Chapter 3

Affected Environment and Environmental Consequences

Chapter 3 is an inventory of the affected environment and a discussion of consequences and potential mitigation measures resulting from the alternatives retained for detailed study. It succinctly describes the physical, biological, social, and economic environments of the area to be affected by the alternatives. It describes the impacts of the alternatives; the adverse effects that cannot be avoided if implemented; the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity; and any irreversible or irretrievable commitments of resources that would result if an alternative is implemented (40 CFR part 1502.16).

3.1 Introduction

The purpose of this section is to introduce new information and present the anticipated impacts of the No-Build, and build alternatives, including Alternative 2B-2/the Preferred Alternative, on the natural, social, and economic environments, as they differ from the information presented in the DEIS. For impacts that have not changed, the affected environment information is summarized and the reader is referred to the DEIS for a complete description.

A study area of approximately 34,416 acres was identified, and a detailed analysis of the natural, social, and economic features of the study area was performed. The study area covers not only the land that would be used for the build alternatives, but also the areas that would experience direct, indirect, and cumulative impacts from them. The No-Build and build alternatives, including Alternative 2B-2/the Preferred Alternative, would not substantially impact the following resources and features:

- physical geography
- climate
- geological resources
- groundwater
- significant sand and gravel aquifers
- wild and scenic rivers
- state endangered or threatened species
- essential fish habitat (EFH)

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- other protected species
- communities
- tribal trust lands
- sites containing uncontrolled petroleum and hazardous wastes
- historic resources
- archaeological resources
- traditional cultural properties
- public properties
- population, demographics, and labor force
- community characteristics and conditions
- minority and disadvantaged populations

3.2 Physical and Biological Environment

3.2.1 Soils

Many different soil types are found in the study area. Certain soil types can be classified as either hydric soils, which are characteristic of wetlands areas, or prime or potential prime farmland soils. Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop at least temporary conditions in which there is no free oxygen in the soil around roots. Generally, hydric soils correspond closely to wetlands (USDA, 1995). Prime farmland soil has the best combination of physical and chemical characteristics for producing forage and crops. Soils of statewide importance are defined as "… land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crop." For a complete description of soils, see DEIS Section 3.1.1.2 Soils.

The No-Build and build alternatives would impact soils and agricultural land (exhibit 3.1), but would not result in a substantial impact to farmland and farming operations. MaineDOT, the FHWA, and the National Resource Conservation Service (NRCS) performed an analysis of the potential impacts of the build alternatives to farmland and farming operations in accordance with the Farmland Protection Policy Act (FPPA); Form NRCS-CPA-106 was completed. The build alternatives result in scores from 49 to 57 of a possible 260. Because the scores for the build alternatives are less than 160, no further coordination is required to demonstrate compliance with the FPPA.

Construction of the build alternatives would require the removal of vegetation and earth-moving activities,

Exhibit 3.1 – *Impacts to Soils with Special Status (acres)*

Alternative	Hydric Soils	Prime Farmland Soils	Soils of Statewide Importance
No-Build	–	–	–
2B-2/the Preferred Alternative	23 (0.3%)	19 (0.8%)	14 (0.3%)
5A2B-2	24 (0.3%)	14 (0.6%)	34 (0.8%)
5B2B-2	25 (0.3%)	19 (0.8%)	19 (0.4%)

thereby exposing soil to erosive forces. Construction precludes the use of functioning soil for other uses such as native vegetation support. During construction, sediment- and erosion-control procedures to control both coarse and fine sediment would be implemented. These measures would be in accordance with Section II of MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a).

3.2.2 Aquatic Resources

3.2.2.1 Water Resources

The predominant surface water features in the study area are the Penobscot River, Felts Brook, Eaton Brook, Kidder Brook, Meadow Brook, Mill Brook, Davis Pond (also known as Eddington Pond), and Holbrook Pond (exhibit 3.2). The study area is located in the Lower Penobscot River watershed; many sub-watersheds are also located in the study area. For a complete description of the lakes, rivers, creeks, and watershed areas in the study area, see the DEIS Section 3.1.2.1 Water Resources.

The No-Build Alternative would impact surface waters through stormwater runoff and from routine maintenance such as surface and shoulder work; ditch, bridge, and culvert maintenance; and snow and ice removal.

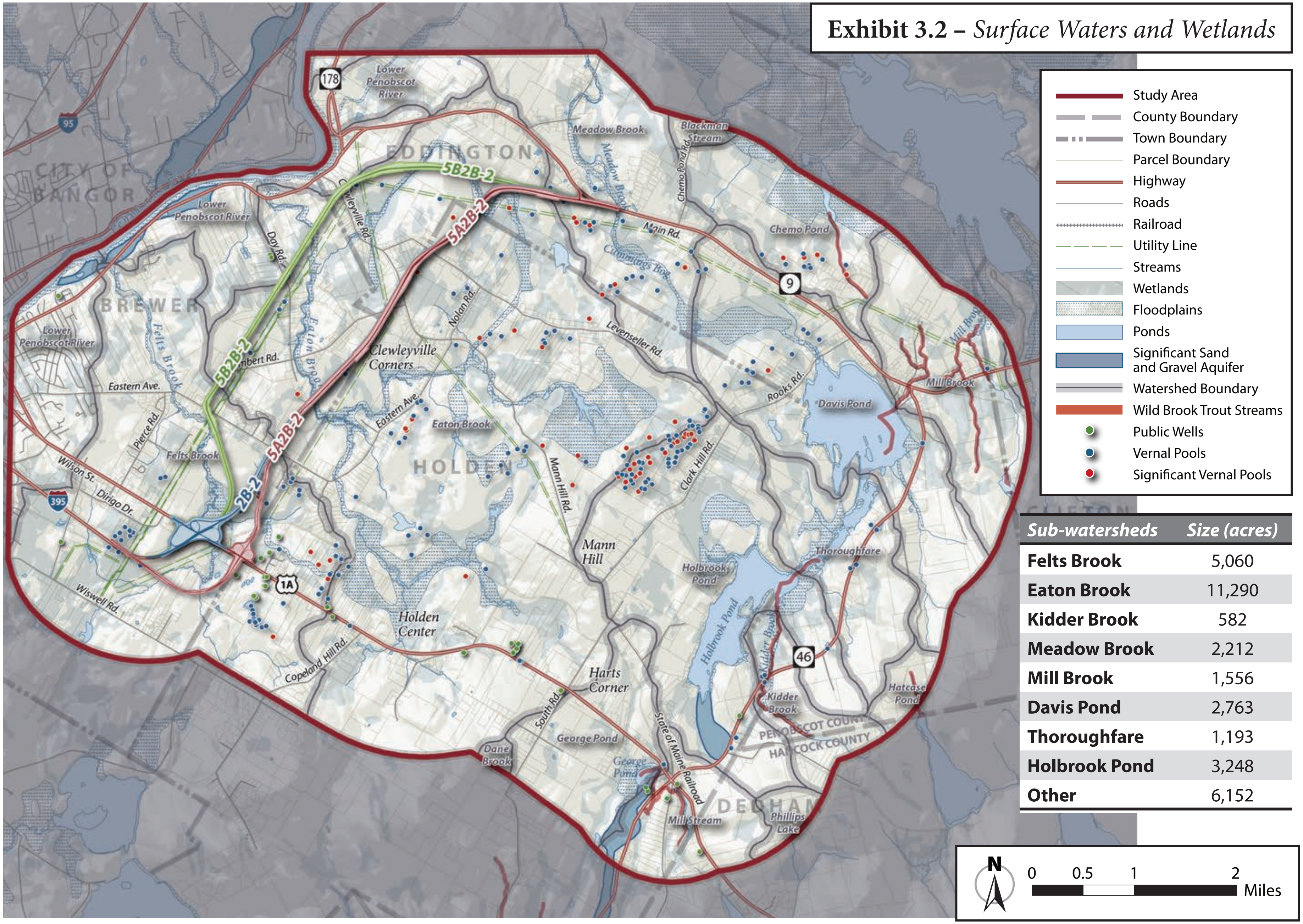
The build alternatives would impact four or five streams; streams would be impacted by bridging them and enclosing portions in culverts, or both, in one or more locations. The bridges would span the streams and in-stream activity would be temporary and limited to the area of the bridge. The build alternatives would enclose portions of streams in culverts ranging from approximately 212 to 222 feet (exhibit 3.3).

During final design of Alternative 2B-2/the Preferred Alternative, MaineDOT would further evaluate opportunities to shorten the width of road-stream crossings, preserve the natural stream bottoms in the road-stream crossings, and promote passage of aquatic organisms. Stream crossings would be designed in accordance with MaineDOT's Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e), except in cases where the drainage is not a stream.

Impervious areas increase the quantity of stormwater runoff and the potential for non-point source pollution. Water from storms that is not absorbed into the ground is discharged into surface waters at higher rates. Higher discharge rates increase the likelihood of contaminants or sediments entering the stream systems and subsequently affecting water quality.

