hinder the property's development since the existing access off Hackett Hill Road is constrained by a narrow underpass under I-293 leading to Front Street. The 10 parcels for development equal approximately 425 acres. The Hackett Hill Conceptual plan envisions the construction of as much as 1.3 million square feet of office or research space (See Figure 4.19-2). It is important to note that this potential future development is subject to market conditions and need. However, the site would offer substantial economic and employment opportunities for the people of Manchester, Goffstown, Hooksett and the surrounding communities.

The existing conditions at this site include close proximity to a large tract of conservation land (the Manchester Cedar Swamp Preserve) and terrain characterized by steep slopes. These sensitive areas would not be subject to development, and development would only occur within parcels owned by the City of Manchester. The conceptual plan to develop Hackett Hill and proposed relocation of Exit 7 are part of the Economic Vitality identified in the City of Manchester's Master Plan. According to the Master Plan, strict design standards and management practices would be employed if development of the site occurs and the Hackett Hill site provides a unique opportunity to meld economic growth with environmental stewardship.

4.19.3.2 Proposed Millyard People Mover¹⁰¹

The Millyard People Mover is a transportation project for pedestrians/commuters proposed within Downtown Manchester. This public-private partnership between the City of Manchester and a private developer would construct an estimated 177-space parking garage near the reconfigured Exit 6 interchange, with a light rail transit station, or other type of "people mover," to the City's developing downtown Millyard district. The project would align with the City of Manchester's goal of providing more alternative transportation to the central business district of Manchester. Currently this project is in the conceptual design stage, therefore the costs and proposed impacts have not been evaluated. This transportation project would likely require a river crossing along or adjacent to the Amoskeag Bridge. Additionally, land has not yet been acquired for the construction of the associated parking garage, located at Exit 6. The Proposed Action would support the implementation of this project by enhancing the opportunity for land/site acquisition for the development of the garage. However, the roadway and intersection improvements do not address the additional elements of the project such as the new light-rail bridge, or their costs and associated impacts.

¹⁰¹ New Hampshire Department of Transportation. 2018. Public Private Partnership Project # RSA 228:107-115 – Millyard People Mover.

City of Manchester. Undated. Current Projects. Accessed from https://www.yourmanchesternh.com/Plans-Projects/Current-Projects. Accessed on January 11, 2019.

Accessed from https://www.nh.gov/dot/programs/public-private-partnership/documents/millyard-application.pdf. Accessed on January 17, 2019.

4.19.3.3 Goffstown Road Connector

During the development of Project alternatives, the construction of a direct connection between the relocated Exit 7 interchange and Goffstown Road was considered. See Figure **B-5** in **Appendix B**.) Based on feedback from the Town of Goffstown, and due to its cost and environmental impact, this project component was subsequently removed from the Proposed Action. However, the Goffstown Connector may be considered a reasonably foreseeable action, as it would improve access from Goffstown to Downtown Manchester and I-293 and could be pursued by the Town of Goffstown and City of Manchester in the future. The connection between Goffstown and Manchester is evident in the community metrics analyzed by RKG; over 30 percent of Goffstown residents work in Manchester (2,906), conversely approximately 23 percent of Manchester residents work in Goffstown (1,429). The conceptual Goffstown Road Connector would connect Dunbarton Road to Goffstown Road at the Straw Road intersection. A three-way intersection near the Manchester Landfill could be constructed, with the connector roadway crossing Black Brook to a four-way intersection of Goffstown Road, Straw Road, and the Connector roadway. The Goffstown Road Connector would require work in or adjacent to Black Brook for the construction of a new bridge. This project would also require the acquisition of private lands for roadway construction and grading.

4.19.4 Cumulative Impacts of the Proposed Action

Investments in highway infrastructure can have adverse and beneficial impacts to environmental resources. A number of factors were identified that could contribute to cumulative impacts. However, these impacts vary depending on the type and function of the existing resources, the improvements being proposed, and existing land use characteristics (such as schools, local roads, employment base, *etc.*) in the affected area.

Subsequent reasonably foreseeable and future actions can have an impact on natural, social and cultural resources within the region long after construction is completed. The cumulative impacts on social and cultural resources include impacts to cultural or historic properties, socioeconomics, and changes in land use. The indirect and cumulative adverse impacts on natural resources include increased impervious surfaces, potential wetland and wildlife impacts, habitat fragmentation and a reduction in forested lands. Through sound, integrated long-range planning and stewardship by all entities, impacts on resources would be diminished.

The following sections discuss so related to the Proposed Action.

4.19.4.1 Clearing and Forest Impacts

An area of importance is Hackett Hill and the Northwest Business Park. If fully constructed, approximately 90 acres of forested lands would be cleared to support the development (in addition to the clearing required to construct the Proposed Action). This includes buildings (20 acres) and parking lots/roadways (70 acres), equaling about 21 percent of the total area owned by the City of Manchester (425 acres). It is important to note that these numbers are



I-293 Exits 6 and 7

Cumulative Impacts Hackett Hill Master Plan The following sections discuss some of the potential cumulative environmental impacts

from the proposed Conceptual Master Plan (Published in 2007) and parcel developments are subject to change. Adjustments in Conceptual Design plans have already occurred since the publishing of the Hackett Hill Master Plan. Under the Northwest Business Park Conceptual Plan, parcel 766-15J¹⁰² was slated for commercial development, however townhomes were constructed in 2015. This resulted in a reduction of clearing, from approximately 8 acres of pavement in the Conceptual Master Plan to 4.5 acres of roadways and driveways for the residential development.

The development of Hackett Hill would occur within the City-owned parcels as identified by the City of Manchester; new development would not segment or further cause fragmentation to wildlife habitat in the Manchester Cedar Swamp. The proposed development and future actions would not have an impact on recreational opportunities; the parcels proposed for the Hackett Hill development are owned by the City and are not currently used for recreation (e.g., walking, hiking, biking).

Undeveloped parcels can provide wildlife habitat or migratory corridors which aid in the movement of species through developed areas. Through the assessment of the proposed Hackett Hill site plan and the New Hampshire Fish and Game 2015 Wildlife Action Plan Habitat Tiers, ¹⁰³ the development is not proposed within any areas that are ranked as *Tier 1-Top Ranked Habitat in the State.* Development would occur within areas ranked as Tier 2-Top Ranked Habitat in the Biological Region and Tier 3–Supporting Landscape.