New road-stream crossings increase non-point source discharge during construction and, over the long term, may alter stream and floodplain hydrology. The likelihood that waterborne pollutants would enter surface waters is determined, in part, by the proximity of the new impervious area. Increasing impervious

Exhibit 3.2 – *Surface Waters and Wetlands*



Sub-watersheds	Size (acres)
Felts Brook	5,060
Eaton Brook	11,290
Kidder Brook	582
Meadow Brook	2,212
Mill Brook	1,556
Davis Pond	2,763
Thoroughfare	1,193
Holbrook Pond	3,248
Other	6,152

Exhibit 3.3 – *Impacts to Streams*

Waterway	New Impervious Area (acres)	Unnamed Tributary to Felts Brook	Felts Brook	Unnamed Tributary to Felts Brook	Eaton Brook	Unnamed Tributary to Eaton Brook	Total (number of bridges & number of crossings/feet)
Length (feet)		8,100	33,500	5,800	37,000	19,200	
No-Build							
2B-2/the Preferred Alternative	38		2 bridges - 250 feet	1 bridge - 25 feet	1 bridge - 100 feet	1 bridge - 100 feet 1 culvert - 212 feet, 5-foot diameter	5 bridges - 475 feet 1 culvert - 212 feet
5A2B-2	46	1 bridge - 25 feet	1 bridge - 25 feet	1 bridge - 25 feet	1 bridge - 100 feet	1 bridge -100 feet 1 culvert - 212 feet, 5-foot diameter	5 bridges- 275 feet 1 culvert - 212 feet
5B2B-2	42		2 bridges - 250 feet	1 bridge - 25 feet	1 bridge - 100 feet	2 bridges - 325 feet 1 culvert - 222 feet, 5-foot diameter	6 bridges - 700 feet 1 culvert - 222 feet

Notes: *25 feet was added to both ends of the road-stream crossing.*
Bridges span waters with no in-stream activity.

areas within 500 feet of a stream may increase peak flow rates of runoff into the stream leading to alteration of the stream morphology. It also reduces the area available to attenuate materials that are washed off the roadway from a storm, which leads to sedimentation and contamination. MaineDOT designs new road-stream crossings in accordance with applicable state and federal regulatory standards relating to aquatic organism passage, primarily by using MaineDOT's Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e), except in cases where the drainage is not a stream. The proposed road-stream crossings would span the streams at a width that is 1.2 times the bankful width (i.e., 20 percent larger than a full stream) and use either a bottomless structure or a four-sided structure with stream simulation design and natural substrate installed (See Appendix C). The substrate inside of the structure would emulate the preexisting substrate of the surrounding stream and banks would mimic terrestrial passage characteristics. Whenever practicable, new road-stream crossings are designed to retain natural stream beds and associated banks to preserve natural stream characteristics and negate the need for stream simulation or engineered passage. Specifications for the road-stream crossings would be part of the final design phase and consider existing conditions, and avoid and minimize impacts to stream habitats.

A short-term increase in the potential for sediment loading to surface waters exists. Impacts from sedimentation caused by construction would be temporary. During final design of Alternative 2B-2/the Preferred Alternative, the highway drainage system would be designed to minimize the transport of sediments and other particulates to surface waters. Buffers improve water quality by helping to filter pollutants in run-off both during and after construction. Best management practices would be implemented during and after highway construction to reduce the water quality impacts of stormwater discharges to surface waters. Erosion and sedimentation control measures would be incorporated into the design and implemented during construction in accordance with Section II of MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a) and designed in accordance with the MDEP/MaineDOT/Maine Turnpike Authority Memorandum of Agreement, Stormwater Management, November 14, 2007 and Chapter 500 Rules. MaineDOT understands the potential detrimental effects that winter maintenance initiatives may have on the environment. MaineDOT has worked diligently to ensure cost-efficient efforts are undertaken in a manner that maintains a high level of safety for the traveling public while minimizing impacts to the environment. This is especially true relative to MaineDOT's actions associated with the protection of groundwater. Maine State Law requires that MaineDOT remedy adverse impacts to residential or commercial potable-water supplies caused by winter maintenance activities; however, it has long been MaineDOT's approach to proactively prevent adverse impacts to water quality in lieu of remediation. Conservatively, MaineDOT uses the secondary drinking water standard established for chloride as the primary indicator of adverse impact.

MaineDOT has a wide array of techniques in its "toolbox" to assist in minimizing impacts to the groundwater regime. Many of the techniques used are detailed in the U.S. Environmental Protection Agency's Source Water Protection Bulletin – Managing Highway Deicing to Prevent Contamination of Drinking Water and include the use of alternative anti-icing chemicals, strategically positioned road weather information systems, properly designed and calibrated application equipment, effective pre-treatment tactics and an aggressive employee training, outreach and education program. Integrated with its pragmatic use of anti-icing chemicals (data consistently shows MaineDOT uses much less anti-icing chemicals per lane mile than other northeastern states), a thoroughly-considered approach to maintaining safe passage for emergency responders, commercial goods and the traveling public in a fiscally prudent and environmentally-sound manner is achieved.

During final design of Alternative 2B-2/the Preferred Alternative, MaineDOT would conduct a Pre-Construction Potable Water Supply Characterization

Assessment prior to construction. This assessment is undertaken to establish a baseline relative to the quality of water extracted from residential and commercial potable water supplies located along the project corridor. Samples are typically collected from water supplies positioned adjacent to the proposed construction and are analyzed for coliform bacteria, nitrate, nitrite nitrogen, fluoride, chloride, hardness, copper, iron, arsenic, manganese, sodium, lead, uranium, pH, color, turbidity and odor. The analytical data is maintained in a state-wide database and is used for comparison purposes should any potential claims arise relative to water supply impacts associated with MaineDOT's construction or long term winter maintenance initiatives.

MaineDOT would be required to meet the General Standards under Chapter 500 to the extent practicable as determined through consultation with and agreement by MDEP. Under the Chapter 500 General Standards for a linear project, MaineDOT would be required to treat 75 percent of the linear portion of Alternative 2B-2/the Preferred Alternative's impervious area and 50 percent of the developed area that is impervious or landscaped for water quality. To meet the General Standards, a project's stormwater management system must include treatment measures that would mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts.

There are no known receiving waters in the project corridor that have existing issues or impairment related to chloride concentrations.

Additionally, MaineDOT would consider green infrastructure and low-impact development practices such as reducing impervious surfaces, using vegetated swales and revegetation, protecting and restoring riparian corridors, and using porous pavements.

3.2.2.2 Aquatic Habitats and Fisheries

The Penobscot River watershed provides a migratory pathway, feeding area, spawning area, nursery area, and valuable habitat for a variety of fish species, some that are harvested both commercially and recreationally. According to the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Penobscot River watershed serves as a migratory pathway, spawning area, nursery, and feeding area for a variety of diadromous fish species, including the Atlantic salmon, alewife, blueback herring, American shad, American eel, Atlantic sturgeon, shortnose sturgeon, striped bass, sea lamprey, rainbow smelt, and brook trout. Rainbow smelt and alewives are harvested commercially.

The principal game fish species in the study area are lake trout, brook trout, brown trout, smallmouth bass, largemouth bass, white perch, yellow perch, pickerel, rainbow smelt, hornpout (i.e., brown bullhead), white sucker, pumpkinseed, and redbreast sunfish (Town of Holden, 2007). According to the MDIFW, there are populations of high value eastern brook trout in Felts Brook and Eaton Brook, and populations of non-native invasive black crappie in Eddington and Holbrook Ponds. For a complete description of aquatic habitats and fisheries, see the DEIS Section 3.1.2.2, Aquatic Habitats and Fisheries.

The No-Build Alternative would not impact aquatic habitats or fisheries.

The build alternatives would impact aquatic habitats and fisheries through the road-stream crossing and channelization of streams (exhibit 3.3). Because road-stream crossings with natural bottoms would be used, small amounts of stream channel bottom habitat would be temporarily impacted during construction.

Road-stream crossings can create restrictions or localized changes in flows so that animal movement could be inhibited. MaineDOT's Waterway Crossing Policy and Design Guide (MaineDOT, 2008e) is intended to reduce the likelihood that road-stream crossings would create a barrier to the movement of aquatic organisms. MaineDOT would further evaluate opportunities to shorten the width of road-stream crossings and preserve the natural stream bottoms. Road-stream crossings would be designed in accordance with MaineDOT Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e), except in cases where the drainage is not a perennial stream. Stream crossings would be evaluated for aquatic-organism passage and impacts would be mitigated by providing passage. Stream-bank impacts would be minimized by revegetation.

During final design, MaineDOT would analyze opportunities to further minimize impacts to aquatic habitat and fisheries.

3.2.2.2.1 Magnuson–Stevens Fishery Conservation and Management Act and Sustainable Fisheries Act of 1996.

The 1996 amendments to the Magnuson–Stevens Fishery Conservation and Management Act (Magnuson–Stevens Act) require that an essential fish habitat assessment be conducted for any activity that may adversely affect important habitats of federally managed marine and anadromous fish species. Under Section 303(a)(7) of the Magnuson–Stevens Act, as amended, EFH must be properly described and identified for those species considered under Federal Fishery Management Plans. According to 16 USC 1802(10), EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." "Waters" refers to the aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. "Substrate" refers to sediment, hard bottom, or other underwater structures and their biological communities. The term "necessary" indicates that the habitat is required to sustain the fishery and support the fish species' contribution to a healthy ecosystem. These regulatory requirements are intended (to the extent practicable) to minimize adverse impacts on habitat caused by fishing or other non-fishing activities, and to identify other actions to encourage the conservation and enhancement of EFH. EFH can be designated for four life stages: eggs, larvae, juveniles, and adults.