The City of Manchester manages and maintains nearly 2,000 acres of green space for residents, many of which offer recreational opportunities. In April 2015 in a partnership with the Nature Conservancy, the City of Manchester added an additional 40 acres to the Cedar Swamp Preserve.¹⁰⁴

4.19.4.2 Cultural Resources

The Study Area is in close proximity to many of New Hampshire's most well-known archeological sites. Cultural and archaeological resources range from Pre-Contact large base camp sites, small residential sites, and fishing processing sites, to Post-Contact mills or historic buildings. As discussed in Section 4.13, Cultural Resources, archaeological studies were completed to confirm the presence or absence of Pre-Contact or Post-Contact archaeological resources. During these investigations Pre-Contact Native American artifacts and thermal features from several locations were found.

Manchester also has numerous historic buildings and districts, most notably related to the industrial revolution. More recently Manchester has seen an increase in the reuse of these buildings. For example, the Amoskeag Mill Yard and Pandora Mill redevelopment have

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Cumulative and indirect impacts on these resources is the result of disturbance, disruption, loss (of artifacts) or the removal of historic buildings, with long-term impacts being a loss of cultural resources (known or unknown) by development activities (e.g., excavation, grading, and fill). To protect against the loss of cultural resources from development and construction activities, archeological surveys and historic building inventories should be completed by applicants to ensure the integrity and vitality of cultural resources.

4.19.4.3 Socioeconomics Benefits

Through the development of the greater Manchester area, both economically and residentially, the region has become a significant economic driver for the State. New Hampshire now boasts the ninth highest percent technology workforce at 7.3 percent.¹⁰⁵ Controlled and regulated development would allow for an increased tax base, for Manchester in particular. Hackett Hill and the Northwest Business Park is one of the few remaining opportunities to increase the tax-base and attract new employers to the proposed corporate campus.

The need for improved transportation infrastructure was discussed in the City of Manchester's Master Plan, dated December 2009, as a key element of the City's economic future. Development and redevelopment are likely to occur in the Manchester Urbanized Area, as projected and planned. Goffstown and Hooksett have developed positions and initiatives to manage the growth of Hillsborough County as outlined in their respective Master Plans.^{106, 107} The potential expansion in economic opportunities is not expected to overburden societal, social, or economic resources as the affected municipalities have all planned for development through the region and of the City-owned Hackett Hill parcels.

4.19.4.4 Wetlands and Vernal Pool Impacts

Impacts on wetlands and vernal pool habitat could include increased dredging and filling of wetlands, stresses on vernal pool habitat, increasing impervious surfaces, encroachment on sensitive habitats, and sedimentation or erosion potentially affecting surface waters.

The Conceptual Master Plan for Hackett Hill was designed to avoid wetlands to the greatest extent practicable. In order to understand the potential cumulative effects of the Proposed Action on wetlands, an analysis was completed using the US Fish and Wildlife National

created viable economic opportunities while preserving and restoring historical buildings in

¹⁰² City of Manchester. Undated. Public GIS Map Viewer – Parcel Layer. Accessed from http://208.82.76.123/pubgis/. Accessed on February 8, 2019.

¹⁰³ New Hampshire Fish and Game. 2015. *Highest Ranked Wildlife Habitat by Ecological Condition*. Accessed from <u>https://wildlife.state.</u> nh.us/wildlife/wap-high-rank.html. Accessed on January 17, 2019.

The Nature Conservancy. Undated. Places and Preserves, Manchester Cedar Swamp. Accessed from https://www.nature.org/en-us/getinvolved/how-to-help/places-we-protect/manchester-cedar-swamp-preserve/. Accessed on January 23, 2019.

¹⁰⁵ New Hampshire Business Review. 2016. Is NH tech employment trend cause for 'concern?' Accessed from <u>https://www.nhbr.com/March-</u> 18-2016/Is-NH-tech-employment-trend-cause-for-concern/. Accessed on February 14, 2019.

¹⁰⁶ Town of Goffstown. 2006. Goffstown Master Plan Update. – Appendix E: Housing. Accessed from http://www.goffstown.com/images/ stories/Town_Hall/Planning/Master_Plan/2006/II-E_Housing_final.pdf. Accessed on February 1, 2019.

¹⁰⁷ Town of Hooksett. 2004. 2004 Master Plan. Accessed from https://www.hooksett.org/sites/hooksettnh/files/uploads/ master_plan_final_2004_adopted.pdf Accessed on February 5, 2019.

Wetlands Inventory¹⁰⁸ and the Hackett Hill Master Plan. This analysis found an estimated 18 acres of wetlands within the parcels planned for development, 0.5 acres of which would be impacted by the implementation of the Master Plan. State and local policies aimed to protect wetland and vernal pool habitat would require future development projects to mitigate for wetland impacts when applicable.^{109,110}

Wetland permit activity was analyzed to determine trends that would indicate high amounts of development which could increase potential impacts on wetland areas. Goffstown averaged the most permit submittals per year with 21 per year, Manchester second with 19 and Hooksett (15). The total number of permits applications by year are shown in **Table** 4.19-1. These data do not indicate any clear trend in wetland impacts since 2012, since the number of filings vary substantially by year.

Table 4.19-1 Wetland Permits Filed From 2012 to 2017

Number of Permits Per Year							
Town	2012	2013	2014	2015	2016	2017	Total
Goffstown	21	13	22	15	18	17	106
Hooksett	7	12	14	9	13	15	70
Manchester	19	18	19	12	20	10	98

Note: New Hampshire Department of Environmental Services – OneStop: Wetlands Permit Activity.¹¹¹

Wetlands and vernal pool habitat were reevaluated and mapped within the Study Area of the Proposed Action in April and May of 2016. A total of six vernal pools and four potential vernal pools were identified where the Study Area extends into the Hackett Hill parcels. Most vernal pools were mapped within the forested area south of Hackett Hill or within the Eversource ROW. A large vernal pool complex consisting of four individual pools is located approximately 200 feet from I-293 and are hydrologically connected within wetland MR-08. The Proposed Action was designed to avoid vernal pool impacts to the maximum extent practicable. Vernal pool impacts within the Hackett Hill parcels total approximately 0.2 acres and are a result from the construction of the Exit 7 Interchange West Connector. Constructing the Exit 7 Interchange West Connector would require filling a small vernal pool at VP-01, VP-08 and PVP-03. The Proposed Action is being designed to avoid directly impacting the largest and most significant vernal pool complex, consisting of VP-02, VP-03, and VP-04 within wetland MR-08, located northwest of the relocated Exit 7 interchange.

4.19.4.5 Water Resources

Waterways within urbanized areas are consistently put under increased stress from stormwater runoff via increases in impervious surfaces and fragmentation of undeveloped parcels (e.g., wetlands, floodplains, forested parcels). The future impacts of development in the Study Area could put additional stresses on water quality. Manchester has a total area of 34.9 square miles (22,336 acres) of which 1.9 square miles (1,216 acres) is water, due to the Merrimack River.¹¹² Other surface water resources in Goffstown, Hooksett, and Manchester include Woodland Pond, Black Brook, Hardy Brook, Milestone Brook, as well as several unnamed intermittent streams. The Millyard People Mover would likely add an additional crossing over the Merrimack River at Exit 6, connecting the parking structure to downtown Manchester. The lower Merrimack River is a designated waterbody by the State of New Hampshire,¹¹³ and special considerations would be required during the design and eventual construction of the Millyard People Mover to ensure water quality is not adversely impacted.

In 2018, the Town of Goffstown passed an ordinance on water quality to ensure water quality standards are met as the town supports development and expanded housing needs when installing private wells.¹¹⁴ The Central Hooksett Water Precinct, which supplies drinking water to Hooksett residents receives its water supply from Manchester Water Works. Manchester Water Works provides the drinking water for Manchester and portions of Goffstown and Hooksett. In preparation for the increased demand/customer base, Manchester Water Works is constructing a new radial collector well adjacent to the Merrimack River in Hooksett. A new treatment facility near the well is anticipated to be completed by 2020.¹¹⁵

The City of Manchester owns, operates, and maintains a significant stormwater system (over 170 miles of stormwater piping), over 16,000 catch basins, miles of earthen drainage swales, and hundreds of drainage outfalls.¹¹⁶ Per the US Environmental Protection Agency standards for urban areas greater than 100,000 people, Manchester developed a Stormwater Management Program. This program uses standards and construction controls to improve water quality via public education, public participation/involvement, illicit discharge detection and elimination, construction control measures, post-construction measures, and pollution prevention. Through the adoption of these practices, all contractors that disturb more than one acre of land are required to fulfill several City, State and Federal standards.

As Permittees of the US EPA MS4 permit, both NHDOT and the City of Manchester will implement and enforce programs to reduce pollutants in stormwater runoff to MS4. Any future projects (development or roadways) with stormwater discharge from NHDOT or City

¹⁰⁸ US Fish and Wildlife Service. 2019. The National Wetlands Inventory. Accessed from https://www.fws.gov/wetlands/. Accessed on February 5, 2019.

¹⁰⁹ Town of Goffstown. Undated. Goffstown Conservation Commission Bylaws and Rules. Accessed from <u>http://www.goffstown.com/</u> images/stories/Boards_Committees/Conservation/ConservationCommission-Bylaws.pdf. Accessed on February 5, 2019.

¹¹⁰ Town of Hooksett. Undated. Zoning Ordinance. Accessed from <u>https://www.hooksett.org/sites/hooksettnh/files/uploads/</u> zoning_ordinance_2018.pdf. Accessed on February 5, 2019.

¹¹¹ New Hampshire Department of Environmental Services. 2019. *OneStop: Wetland and Shoreline Query*. Accessed from https://www4.des.state.nh.us/OneStop/. Accessed on February 14, 2019.

¹¹² City of Manchester. 2008. Stormwater Feasibility Study. Accessed from <u>https://www.des.nh.gov/organization/divisions/water/stormwater/</u> documents/manch-sw-utilityfs-rpt.pdf. Accessed on February 12, 2019.

¹¹³ New Hampshire Department of Environmental Services. Undated. Designated Rivers. Accessed from <u>https://www.des.nh.gov/organization/</u> divisions/water/wmb/rivers/desigriv.htm. Accessed on February 13, 2019.

¹¹⁴ Town of Goffstown. 2018. Certificate of Occupancy Requirements-Water Quality. Accessed from http://www.goffstown.com/images/ documents/ordinances/town-property/CertificateOfOccupancyWaterQuality.pdf. Accessed on February 12, 2019.

¹¹⁵ City of Manchester, Manchester Water Works. Undated. *Future Supply*. Accessed from <u>https://www.manchesternh.gov/Departments/</u> Water-Works/Water-Supply. Accessed on February 13, 2019.

¹¹⁶ City of Manchester, Manchester Water Works. Undated. *Future Supply*. Accessed from <u>https://www.manchesternh.gov/Departments/</u> Water-Works/Water-Supply. Accessed on February 13, 2019.

of Manchester projects are subject to the terms and conditions set forth in their MS4 permit. This includes proposed or future stormwater infrastructure constructed by the permittee, and maintenance activities on their current MS4 systems. Maintenance activities include street sweeping, inspections, and catch basin cleaning, maintenance activities are required by the MS4 permit to ensure these features are functioning properly.

4.19.5 Conclusions

The Proposed Action aligns with the goals of Smart Growth opportunities identified in municipal Master Plan of Manchester. The Proposed Action was designed to improve existing traffic conditions throughout the I-293 corridor and adjacent commuter communities (i.e., Goffstown and Hooksett), alleviating current congestion issues and accommodating for future traffic growth potential. It is not anticipated that the Proposed Action would induce rapid expansion and growth in an area previously undeveloped or rural but may facilitate the development of City-owned land at the planned Hackett Hill area and other parcels in the area. Other parcels include Manchester Community College, Hackett Hill and privately-owned land near Exit 7 which are currently more difficult to access due to the layout of Exit 7. The project may spur development within these parcels. Any future or proposed developments discussed in this document are still dictated by broader market demand and supply characteristics, financial feasibility and developer capacities. Cumulative effects to the environment can be managed through the application of existing environmental and planning regulations or the adoption of new public policies to ensure sustained environmental quality for current and future residents of Manchester and the surrounding areas.