In the study area, freshwater Atlantic salmon habitat is the only EFH present (MaineDOT, 2013b).

The No-Build Alternative would not impact EFH.

The build alternatives would impact EFH through the construction of four road-stream crossing and channelization of streams (exhibit 3.3). The road-stream crossings may affect Atlantic salmon during their juvenile stage (exhibit 3.4). Construction of the road-stream crossings increases temporary sedimentation within 600 feet downstream of each crossing that could affect migrating adult salmon. The construction of temporary cofferdams (a temporary enclosure built in or across a body of water and constructed to allow the enclosed area to be pumped out, creating a dry area for construction to proceed) may inhibit Atlantic salmon use of waters for rearing and foraging. The benthic communities of the streams in proximity to the road-stream crossings would be disturbed during construction.

The proposed crossings would span the streams at a width that is 1.2 times the bankful width (i.e., 20 percent larger than a full stream) and use either a bottomless structure or a four-sided structure with stream simulation design and natural substrate installed. Stream crossings would be designed in accordance with MaineDOT's Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e). An open work window with restrictions for in-stream work would be used to construct the project. If construction must take place outside of the July 15–October 1 work window, fish passage would be maintained through the use of a bypass channel. During final design, MaineDOT would analyze opportunities to further minimize impacts to EFH by considering

Exhibit 3.4 – *Managed Species by Life-History Stage*

Stage	Atlantic Salmon
Eggs	F/gravel or cobble riffles/below 10° C (50 F)/shallow
Larvae	F/gravel or cobbles/below 10° C (50 F)/shallow
Juveniles	F/shallow gravel and cobbles/below 10° C (50 F)/4 to 20 inches
Adults	F,M,S/ pelagic/oceanic when not returning to spawn
Spawning Adults	F/gravel or cobble riffles/below 10 ° C (50 F)/12 to 20 inches (October and November)

Legend: *salinity code/substrate type/water temperature/water depth*
S = seawater salinity zone (salinity > 25.0%)
M = mixing water/brackish salinity zone (0.5 < salinity < 25.0%)
F = freshwater salinity zone (0.0 < salinity < 0.5%)

minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative.

The MaineDOT concluded the adverse effect from the construction and operation of Alternative 2B-2/ the Preferred Alternative on EFH is not substantial. An EFH Assessment was submitted to NMFS on October 1, 2013 for impacts from Alternative 2B-2/ the Preferred Alternative. NMFS responded, in writing, on October 22, 2013 stating they do not have any conservation recommendations at this time.

3.2.2.2.2 Vernal Pools

According to the MDEP, vernal pools or "spring pools" are shallow depressions that usually contain water for only part of the year. It is a natural, temporary, or semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may be dry during the summer. Vernal pools are defined as temporary pools that serve as reproductive habitat for amphibians such as spotted salamanders, blue-spotted salamanders, and wood frogs. Those species breed primarily in vernal pools because the temporary nature of the pools supports invertebrate food sources and discourages colonization of predatory fish.

According to the MDEP, a vernal-pool habitat is considered significant wildlife habitat if it has high habitat value. "Significant vernal pools" are a subset of vernal pools with particularly valuable habitat. The State of Maine deems that a vernal pool is significant if it meets one of the following criteria. The criteria are:

- It supports a state-listed threatened or endangered species
- It supports abundant egg masses of any one of the following amphibian indicator species: spotted salamanders, blue-spotted salamanders, or wood frogs. (Egg-mass numbers vary with species and were based on extensive surveys of pools throughout Maine.) The abundance criteria on vernal pools being significant is 10 or more egg masses of the blue-spotted salamander, 20 or more egg masses of the spotted salamander, 40 or more egg masses of the wood frog. Egg mass counts are a surrogate of indication of productivity.
- It supports fairy shrimp.

Starting on September 1, 2007, significant vernal pool habitat is protected by law under the NRPA. Development within 250 feet of a significant vernal-pool requires a MDEP permit (MDEP, 2008).

The USACE and federal resource agencies typically use the concentric-circle model with recommended management zones (including 750 feet of "critical terrestrial habitat") to assess indirect impacts to the critical terrestrial habitat around a vernal pool. This was first introduced in the Calhoun and Klemens (2002) "Best Development Practices Conserving

Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States" and is mentioned in the USACE New England District's Compensatory Mitigation Guidance.

There were 251 vernal pools identified in the study area: 55 significant and 196 that do not meet the significant criteria (exhibit 3.2).

For a complete description of vernal pools, see the DEIS Section 3.1.2.2 Aquatic Habitats and Fisheries under the vernal pools heading.

The No-Build Alternative would not impact vernal pools.

The build alternatives would impact/fill one non-significant vernal pool (the same vernal pool for all three build alternatives) and its upland dispersal habitat and wetland habitats (exhibit 3.5). No significant vernal pools would be impacted. The build alternatives may impact upland dispersal habitat and wetland habitats from vernal pools not within the alignments of a build alternative.

The perimeter of vernal pools in and adjacent to Alternative 2B-2/the Preferred Alternative would be reevaluated and identified by MaineDOT during final design. During final design of Alternative 2B-2/the Preferred Alternative, MaineDOT would work to further avoid and minimize impacts to upland dispersal habitat and wetland habitats for vernal pools by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material.

3.2.2.3 Floodplains

Federal protection of floodplains is afforded by Executive Order 11988, "Floodplain Management," and implemented under 44 CFR 9. These regulations direct federal agencies to undertake actions to avoid impacts on floodplain areas by structures built in flood-prone areas. In accordance with these federal directives, the FHWA also enacted federal-aid policy guidance and regulations under 23 CFR 650. The Federal Emergency Management Agency (FEMA) has primary responsibility for identifying flood-prone areas.

Exhibit 3.5 – *Impacts to Vernal Pools*

Alternative	Number of Vernal Pools	Significant		Dispersal Habitat within 250 feet (ac.)	Dispersal Habitat within 750 feet (ac.)	Total
		Yes	No			
No-Build				54	480	
2B-2/the Preferred Alternative	1		x	17	278	1
5A2B-2	1		x	25	395	1
5B2B-2	1		x	8	146	1

Source: USACE, NEW England District, "Compensatory Mitigation Guidance", 2010.

The study area contains land that could be inundated by a flood of a magnitude that has a one percent chance of being equaled or exceeded in any given year (i.e., 100-year floodplain). Approximately 3,322 acres (9.7 percent) of the study area is identified as an area located within the 100-year floodplain (exhibit 3.2). For a complete description of floodplains in the study area, see the DEIS Section 3.1.2.3 Floodplains.

In accordance with Executive Order 11988, Floodplain Management, impacts on floodplains and floodplain encroachments were considered for the No-Build Alternative and the build alternatives. Encroachments are considered significant under Executive Order 11988 if at least one of the following factors is applicable:

- It has a significant effect on natural and/or beneficial floodplain values.
- It would increase the risk of flooding that could result in the loss of life or property.
- It would significantly impact or otherwise disrupt vital services, facilities, or travel routes.

Impacts to floodplains result from:

- reduction of flood storage from filling
- increase in tailwater elevations at road-stream crossings

Exhibit 3.6 – *Impacts to Floodplains (acres/percentage)*

Alternative	Watersheds		
	Felts Brook	Eaton Brook	Total
No-Build	–	–	–
2B-2/the Preferred Alternative	8	2	10 (0.3%)
5A2B-2	–	2	2 (0.0%[1])
5B2B-2	8	3	11 (0.3%)

[1]*Impact to floodplains less than one tenth of one percent.*

The No-Build Alternative would not impact floodplains.

The build alternatives would not impact floodplains in the Kidder Brook, Meadow Brook, Mill Brook, the Thoroughfare, Davis Pond, or Holbrook Pond watersheds. The build alternatives would impact two to 11 acres of floodplains with most of the impacts occurring in the Felts Brook watershed (exhibit 3.6).

Floodplains have been avoided to the extent possible. Where impacts could not be avoided, the build alternatives were designed to cross floodplains in remote areas and at the narrowest location practical while avoiding and minimizing impacts to other features. Enclosures have been conceptually designed and placed to minimize impacts to floodplains.

Alternative 2B-2/the Preferred Alternative would not result in a significant impact to floodplains.

During final design, the MaineDOT would work to further avoid and minimize impacts to floodplains by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material that could reduce the amount of fill material placed in floodplains. The road-stream crossings were conceptually designed; detailed hydraulic analysis to size the road-stream crossings would be performed during final design. If during final design, it is determined that there would be lost storage volumes, it would be mitigated.

3.2.2.4 Wetlands

Wetlands are those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (USACE, 1987).