Transportation

- DESIGN/CONSTRUCTION) Page 4-27
- roadways. (HIGHWAY DESIGN/CONSTRUCTION) Page 4-28

Air Quality

Summary of Environmental Commitments

The following environmental commitments have been made for this project:

1. NHDOT will construct the northern portion of the project, including the new Exit 7 interchange and associated roadways, prior to construction of the reconfigured Exit 6 interchange. This early construction will be completed largely outside of existing roadways, thereby minimizing impacts to existing traffic operations. (HIGHWAY

2. A comprehensive phased Traffic Control Plan will be prepared during the final design phase of the project. The Traffic Control Plan will include creating temporary detours for regular roadways where capacities have been diminished, providing traffic control, routing trucks away from residential neighborhoods, and consideration of restricting construction activities during certain periods of high traffic volumes on the existing

3. During the I-293 mainline construction, the Contractor will be required to maintain two lanes of travel in each direction at all times. (CONSTRUCTION) Page 4-28

4. Construction contractors will be required to implement measures to protect local residents, visitors, passengers, and passers-by from off-site exposure to dust and debris by appropriate methods to be determined according to the surfaces concerned, such as wetting soils during excavation. (HIGHWAY DESIGN/CONSTRUCTION) Page 4-41

- 5. Construction contract documents will advise contractors to adhere to the New Hampshire anti-idling regulations (Env-A 1100) to minimize the health and environmental impacts of idling by establishing a limit on the amount of time that engines are permitted to idle. (HIGHWAY DESIGN/CONSTRUCTION) Page 4-41
- Construction contract documents will advise contractors regarding the recommended use of Ultra Low Sulfur Diesel (ULSD) fuel; proper maintenance of all motor vehicles, machinery, and equipment; and proper fitting of equipment with mufflers or other regulatory-required emissions control devices. (HIGHWAY DESIGN/CONSTRUCTION) Page 4-41

Noise Environment

- 7. Sound walls will be constructed where determined feasible according to NHDOT criteria in the Noise Policy. The Proposed Action includes construction of three sound walls at locations adjacent to I-293 where abatement is expected at the following areas:
 - Along the east side of I-293, north of Exit 6, adjacent to Riverfront Drive and Stark Lane:
 - Along the west side of I-293, north of Exit 6, adjacent to a portion of Front Street between Omega Street and Amoskeag Street; and
 - Along the east side of I-293, extending north from the relocated Exit 7 interchange, in the vicinity of Country Club Drive.

A final decision on the installation of sound walls will be made during the final design process, following the completion of public involvement. (HIGHWAY **DESIGN/ENVIRONMENT)** Page 4-48

- 8. The following mitigation strategies will be employed during construction to the extent practicable to limit the potential impact of construction noise:
 - All exhaust systems in good working order, also using properly designed engine enclosures, and intake silencers.
 - Regular equipment maintenance.
 - Placement of stationary equipment as far away from sensitive receptors as possible (e.g., pumps, compressors, aggregate crushers, AC plants, operators).
 - Choice of disposal sites and haul routes thereto.
 - Employing shielding where possible.
 - Schedule of operations to coincide with periods when people will least likely be affected.
 - Limiting working hours and work days to least noise-sensitive times.
 - Public notification of construction operations.
 - Methods to handle complaints.

(CONSTRUCTION) Page 4-48

Groundwater Resources

- conditions. (HIGWAY DESIGN/ENVIRONMENT) Page 4-64
- Page 4-65

Water Quality

- design. (ENVIRONMENT/DESIGN) Page 4-73
- (ENVIRONMENT) Page 4-73
- EPA MS4 permit. (ENVIRONMENT) Page 4-74
- 4-74
- (ENVIRONMENT/CONSTRUCTION) Page 4-74

9. During final design, measures that could be used to promote infiltration of stormwater as part of the drainage design will be considered to maintain existing groundwater recharge

10. Where temporary groundwater dewatering is required, proper containment and handling measures will be deployed to prevent turbid or potentially contaminated water from being released to surface waters or other resources. (ENVIRONMENT/CONSTRUCTION)

11. Increased stormwater runoff from the proposed additional pavement would be mitigated by constructing various stormwater treatment BMPs as described in this document. This system would include a combination of BMPs such as wet extended detention basins, vegetated swales, and/or gravel wetlands. The exact number and type of stormwater BMPs and the amount of roadway area to be treated will be finalized as part of the final

12. NHDOT will coordinate with the City of Manchester to develop a stormwater BMP inspection and maintenance agreement for certain proposed BMPs and roadway areas that will be under the City's maintenance jurisdiction consistent with the City's Stormwater Management Plan and the 2017 EPA MS4 Stormwater Permit.

13. NHDOT and City of Manchester will inspect and maintain the proposed stormwater BMPs in accordance with the NHDOT's Stormwater BMP Inspection and Maintenance Manual and the 2017 MS4 Stormwater Permit. (ENVIRONMENT) Page 4-74

14. NHDOT and the City of Manchester will perform routine maintenance of their respective roadways and related stormwater infrastructure including annual catch basin cleaning and street sweeping in accordance with their Stormwater Management Plans and the 2017

15. NHDOT will incorporate, as available funding allows, additional deicing efficiency measures as outlined in its recently updated statewide Salt Management Plan to minimize any potential increase in road salt usage due to the added lane miles of roadway associated with the Project. These practices include the use of liquid deicers to pretreat roads and prewet road salt, use of ground-speed controllers, more effective plow blades and enhanced weather forecasting and notification technology. (ENVIRONMENT) Page

16. NHDOT will apply for coverage under the USEPA National Pollutant Discharge Elimination Systems' Construction General Permit since more than one acre of land will be disturbed at a time during Project construction and dewatering will be required in certain locations (Black Brook, Milestone Brook). A separate Notice of Intent and Stormwater Pollution Prevention Plan will be developed by the Contractor for each construction contract.

Floodplains & Floodways

- 17. Floodplain impacts will be offset by incorporating compensatory storage at BMPs 23953 and 23983 to the extent practical, and through the removal of floodplain fill associated with the reconstruction of the Black Brook Bridge. (HIGHWAY DESIGN/ENVIRONMENT/CONSTRUCTION) Page 4-82
- 18. Upon completion of construction, temporarily impacted floodplains will be restored to provide pre-disturbed flood storage volumes. (HIGHWAY DESIGN/ENVIRONMENT/CONSTRUCTION) Page 4-82

Wetlands and Surface Waters

- 19. Mitigation for the wetland impacts will be determined in accordance with the NHDES Wetlands Bureau Administrative Rules, Env-Wt 801.03 and the USACE policies as outlined in New England District Compensatory Mitigation Guidance (September 7, 2016). Mitigation for direct and secondary vernal pool impacts will follow the USACE mitigation guidance, including impacts to the Vernal Pool Envelope and Critical Terrestrial Habitat. (ENVIRONMENT) Page 4-109
- 20. Erosion Control Plans will be prepared for each construction contract that specify the appropriate pollution prevention measures and BMPs as outlined within the New Hampshire Stormwater Manual Vol. 3 – Erosion Control and Sediment Controls During Construction (December 2008) to protect the water quality of wetlands, surface waters, and vernal pools located within and adjacent to the Project. (ENVIRONMENT/CONSTRUCTION) Page 4-110
- 21. A stream geomorphic assessment of Black Brook will be completed prior to the final design of the new bridge over the brook; the design of the new bridge will comply with the NHDES Stream Rules. (ENVIRONMENT/HIGHWAY DESIGN) Page 4-110

Wildlife and Habitat

22. Tree clearing and ground disturbing impacts will be reduced to the extent practicable during the design and construction to limit unnecessary impacts on wildlife habitat. (ENVIRONMENT) Page 4-116

Threatened and Endangered Species

- 23. Updated plant surveys for clasping milkweed, downy false foxglove, wild lupine, and licorice goldenrod will be completed prior to construction. Surveys are recommended to be completed in 2022 or 2023, based on the current anticipated construction start date. Prior to starting the surveys, NHDOT will submit a detailed map of the locations of the proposed rare plant survey extents to the NH Natural Heritage Bureau (NHNHB) for confirmation. (ENVIRONMENT) Page 4-130
- 24. If a threatened, endangered, or rare plant species is encountered during construction that was not documented prior to construction, construction activities in that area will temporarily cease until the plant has been relocated. (ENVIRONMENT/CONSTRUCTION) Page 4-130
- 25. Wildlife friendly erosion control methods will be implemented during construction such as woven organic material for erosion control blankets as recommended by the NHFG.

Additionally, welded plastic, biodegradable plastic, or threaded erosion control materials will not be used as part of construction. (ENVIRONMENT/CONSTRUCTION) Page 4-130

- Page 4-130
- 4-130

Cultural Resources

- completed. (ENVIRONMENT) Page 4-152

Hazardous Materials and Contamination

- the unlikely event of inadvertent spill during construction. (ENVIRONMENT/CONSTRUCTION) Page 4-160

26. The little brown bat and tricolored bat are being assessed for listing as federally endangered species. The status of these species will be re-evaluated, in consultation with USFWS, closer to the date of construction to determine whether or not tree clearing impacts will negatively impact the little brown bat and tricolored bat. (ENVIRONMENT)

27. The project has been reviewed for potential impacts to the Northern Long-eared bat. This project has been determined to conform to one or more of the activities included in the 4(d) rule (does not occur within a hibernacula, does not occur within 0.25 miles of a known, occupied hibernacula and does not cut a known, occupied maternity roost tree or trees within a 150 foot radius of a maternity roost tree), which allows for incidental take. If the scope of work or resources impacted change, the project will need to be reviewed by the Bureau of Environment (HIGHWAY DESIGN, ENVIRONMENT, CONSTRUCTION). Page

28. To ensure no adverse effect to the Amoskeag Millyard Historic District, NHDOT will coordinate with FHWA, NHDHR, and the owner of the Cotton Duck Building to relocate the Valve House such that retains its association and spatial awareness to the Cotton Duck Building. NHDOT will ensure that prior to and following the move the building is structurally stable and weather tight. (ENVIRONMENT/DESIGN) Page 4-151

29. The details of an Archaeological Discovery Plan will be outlined in a Memorandum of Agreement (MOA) among FHWA, NHDOT, and NHDHR, and any Consulting Parties that may be identified. For nine sites that are potentially eligible, a Phase II DOE will be completed to develop more information to determine whether the resources warrant listing on the National Register. (ENVIRONMENT) Page 4-151

30. Following the Phase II investigations, if necessary, a Phase III Data Recovery Plan will be developed in consultation with NHDHR, and all necessary phases of archaeology will be

31. Spills and leaks associated with vehicles and heavy machinery will be mitigated through the implementation of spill response programs that specify procedures for emergency response in the event a spill or leak occurs. Spill prevention plans are anticipated to be developed prior to construction to limit the potential and outline containment measure in

32. Hazardous building materials (asbestos, lead-based paint, PCBs, mercury, and others) will be inventoried prior to any structural demolition or renovation work. If these hazardous materials are found to be present in the structures, then they will be properly abated by a licensed contractor in accordance with state and local regulations and shipped to a receiving facility licensed to handle the specific type of solid waste under the appropriate shipping documents such as manifests. (ENVIRONMENT/CONSTRUCTION) Page 4-161