Wetlands were identified using a combination of mapping from the National Wetlands Inventory (NWI), hydric soils determined by the U.S. Department of Agriculture (USDA), the NRCS, and a field reconnaissance of portions of the study area. The NWI is a program administered by the USFWS for mapping and classifying wetlands resources in the United States.

Approximately 10,962 acres (31.9 percent) of the study area is wetlands (exhibit 3.2). Large wetland complexes are located along the Thoroughfare between Davis Pond and Holbrook Pond, at Cummings Bog south of Route 9, and along the Felts Brook and Eaton Brook stream corridors. For a complete description of wetlands in the study area, see the DEIS Section 3.1.2.4 Wetlands.

In accordance with Executive Order 11990, Protection of Wetlands, agencies shall avoid undertaking or providing assistance for new construction in wetlands unless:

- there is no practicable alternative to such construction
- the proposed action includes all practicable measures to minimize harm to wetlands that may result from its use

Impacts to wetlands result from:

- direct filling of a habitat
- impacts to functions and values
- indirect impacts to wetlands by siltation or hydrologic alterations
- conversion of one habitat to another

The No-Build Alternative would impact wetlands through stormwater runoff and from routine maintenance such as surface and shoulder work; ditch, bridge, and culvert maintenance; and snow and ice removal.

The build alternatives would impact 26 to 31 acres (0.2 to 0.3 percent) of wetlands (exhibit 3.7). The

Exhibit 3.7 – *Impacts to Wetlands by Watershed (acres/percentage)*

Alternative	Wetlands Types				Total
	Emergent	Forested	Scrub-Shrub	Unconsolidated Bottom	
Total					
No-Build					
2B-2/the Preferred Alternative	2	21	3		26 (0.2%)
5A2B-2	1.5	23	6	0.5	31 (0.3%)
5B2B-2	1	25	4		30 (0.3%)
Felts Brook Watershed					
No-Build					
2B-2/the Preferred Alternative	1	6	2		9 (0.6%)
5A2B-2	0.5	8	5	0.5	14 (0.9%)
5B2B-2		9	1		10 (0.7%)
Eaton Brook Watershed					
No-Build					
2B-2/the Preferred Alternative	1	12	1		14 (0.4%)
5A2B-2	1	12	1		14 (0.4%)
5B2B-2	1	13	3		17 (0.5%)
Meadow Brook Watershed					
No-Build					
2B-2/the Preferred Alternative		3			3 (0.5%)
5A2B-2		3			3 (0.5%)
5B2B-2		3			3 (0.5%)

approximately 15 to 18 wetlands impacted range from small isolated areas to large, expansive areas comprising hundreds of acres; these wetlands are in the Felts Brook, Eaton Brook, and Meadow Brook watersheds.

Wetlands have been avoided to the extent possible while avoiding and minimizing impacts to other features.

To minimize impacts where further avoidance was not possible, fill material was designed with 1:1 side slopes (2:1 slopes were used when not in proximity to wetlands); MaineDOT would reduce the right-of-way clearing to the minimum necessary and minimize clear zones at wetlands and streams. Wetlands would be delineated and a detailed assessment of the functions provided by these wetlands would be performed during final design of Alternative 2B-2/the Preferred Alternative. During final design, MaineDOT would work to further minimize impacts to wetlands by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material that could reduce the amount of fill material placed in wetlands. During final design of Alternative 2B-2/the Preferred Alternative, MaineDOT would continue to coordinate with the federal and state regulatory and resource agencies.

MaineDOT submitted a preliminary Section 404 Permit Application to the USACE for the discharge of fill material into waters of the United States. MaineDOT would prepare and submit an NRPA Permit application to the MDEP during final design of Alternative 2B-2/the Preferred Alternative. MaineDOT would coordinate the identification and development of compensatory mitigation with federal and state regulatory and resource agencies (see section 3.10).

Only Practicable Alternative Finding. In accordance with Executive Order 11990, Protection of Wetlands, MaineDOT and FHWA have avoided wetlands to the extent practicable and there are no practicable alternatives to the proposed action. The proposed action includes all practicable measures to minimize harm to wetlands by avoiding wetlands to the extent possible, using bridges instead of culverts, using bridges that span streams at a width that is 1.2 bankful (i.e., 20 percent larger than a full stream), using oversized culverts, steepening slopes in proximity to wetlands, and crossing wetlands at the narrowest location practicable while avoiding and minimizing impacts to other features.

Based upon the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and the proposed actin includes all practicable measures to minimize harm to wetlands which may result from such use.

3.2.3 Vegetation

Forests in Penobscot County are dominated by two forest types: the spruce/fir group and the northern hardwoods group (USDA Forest Service, 2005). The spruce/fir forest type typically consists of species such as red spruce, black spruce, balsam fir, and northern white cedar. Eastern hemlock and white pine are also frequently occurring coniferous species. The northern hardwood forests in Penobscot County are typically dominated by sugar maple, red maple, yellow birch, beech, and poplar. Approximately 28,538 acres of the study area is vegetated, including approximately 22,736 acres (66.1 percent) of forest vegetation. The forested areas consist of approximately 16,894 acres (74.3 percent) of deciduous forest, 5,013 acres (22.1 percent) of mixed forest, and 829 acres (3.6 percent) of coniferous forest. For a complete description of vegetation in the study area, see the DEIS Section 3.1.3 Vegetation.

The No-Build Alternative would impact vegetation through stormwater runoff and from routine maintenance

Exhibit 3.8 – *Impacts to Vegetation (acres/percentage)*

Alternative	Agricultural	Grassland/ Mowed Grass	Shrub/ Dense Shrub	Deciduous Forest	Coniferous Forest	Mixed Forest	Total
No-Build							
2B-2/the Preferred Alternative	14	6	11	64	0[1]	8	103 (0.4%)
5A2B-2	15	7	29	69	0[1]	16	136 (0.5%)
5B2B-2	20	6	18	57	0	1	102 (0.4%)

Note: *[1] Impact less than a half-acre.*

such as surface and shoulder work; ditch, bridge, and culvert maintenance; mowing, brush control and other vegetation management; and snow and ice removal.

The build alternatives would impact 102 to 136 acres (0.4 to 0.5 percent, respectively) of vegetation (exhibit 3.8). Deciduous forests would be impacted to a greater extent than other general types of vegetation. The total amount of vegetation in the study area impacted by each build alternative is less than one percent.

The build alternatives may create an opportunity to introduce invasive species to the study area. Roadside erosion-control plantings, drainage ditches, maintenance and construction fill, automobiles and boats traveling from areas infested by invasive species, and animals traveling along roadways provide a means for invasive species to disperse. Roadside erosion into wetlands and streams allows invasive species to gain a foothold as native vegetation is scoured or smothered by eroding soils. MaineDOT plants only native species on construction sites to reduce the spread of invasive species.

Some invasive species are damaging to ecosystems to which they are introduced; others negatively affect agriculture and other human uses of natural resources or impact the health of both animals and humans. Common invasive species found in Maine are oriental bittersweet, Japanese knotweed, Norway maple, multiflora rose, and Morrow's honeysuckle.

3.2.4 Wildlife Habitats and Wildlife

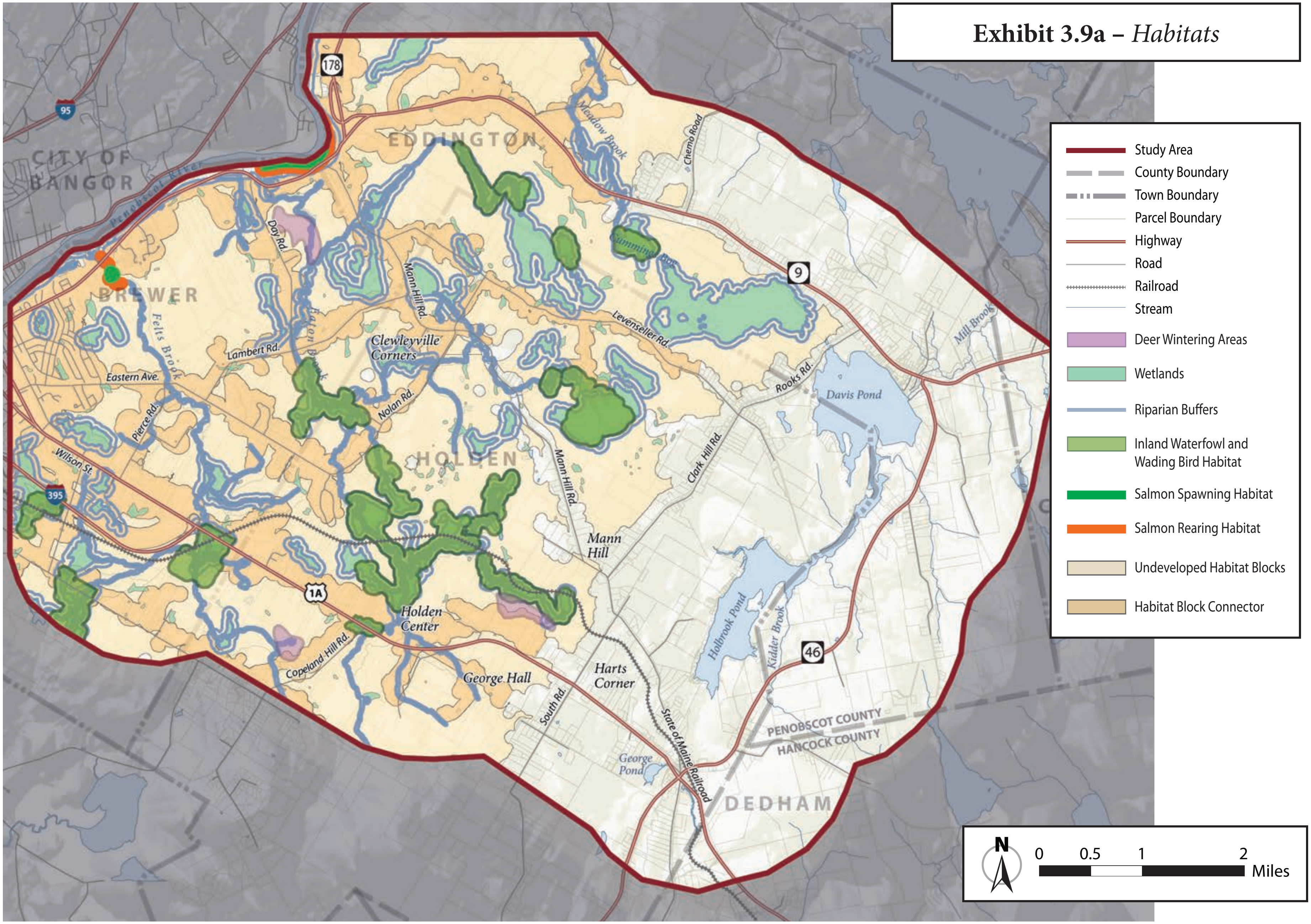
Approximately 28,538 acres (83%) of the study area is wildlife habitat. These areas contain forests, grasslands, wetlands, and agricultural fields.