- 33. If groundwater impacted by OHM such as chlorinated solvents and/or PFAS is encountered during construction phases, dewatering activities shall be conducted in accordance with applicable federal and state regulations (including NHDES rules and/or Groundwater Management Plans) and coordinated with NHDES and the City of Manchester. Groundwater within Groundwater Management Zones will be treated using a conventional water treatment system and, based on the assumption that liquids are treated to less than AGQS for all parameters, infiltrated under a temporary discharge permit. Groundwater generated from within the Groundwater Management Zone associated with the Manchester Landfill may be discharged to the City of Manchester sanitary sewer following treatment. (ENVIRONMENT/CONSTRUCTION) Page 4-161
- 34. If saturated soils located within the GMZ adjacent to the Manchester Landfill require removal, these saturated soils will be excavated, stockpiled, drained of free liquids, and tested to determined leachability concerns. The drained free liquids will be treated as dewatering liquids and treated accordingly. Based on the analytical results, if leachability is a concern, then the soil cannot be reused within the Project Footprint and may require disposal at a permitted landfill or treatment at a permitted incinerator. If there are no leachability concerns, then soils should be reused within the GMZ area. If soil cannot be re-used and requires disposal at a landfill or incinerator treatment, Project impacts are anticipated due to the limited facility options available for managing PFAS-impacted soils, which could result in cost premiums and construction delays. (ENVIRONMENT/CONSTRUCTION) Page 4-161
- 35. A Project-specific Soil and Groundwater Management Plan will be developed in accordance with NHDOT specifications, based upon the results of subsurface investigations for the Proposed Action, with special attention to areas where excavation within contaminated soil or groundwater will occur. These investigations will be conducted in order to pre-characterize soils that are designated for excavation during construction phases of the Project. A SGMP typically outlines standards and procedures for the identification and disposal of contaminated materials that may be encountered during construction. Soil tracking protocols will be detailed from the point of excavation to designated testing areas and to the ultimate disposal site. Fugitive dust will be controlled through wetting, sweeping, and other suppression techniques. The SGMP would include analytical data for the Contractor to develop a comprehensive health and safety plan. (ENVIRONMENT/CONSTRUCTION) Page 4-161
- 36. Contractors will be advised that roadside LRS have been identified within the Study Area. The SGMP will provide guidance for the identification, handling, storage, reuse, and disposal of LRS soils generated during construction activities. (ENVIRONMENT/CONSTRUCTION) Page 4-161
- 37. The SGMP will require that LRS be reused, with priority, within the Project Footprint if feasible. Reuse restrictions will require that LRS placement be in accordance with the BMPs described in the SGMP and with applicable federal, state, and local regulations. If reuse within the foregoing restrictions is not possible, alternative disposal options will be identified in the SGMP. LRS will not be stored or disposed of on private land. (ENVIRONMENT/CONSTRUCTION) Page 4-161

- known LRS. (ENVIRONMENT/CONSTRUCTION) Page 4-161
- NHDES. (ENVIRONMENT/CONSTRUCTION) Page 4-162

Visual and Aesthetic Resources

- (CONSTRUCTION) Page 4-173
- natural surrounding vegetation. (DESIGN) Page 4-173
- (CONSTRUCTION) Page 4-173

Environmental Justice

(ENVIRONMENT) Page 4-176

Socio-Economic Resources

38. The Project will require the development of a Project Operations Plan (POP), which will specify the Contractor's means and methods for handling and managing LRS. This will include the implementation of the BMPs described in the SGMP. No excavation in known areas of LRS will take place until the POP has been approved by the NHDOT. In addition, following approval of the POP, the Contractor will be required to notify the NHDOT Bureau of Environment at least two weeks prior to beginning excavation in the area(s) of

39. Because the Proposed Action may impact active groundwater monitoring wells located on both public and privately-owned, these groundwater monitoring wells will be decommissioned and relocated as necessary in coordination with the well owner and

40. Land uses adjacent to construction areas may have sensitivity to night time lighting, therefore construction-related artificial light will be limited to safety and security requirements while providing minimum impact to the surrounding environment.

41. Plantings will be considered, within NHDOT specifications, for areas that are justified and warrant plantings. Plantings of trees, shrubs, and an herbaceous understory of varying heights, as well as both evergreen and deciduous will be selected, if necessary, to mimic

42. Tree and shrub removal and pruning will be minimized to accommodate sound walls.

43. In coordination with the City of Manchester, NHDOT will consider incorporation of landscaping elements such as flower beds, landscaped areas, wayfinding signage, or welcome signs. It is assumed the City will retain ownership and responsibility of the maintenance of these visual improvements. (DESIGN) Page 4-173

44. Because NHDOT's analysis shows the presence of protected groups within the Study Area, special considerations related to the planning and design of the Project [i.e., American with Disabilities Act (ADA) compliance] and public outreach for future meetings are recommended. A list of contact information for known agencies and subsidized housing units serving these groups are provided in the NHDOT Environmental Justice Population Analysis, contained within **Appendix K**. These contacts will be included in the notification list for public information meetings and hearings related to the Project.

45. Full and partial land acquisitions will be completed in accordance with federal and state laws. These parcels will be acquired at fair-market value. Any property acquisitions will be completed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. (RIGHT-OF-WAY) Page 4-188

46. The billboard currently located on the building at 97 Eddy Road (Cotton Duck Building) will be removed due to roadway design requirements and acquisition of ROW. Compensation for the value of the billboard will be determined and included in the ROW cost for this property. The relocation of the billboard will be the responsibility of the billboard owner based on property owner/management guidelines and City officials regarding any zoning ordinances or permits, as applicable. (RIGHT-OF-WAY) Page 4-188

Findings and Conclusions

A final determination as to whether the Proposed Action would result in a Finding of No Significant Impact will be noted in this section after the document has been circulated to the appropriate agencies and parties and all issues have been appropriately evaluated.

Table 7.1-1 Required Federal Permits, Approvals, or Certifications (Cont.)

National Historic Preservation Act, Section 106	ACHP	Section 106 Consultation ³	120
Magnuson-Stevens Fishery Conservation and Management Act	NOAA - NMFS	Essential Fish Habitat Assessment ⁴	30
Endangered Species Act	USFWS	Section 4(d) Rule ⁵	30

Notes:

- Includes the preparation of a Notice of Intent, Notice of Termination. and Stormwater Pollution Prevention Plan. 1
- 2 3
- Memo, executed August 13, 2019, in Appendix I. Essential Fish Habitat consultation with NOAA – NMFS is complete. See Section 4.10.
- 5 4.11.