3.2.4.1 Wildlife Habitats

Beginning with Habitat, a collaborative program of federal, state and local agencies and non-governmental organizations, is a habitat-based approach to conserving wildlife and plant habitat on a landscape scale. Beginning with Habitat provides maps and information about important habitat features to help promote habitat conservation in local land use planning and decisions (exhibit 3.9a).

Undeveloped habitat blocks are defined by the Beginning with Habitat program as blocks of wildlife habitat that are undeveloped, typically not affected by intense human development, more than 100 acres in size, and outside a 500-foot buffer from improved roads. There are 20 blocks of undeveloped habitat in the study area according to the Beginning with Habitat program. The undeveloped habitat blocks were analyzed with the two Bangor Hydro-Electric Company utility easements as features fragmenting habitat. Some of these blocks extend beyond the study area. The total acreage of undeveloped habitat blocks in their entirety is approximately 182,000. The 20 undeveloped habitat blocks range in size from 103 to 108,216 acres.

Exhibit 3.9a – *Habitats*



Source: Beginning with Habitat, 2013
Note: Beginning with Habitat data not available for entire study area

The study area has an abundance of wildlife and a diverse range of habitats for this wildlife. This level of abundance and diversity has been supported by the large areas of forested and undeveloped land and the many riparian and wetland habitats that link these larger areas. For a complete description of wildlife habitat, see the DEIS Section 3.1.4.1 Wildlife Habitat.

The No-Build Alternative would not result in additional impacts to wildlife and wildlife habitat (exhibits 3.8 and 3.9).

The build alternatives would impact wildlife through the conversion of wildlife habitat to transportation use and the fragmentation of habitat into habitat blocks of smaller size. The build alternatives would impact 88 to 121 acres of wildlife habitat through conversion to transportation use.

The build alternatives would be controlled-access highways with fencing along the limits of the land to be acquired and used for right-of-way. The build alternatives would impact wildlife through restricting their movement and degrading the habitat adjacent to the proposed rights-of-way of the build alternatives. Fencing along the rights-of-way of the build alternatives would reduce wildlife highway mortality but would not eliminate it.

Undeveloped habitat blocks consist of various habitat types that are home to species less tolerant or intolerant of disturbance and those that would use a mixture of habitats. These areas are larger than 100 acres in size and serve as habitat for animals that require a variety of habitat types during their lifespan. Animal passage and habitat connectivity within an undeveloped habitat block would be impacted by the placement of a build alternative.

The build alternatives would impact wildlife habitat through fragmentation, which is the subdivision of larger continuous tracts of habitat into smaller tracts. Impacts to undeveloped habitat blocks more than 100 acres in size were evaluated. Because an undeveloped habitat block is defined as 500 feet from a public road or development, direct impacts include areas converted to and within 500 feet of transportation use. The Bangor Hydro-Electric Company utility easements were considered as features that fragment habitat but were not buffered by 500 feet because most of the two easements are vegetated with trees, shrubs, and grass that is mowed occasionally.

Impacts are considered minor when the reduction in areas is in a narrow or otherwise lower value portion of undeveloped habitat block. Impacts are considered moderate when the existing undeveloped habitat block is reduced in area but remains larger than 100 acres and is not bisected. Severe impacts occur when the existing undeveloped habitat block is bisected into smaller habitat areas with one or more remnants smaller than 100 acres in size (exhibit 3.9b).

Although the build alternatives were designed to minimize impacts to undeveloped habitat blocks, they would fragment habitat into smaller tracts (exhibits 3.10a, b, and c). The impacts range from minor to severe. The coniferous and mixed forest areas provide some winter thermal cover for wildlife that would be reduced by the build alternatives. The diversity and quality of habitat adjacent to the right-of-way for the build alternatives would be reduced through the traffic operation and maintenance activities.

The build alternatives would have two wildlife passage structures, large enough to pass moose, on both sides of Eaton Brook. The locations were chosen because they are in a remote area with abundant wildlife. The wildlife passage structures would not be located in wetlands to avoid the bottoms from freezing during the winter.

Exhibit 3.9b – *Impacts to Undeveloped Habitat with Utility Easements as Fragmenting Features (acres)*

Alternative	A	F	I	J	M	M1	N	P	P1	Q	Total
	720	349	1,194	316	291	157	115	2,011	626	108,216	
No-Build											
Total impact											
Remnants after impact											
2B-2/the Preferred Alternative											
Total impact		148		316	2		115	62	183	3	829
Remnants after impact		203			289			141 1,808	443	108,213	
5A2B-2											
Total impact	130	69		316	2		115	62	183	3	880
Remnants after impact	590	280			289			141 1,808	443	108,213	
5B2B-2											
Total impact		134	58			47			270	3	512
Remnants after impact		102 116	1,136			110			158 198	108,213	

Exhibit 3.10a – *Impacts to Undeveloped Habitat with Alternative 2B-2/the Preferred Alternative*

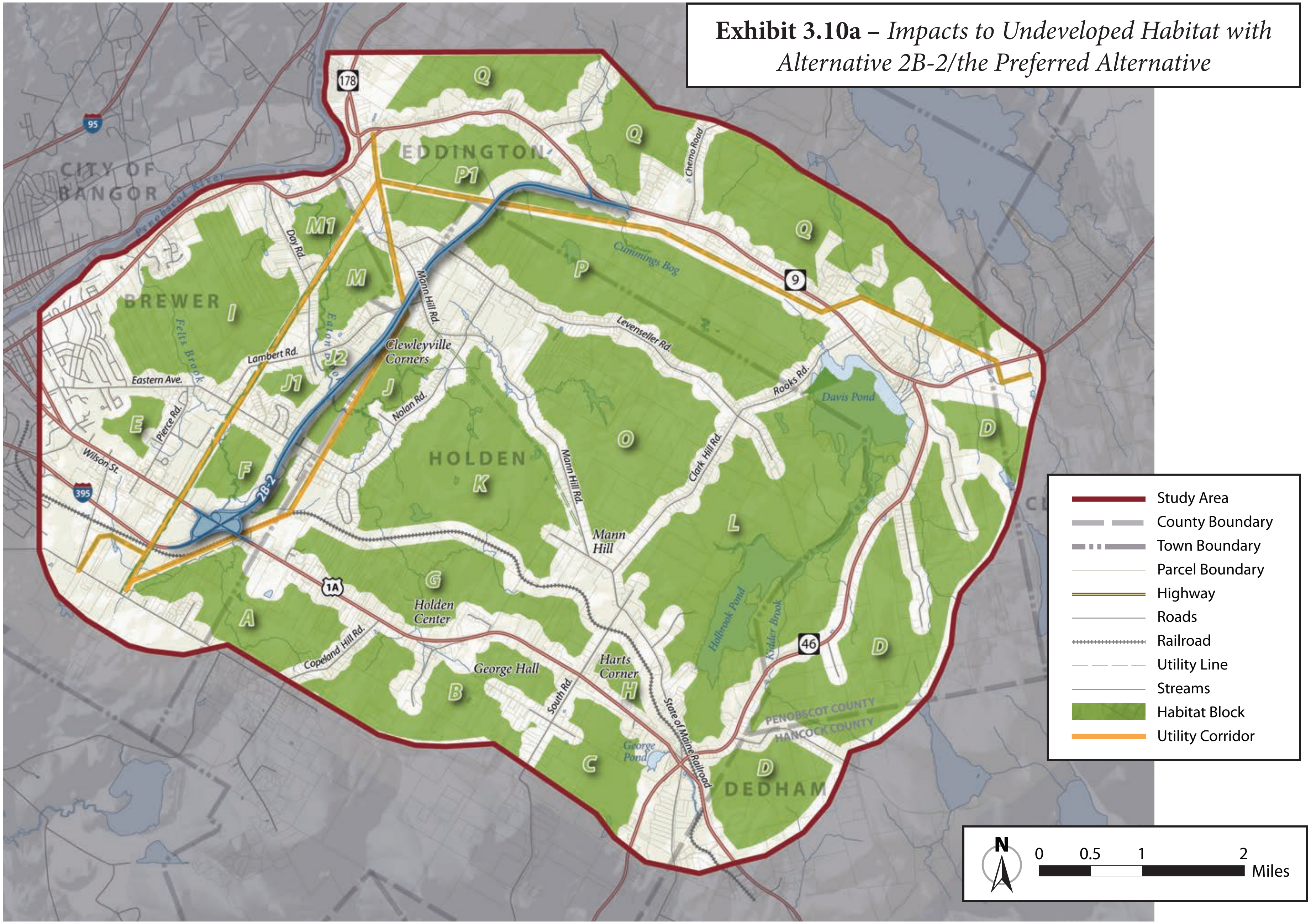


Exhibit 3.10b – *Impacts to Undeveloped Habitat with Alternative 5A2B-2*

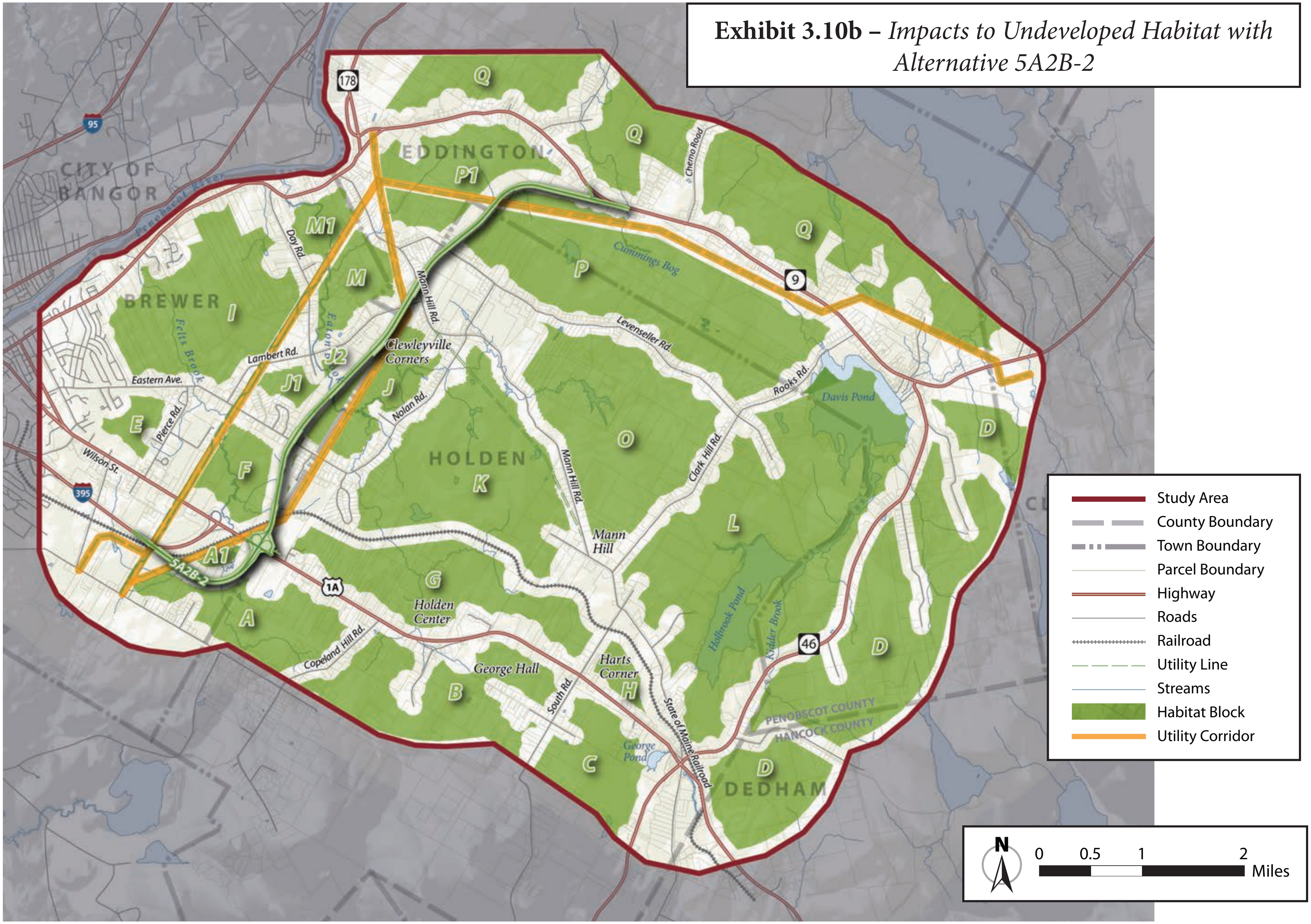
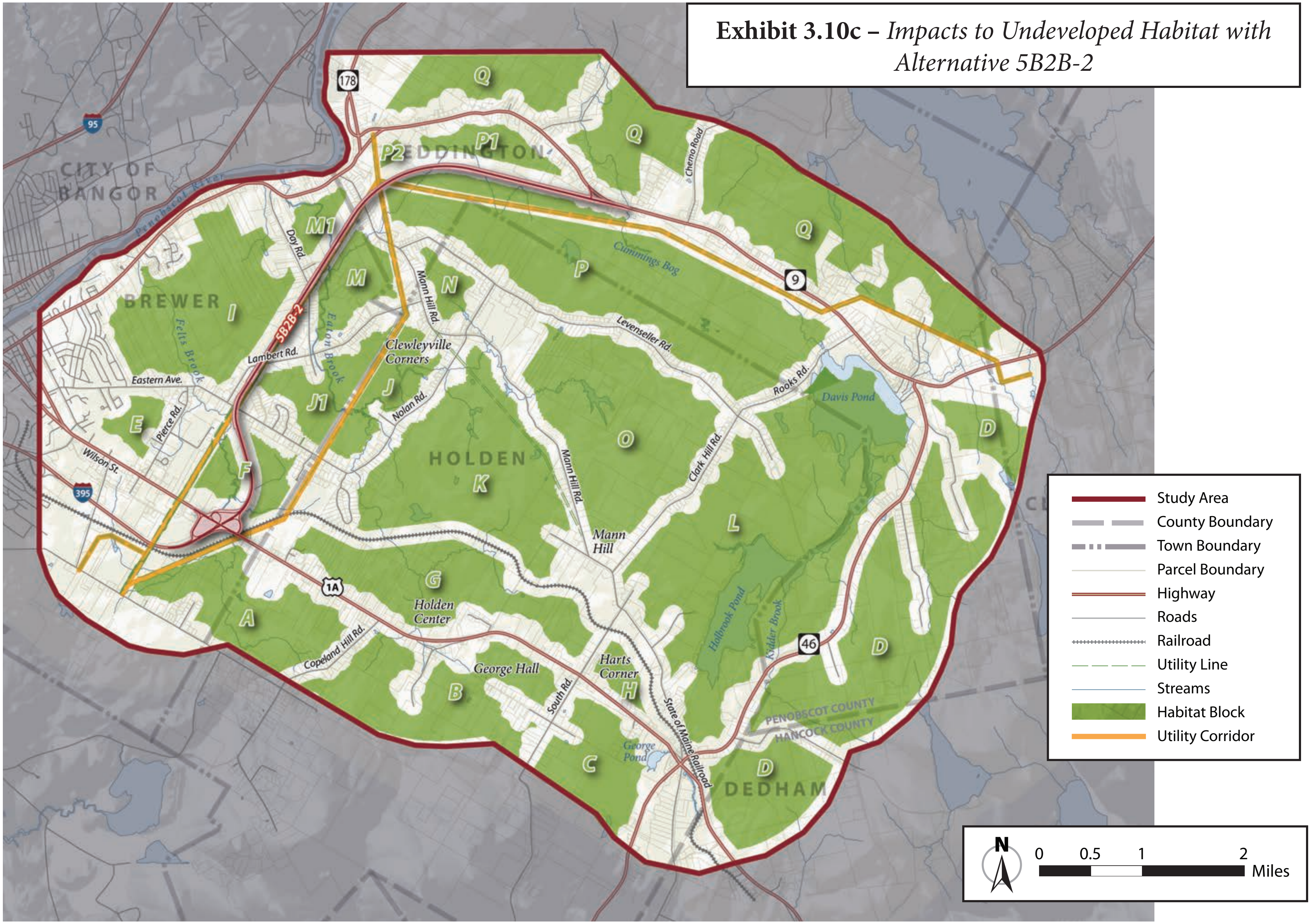