7.2 State Compliance

A total of seven state approvals are required to construct the Proposed Action from NHDES, NHDHR, NHNHB, and NHFG. These permits and approvals are outlined in the table below.

Table 7.1-2 Required State Permits, Approvals, or Certifications

Regulation/Jurisdiction	Issuing Agency/Program	Name of Filing	Agency Review Time (days)
NH RSA 482-A, Fill and Dredge in Wetlands	NHDES Wetlands Bureau	Wetlands Permit	90-120
NH RSA 483-B, Shoreland Water Quality Protection Act	NHDES Shoreland Program	Shoreland Permit	30
Section 401, Clean Water Act	NHDES	Water Quality Certification	120 - 180
NH RSA 227-C, Compliance	NHDHR	Request for Project Review ¹	30
NH RSA 217-A, Native Plant Protection Act of 1987	NHNHB	Threatened and Endangered Species Protection Plan Approval	14-120
NH RSA 212-A, Endangered Species Conservation Act	NHFG	Threatened and Endangered Species Protection Plan Approval	30-120
NH RSA 485-C, Groundwater Protection Act	NHDES, Hazardous Waste Management Bureau	Site Specific Soil/Groundwater Management Plan	90-120

An RPR has already been submitted for the Proposed Action which initiated a Section 106 Consultation. This consultation resulted in an Adverse Effects Memo, executed August 13, 2019 (refer to Appendix I). A Memorandum of Agreement will be drafted for the Project based on the executed Effects Memo (refer to Section 4.13.5).

Permits, Approvals, and Certifications

A summary of the anticipated permits, approvals, and certifications required by federal and State agencies to construct the Proposed Action are provided in Tables 7.1-1 and 7.1-2, below. Since the Proposed Action is State funded, no local permits, approvals, or authorizations are required to be obtained for the proposed Project prior to construction. The FHWA is the lead federal agency for the proposed Project due to proposed interchange modifications to an Interstate highway, however NHDOT will serve as the permit applicant for the permits and reviews listed below.

7.1 Federal Compliance

Federal requirements to construct the Proposed Action include six permits and/or approvals from various agencies including the USACE, USFWS, NOAA - NMFS, USEPA, and USDOT. These permits and approvals are outlined in the table below.

Table 7.1-1 Required Federal Permits, Approvals, or Certifications

Regulation/Jurisdiction	Issuing Agency/Program	Name of Filing	Agency Review Time (days)
Interstate System Access Agreement, 23 USC 111	USDOT/FHWA	Interchange Modification Report	120
Clean Water Act, Section 404	USACE	Individual Permit	120
Clean Water Act, 33 USC §1251 et seq.	USEPA	National Pollutant Discharge Elimination System Construction General Permit ¹	14 ²

The National Pollutant Discharge Elimination System Construction General Permit is to be prepared just before construction begins. An RPR has been submitted for the Proposed Action which initiated a Section 106 Consultation which is ongoing. This consultation resulted in a determination that the project would result in an Adverse Effect to archaeological resources. See the Adverse Effects

The Proposed Action is in compliance under the ESA 4(d) rule (NLEB conservation) per the Streamlined Consultation Form. See Section

Table 8.1-1 Public Outreach and Involvement Efforts

Outreach Type	Date	Summary
Project Website	ONGOING	The website se Project, and pr
	Summer 2016	
Novelattors	Spring 2017	The newsletter
Newsietters	Summer 2018	and ways to pa
	Fall 2019	
Open House and Public Officials/Public Informational Meeting	August 10, 2016	Presented the study materials members.
Public Workshop/Public Informational Meeting	June 7, 2017	Presented the materials were Exit 7, and the interact with st
Public Workshop/Public Informational Meeting	June 13, 2018	Provided proje community inp
Formal Public Hearing	October 30, 2019	Will present the natural enviror potential neces opportunity to

Public Involvement and Agency Coordination

This chapter describes outreach, coordination, and other actions undertaken to involve communities, stakeholders, interested citizens, public officials, and resource agency partners during the NEPA process. Meeting presentations, notes and other related materials from completed Public Meetings and Technical Advisory Committee (TAC) Meetings are available on the project website (http://www.293planningstudy.com/meetings.asp).

8.1 Meeting with the Community

Public outreach efforts in support of this Project began in February 2016, including public workshops and meetings and publication of periodic newsletters. Additionally, NHDOT maintains a project website with project information, presentations, meeting notes, documents, and notices. On the website, individuals can sign up for project emails and submit questions or comments.

NHDOT has hosted three public meetings to update the community on the Project and solicit specific concerns. NHDOT will also conduct a formal public hearing in October 2019, overseen by a panel of three Highway Layout Commissioners appointed by the Governor and Executive Council pursuant to NH RSA 230:14 and the Surface Transportation and Uniform Relocation Assistance Act of 1987.

Engagement with the community is summarized below in **Table 8.1-1**.

8.2 Technical Advisory Committee Meetings

A total of nine TAC meetings have been held from February 2016 to January 2019, with one additional meeting expected to occur before the public hearing after completion of the Draft EA. The TAC serves in an advisory role to the project team and as a liaison to the community. The TAC consists of representatives of the City of Manchester, the Towns of Goffstown and Hooksett, the Southern New Hampshire Regional Planning Commission, the Greater Manchester Chamber of Commerce, the Hooksett Chamber of Commerce, Manchester Community College, State Senator Boutin, FHWA and NHDOT.¹¹⁷ Coordination with the TAC is summarized below in Table 8.1-2.

¹¹⁷ Contact information for members of the TAC are provided on the project website at <u>http://www.293planningstudy.com/tac.asp</u>.

erves to keep the public informed and up-to-date on the rovide feedback opportunities.

publications present project updates, describe next steps articipate, and list project contacts.

proposed Project and solicited public input. Presented s and provided opportunity to interact with study team

Project purpose, schedule, updates, and alternatives. Study made available for viewing at three workstations for Exit 6, mainline between Exit 5 and Exit 6. Provided opportunity to tudy team members.

ect updates, overview of the study phases, and obtained out on alternatives.

e need for the Project and the social, economic, cultural, and nmental effects of the Proposed Action, as well as the ssity for land acquisitions or relocations. The public will have provide oral and/or written testimony.