Exhibit 3.10c – *Impacts to Undeveloped Habitat with Alternative 5B2B-2*



3.2.4.2 Regulated Wildlife Habitat and Significant Habitats Protected under the NRPA

The Maine NRPA, administered by the MDEP, provides protection for certain natural resources, including significant wildlife habitats (38 MRSA 480B). Under the NRPA, habitats defined as "significant" and subject to protection include the following:

- habitat for federal- or state-listed endangered or threatened animal species
- high- and moderate-value deer-wintering areas and travel corridors
- critical spawning and nursery areas for Atlantic sea-run salmon, as defined by the Maine Atlantic Salmon Commission (MASC)

The following are further defined in Chapter 335 rules in 06 Code of Maine Rule 96:

- high- and moderate-value waterfowl and wading-bird habitats, including nesting and feeding areas
- shorebird nesting, feeding, and staging areas
- seabird nesting islands
- significant vernal pools

Under the NPRA, the MDIFW is responsible for defining the high- and moderate-value deer-wintering areas; waterfowl and wading-bird habitats; shorebird nesting, feeding, and staging areas; and seabird nesting islands. For a complete description of regulated wildlife habitat and significant habitats, see the DEIS Section 3.1.4.2 Regulated Wildlife Habitat and Significant Habitats Protected under the NRPA.

Deer-wintering areas (DWAs), or deer "yards," are critical to the survival of deer over the winter months. The MDIFW identifies and defines DWAs as stands of mature conifers with a tree height greater than 30 feet and crown closure greater than 60 percent (Beginning with Habitat, 2008). Eleven DWAs totaling 1,051 acres exist in the study area (exhibit 3.11).

The No-Build Alternative, Alternative 2B-2/the Preferred Alternative, and Alternative 5A2B-2 would not impact DWAs. Alternative 5B2B-2 would impact three acres (0.3 percent) of DWAs (exhibit 3.12).

The high- and moderate-value inland waterfowl and wading-bird significant habitat areas are used by waterfowl, members of the family Anatidae including brant, wild ducks, geese, swans, and wading birds such as herons, glossy ibis, bitterns, rails, coots, and common moorhens. Waterfowl use portions of the study area for feeding, breeding, and staging areas; organisms on which they feed use the habitat for food supplies. These habitats are highly productive and are recognized as a valued resource.

Approximately 2,877 acres of IWWH are in the study area: along Felts Brook, Eaton Brook, and the Thoroughfare between Holbrook Pond and Davis Pond (MDIFW, MGIS, 2009). These areas are classified as significant wildlife habitat by the MDIFW.

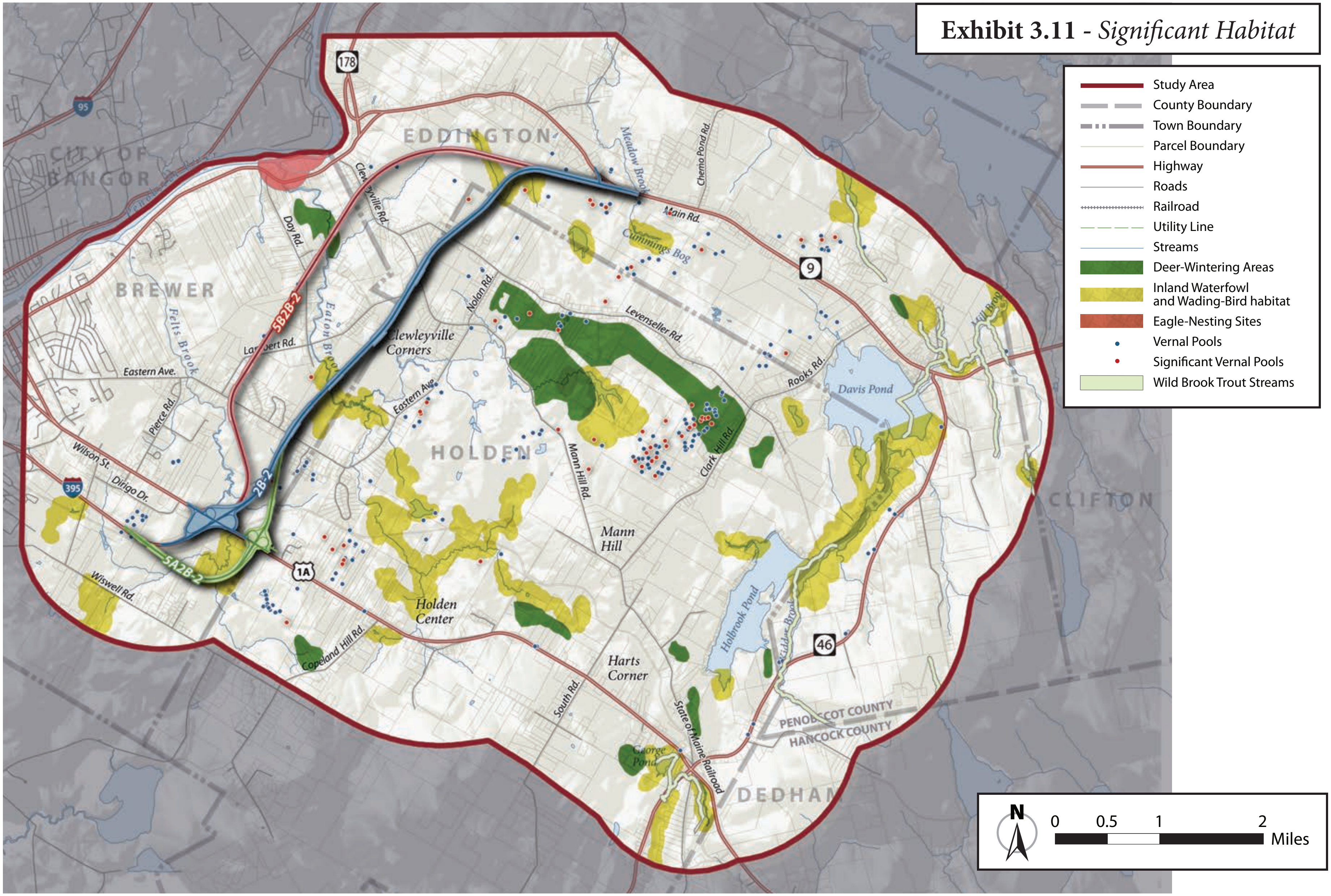


Exhibit 3.11 - *Significant Habitat*

Note: *Only vernal pools near the corridors for alternatives were identified.*

Note: *Under the NRPA, habitats defined as "significant" and subject to protection include the following: habitat for federal- or state-listed endangered or threatened animal species, high- and moderate-value deer-wintering areas and travel corridors, and critical spawning and nursery areas for Atlantic sea-run salmon, as defined by the Maine Atlantic Salmon Commission (MASC). The following are further defined in Chapter 335 rules in 06 Code of Maine Rule 96: high- and moderate-value waterfowl and wading-bird habitats, including nesting and feeding areas, shorebird nesting, feeding, and staging areas, seabird nesting islands, and significant vernal pools.*

Exhibit 3.12 – *Impacts to State-Regulated Wildlife Habitat*

Alternatives	DWA	IWWH
No-Build		
2B-2/the Preferred Alternative		9 acres (0.3%) along Eaton Brook and its tributaries
5A2B-2		20 acres (0.7%) along Felts Brook near the proposed interchange and 9 acres (0.3%) along Eaton Brook
5B2B-2	3 acres (0.3%) along a tributary to Eaton Brook	3 acres (0.1%) along a tributary to Eaton Brook

The No-Build Alternative would not impact IWWH.

The build alternatives would impact three to 20 acres (0.1 and one percent respectively) of IWWH(exhibit 3.12).

Beginning on September 1, 2007, significant vernal pool habitat is protected by law under the NRPA (section 3.2.2.2.2) (MDEP, 2010).

The No-Build Alternative would not impact vernal pools.

The build alternatives would impact one non-significant vernal pool and its upland dispersal habitat (exhibit 3.5). The build alternatives may impact upland dispersal habitat from vernal pools not within the alignments of a build alternative.

3.2.5 Endangered and Threatened Species

There are species and critical habitat in the state that receive federal and state protection to help repair previous damage to populations and attempt to return a species population to self-sustaining levels.

Other species receive state protection if the limits of their distribution ranges are in Maine or if populations can exist only in a specific but uncommon habitat in Maine.

The Federal ESA, as amended (16 USC 1531 et seq.), provides protection for those species that are listed as endangered or threatened under the ESA. Section 7 of the ESA requires that the USFWS and/or the NMFS work with the federal action agencies to achieve conservation and recovery of listed species. "Critical habitat" is a term defined and used in the ESA to designate a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but would be needed for its recovery.

According to the Maine Natural Areas Program, there are no rare botanical features that would be disturbed within the study area (MNAP, 2012).

3.2.5.1 Federal Endangered and Threatened Species

According to the NMFS, there are three species of diadromous fish in the study area listed under the ESA.