Table 8.1-2 Technical Advisory Committee Meetings

Date	Summary
February 2016	Discussed role of TAC members, the project process, planning study recap, and public outreach.
April 2016	Discussed data collection, the Purpose and Need, and FHWA's INVEST Sustainability Scoring tool.
May 2016	INVEST Sustainability Scoring Workshop provided time for breakout group discussions to identify opportunities to enhance project sustainability during final design and construction.
July 2016	Discussed the updated project schedule, environmental resources, preliminary traffic model results, Purpose and Need statement, and plans for the August 2016 public informational meeting.
November 2016	Discussed the Project purpose, modified Front Street alignment, the Proposed Action, bicycle and pedestrian connectivity, and the project schedule.
April 2017	Discussed modified Exit 6 alternative, the connector road to Goffstown, and minimization of impacts to the Merrimack River at the curve between Exits 5 and 6.
July 2017	Discussed finalization of a Proposed Action.
April 2018	Discussed the Project purpose, project input and meetings that have occurred to date, and finalized the Proposed Action.
January 2018	Discussed updates in TAC membership. Discussed anticipated natural and cultural resource impacts as a result of the Proposed Action.

8.3 Scoping

The NEPA process encourages participation of local, state, and federal resource agencies early in the planning stages. In March 2016, scoping letters to notify agencies of the preparation of a NEPA EA were sent to formally request any relevant environmental data, concerns, or comments regarding the Project. The local, state, and federal resource agencies listed below in Table 8.1-3 were provided notice of preparation of this EA. Copies of the agency responses to the scoping letters are provided in **Appendix L**.

Table 8.1-3 Federal, State, and Local Agencies Notified of Preparation of the EA

Federal	
US Army Corps of Engineers	US Fish and Wildlife Service
US Department of Agriculture Natural Resources Conservation Service	National Oceanic and Atmospheric Administration Fisheries
US Environmental Protection Agency – Office of Ecosystem Protection	US Environmental Protection Agency – Office of Environmental Review
Federal Emergency Management Agency	

Table 8.1-3 Federal, State, and Local Agencies Notified of Preparation of the EA (Cont.)

State of New Hampshire	
Fish and Game Department	Department of Environmental Services
Department of Resources and Economic Development (now the Department of Natural & Cultural Resources)	Department of Natural & Cultural Resources – Division of Parks & Recreation
Office of Energy and Planning (now the Office of Strategic Initiatives)	Department of Agriculture, Markets & Food
Office of Energy and Planning – NH Floodplain Coordinator	Department of Cultural Resources (now under
Conservation Land Stewardship Program	Department of Natural & Cultural Resources)
Local	

Town of Goffstown Planning and Zoning	Town of Goffstown Conservation Commission
Town of Hooksett Planning Board	Town of Hooksett Conservation Commission
City of Manchester Planning Board	City of Manchester Conservation Commission
City of Manchester Department of Parks and Recreation	

8.4 Public Officials Meetings

A total of eight meetings with public officials have been held since August 2016. In general, these meetings were held to fully understand the needs and desires of the communities. Coordination with public officials is summarized below in Table 8.1-4.

Table 8.1-4 Coordination with Public Officials

Meeting	Date	
Manchester Community College (MCC)	August 2016	
Southern NH Planning Commission	September 2016	
City of Manchester Staff	December 2016	
Town of Goffstown Staff	January 2017	
Town of Goffstown Selectmen	March 2017	
Manchester Chamber Infrastructure Committee	March 2017	
City of Manchester Mayor and Staff	August 2017	
City of Manchester Mayor and Staff	February 2018	
Southern NH Planning Commission	May 2019	

8.5 Resource Agency Coordination and Meetings

Since December 2012, a total of nine meetings have been held with NHDOT, FHWA, and resource agencies, including NHDHR, USACOE, USEPA, NHDES, NHFG, and NH Natural Heritage Bureau. The NHDOT Natural Resource Agency Coordination Meetings (NRAM) provide an opportunity for early coordination and problem solving on natural resource concerns that arise in the development of transportation projects, thereby streamlining state and federal permitting, and NEPA approvals.¹¹⁸ The NHDOT Cultural Resource Agency Meetings (CRAM) provide an opportunity for early coordination and problem solving on cultural resource concerns that arise in the development of transportation projects.¹¹⁹ Coordination with resource agencies at NRAMs and CRAMs is summarized below in Table 8.1-5.

Table 8.1-5 Coordination with Federal, State, and Local Resource Agencies

Date	Description	Summary
December 2012	CRAM	Discussed the Planning Study and introduced the agencies to the Project, including the evaluation of interchange configurations and system connectivity of the FEE Turnpike/I-293.
December 2012	NRAM	Discussed the Planning Study and introduced the agencies to the Project and key issues. Substantial concerns or issues from the agencies were solicited.
June 2013	NRAM	Discussed the key environmental and cultural resources and provided agencies with a summary of the conceptual alternatives that had been developed, a review of the alternatives analysis, and requested feedback on any concerns or issues from the agencies.
July 2013	CRAM	Discussed updates to alternatives and presented aerial views of the project with combined footprints of all alternatives, and historic districts and properties.
August 2016	NRAM	Discussed the Project status and schedule, the draft Purpose and Need statement, preliminary wetland impacts, permit applications, and mitigation.
March 2017	NRAM	Discussed background information of the Project, key wetland impacts, and mitigation.
June 2017	CRAM	Discussed the Proposed Action, alternatives, design constraints, potential historical resource impacts, and archeological work.
October 2018	CRAM	Discussed the draft Adverse Effects Memo, including anticipated effects of the Proposed Action on historic properties and proposed mitigation.
July 2019	CRAM	Discussed coordination effort with Manchester Historic Association, project impacts and potential mitigation options to Valve House, draft Effects Memo,

¹¹⁸ Natural Resource Agency Meeting notes are available online at https://www.nh.gov/dot/org/projectdevelopment/environment/units/project-management/nracrmeetings.htm.

¹¹⁹ Cultural Resource Agency Meeting notes are available online at https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/crmeetings.htm.

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