These species are the Atlantic sturgeon, which is listed as a threatened species, the shortnose sturgeon, which is listed as an endangered species, and the Atlantic salmon, which is listed as an endangered species with designated critical habitat in the study area (NOAA, NMFS 2012).

In accordance with the January 2014 Section 7 Programmatic Agreement between FHWA, USACE, MaineDOT, USFWS and NMFS, MaineDOT determined that while the federally threatened Atlantic sturgeon and federally endangered shortnose sturgeon are known to occur within the study area, they are not present within the action area and therefore, determined the proposed action would not have an effect on these species. Also in accordance with the Section 7 Programmatic Agreement, MaineDOT determined that Atlantic salmon and its designated critical habitat were present within the study area and the action area and therefore, would require consultation with the USFWS.

According to the USFWS, the Canada lynx and its designated critical habitat is not considered to be present in the study area (U.S. Fish and Wildlife Service, …, January, 2014).

According to the USFWS, the northern long eared bat (NLEB) was proposed for listing under the ESA on October 2, 2013 (Federal Register Vol. 78, No. 191, pages 61046-61080). Critical habitat for the NLEB is not currently designated. Due to the recent proposed listing, MaineDOT, on behalf of the FHWA, is conferencing with the USFWS. Other than the NLEB interim conference and planning guidance (USFWS, 2014), the USFWS has not developed guidance regarding avoidance and minimization measures and are currently developing known life history data gaps in Maine. The NLEB is dependent on forests, using trees as summer and maternity roosts (Federal Register Vol. 78, No. 191, pages 61046-61080). Specific NLEB summer and maternity roost location information is unavailable for Maine, but USFWS asserts that NLEB roosts occur throughout the entire state and, therefore, could be present in the study area. Only three winter hibernacula (a place in which an animal seeks refuge) are known for NLEB in Maine. These hibernacula occur in northern and western Maine.

The Rufa red knot was proposed for listing as a threatened species by the USFWS on September 30, 2013. It is a medium-sized shorebird belonging to the sandpiper group that spends much of its life in migration between its breeding and wintering grounds. During the spring and fall migrations, red knots use staging and stopover areas to rest and feed, including areas along the Maine coast. Currently, no mapping of the Rufa red knot in Maine exists. The MDIFW monitors the species (U.S. Fish and Wildlife Service, …, January, 2014).

The No-Build Alternative would not impact known federal, listed or proposed threatened species.

The build alternatives are in the geographic range of the Gulf of Maine Distinct Population Segment (GOM DPS) of endangered Atlantic salmon and designated critical habitat for the Atlantic salmon. The Penobscot River, located on the western boundary in the study area, is in the known range of Atlantic sturgeon and shortnose sturgeon. Because the build alternatives would not directly or indirectly impact the Penobscot River, all of the build alternatives, including 2B-2/the Preferred Alternative, would have no effect on the Atlantic sturgeon and the shortnose sturgeon.

The build alternatives may affect Atlantic salmon and its designated critical habitat through the construction of road-stream crossing and channelization of streams. The road-stream crossings may affect Atlantic salmon during their juvenile stage (section 3.2.2.2.1). The proposed crossings would span the streams at a width that is 1.2 times the bankful width (i.e., 20 percent larger than a full stream) and use either a bottomless structure or a four-sided structure with stream simulation design and natural substrate installed. The substrate inside of the structure would emulate the preexisting substrate of the surrounding stream and banks would mimic terrestrial passage characteristics.

Stream crossings would be designed in accordance with MaineDOT's Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e). An open work window with restrictions for in-stream work would be used to construct the project. If construction must take place outside of the July 15-October 1 work window, fish passage would be maintained through the use of a bypass channel. During final design, MaineDOT would analyze opportunities to further minimize impacts to designated critical habitat by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative. An increase in the potential for sediment loading and roadway contaminants introduced to surface waters (including those that contain Atlantic salmon) exists for the build alternatives. Impacts from sedimentation caused by construction would be temporary. During final design, a highway drainage system would be designed to minimize the transport of sediments and other particulates to surface waters. Erosion and sedimentation control measures would be incorporated into the design and implemented during construction in accordance with Section II of MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* and designed in accordance with the MDEP/ MaineDOT Memorandum of Agreement, Stormwater Management, November 14, 2007 and Chapter 500 Rules. Redundancy of controls would be included in each watershed that would be impacted to minimize potential control failures that could deliver sediment laden runoff to streams. The build alternatives would not impact other known federal, listed or proposed, endangered and threatened species.

MaineDOT prepared a Biological Assessment (BA) for the FHWA for the proposed action in compliance with Section 7 of the ESA. FHWA formally consulted with the USFWS under Section 7 of the ESA for effects of eight proposed crossings of perennial and intermittent streams for Alternative 2B-2/the Preferred Alternative on Atlantic salmon, Atlantic salmon designated critical habitat and the NLEB. One of these crossings is approximately 2,000 feet upstream of a historically inaccessible natural barrier and would have no permanent or temporary effects on Atlantic salmon or Atlantic salmon designated critical habitat. The scope of the BA is based on field measured and U.S. Geological Survey (USGS) regression analysis to determine bankful widths. In addition, because final design for Alternative 2B-2/Preferred Alternative has not started, final plans, sizes, and types of crossing structures have not been determined (MaineDOT, 2013a).

The BA concluded that because the Penobscot River would not be affected directly or indirectly by the build alternatives, there would be no effect on Atlantic sturgeon and shortnose sturgeon (exhibit 3.13). However, the build alternatives may affect, and are likely to adversely affect, Atlantic salmon because (exhibit 3.14):

- Installation of cofferdams would have the potential to 'take' a species in the area of the project.
- Upstream and downstream passage could be blocked during construction of the crossing structures.

Exhibit 3.13 – *Overall Effect Determination for Each Affected Species and Critical Habitat*

Jurisdiction	*Federal Status*	*Common Name*	*Effect determination for Stormwater Runoff*	*Effect determination for in water work*	*Effect determination for pile driving*	*Effect determination for clearing and grading*	*Overall effect determination for project*
USFWS	Endangered	Atlantic salmon	Not likely to adversely affect	Likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect	Likely to adversely affect
USFWS	Endangered	Atlantic salmon Critical Habitat	Not likely to adversely affect	Likely to adversely affect (temporary)	Not likely to adversely affect	Not likely to adversely affect	Likely to adversely affect
NMFS	Endangered	shortnose sturgeon	No effect	No effect	No effect	No effect	No effect
NMFS	Threatened	Atlantic sturgeon	No effect	No effect	No effect	No effect	No effect

Exhibit 3.14 – *Summary of Effect Determination of Activities Affecting Atlantic Salmon*

Stages	Activity Category	Minimization Measure	Presence/ Exposure listed species	Chemical and physical changes	Biological response	Effect Determination
Construction	Cofferdam installation	Complete evacuation	Yes	None	Yes, temporary displacement	Likely to adversely affect
Construction	Cofferdam/ Bypass channel	Passage will be maintained if work is completed outside of July 15-October 1	Yes	None	No	Not likely to adversely affect
Construction	Pile Driving	Use of Vibratory hammer	Yes	None	Yes, temporary displacement	Likely to adversely affect
Post Construction	Vegetation Removal	Amount Minimized	No	Potential impact on water quality	No	Not likely to adversely affect

The BA concludes that the proposed project would not jeopardize the continued existence of the NLEB for the following reasons:

- The amount of forested clearing represents a very small fraction of forest available to NLEB
- The proposed project is not located near known hibernacula
- The type of project proposed is not one identified by USFWS as being most likely to result in lethal impacts or significant adverse effects to NLEB.

MaineDOT and FHWA are required to and would re-initiate Section 7 consultation with the USFWS when the NLEB and/or its critical habitat become officially listed under the ESA.

The Federal ESA requires that all Federal agencies consult with the USFWS and/or NMFS to determine if actions of an agency would have any effect on species listed under the ESA and to avoid any actions that may jeopardize the continued existence of the species or result in the destruction or adverse modification of designated critical habitat. The formal consultation process is concluded when USFWS issues a biological opinion (BO) that makes a determination of effect that includes terms and conditions of approval, a statement for potential incidental 'take' of the species, and conservation recommendations.

3.2.5.2 USFWS Biological Opinion

New information regarding the NLEB will be available and published in the Federal Register in April 2015 requiring further ESA section 7 consultation for potential effects to the NLEB as a result of the proposed action, not previously addressed in the BA or the USFWS's BO.

In the BO issued on September 19, 2014 the USFWS concluded that the I-395/Route 9 connector would not jeopardize the continued existence of the NLEB due primarily to the minimal amount of potentially suitable habitat that would be permanently impacted relative to the total habitat area available range-wide (USFWS, 2014).

After considering the current status of Atlantic salmon and its designated critical habitat, the project's environmental baseline, the effects of the proposed action, and the potential for future cumulative effects in the study area, the USFWS concluded the I-395/Route 9 connector is not likely to jeopardize the continued existence of the Atlantic salmon throughout all or a significant portion of its range. Furthermore, the proposed action is not expected to result in the destruction or adverse modification of critical habitat (USFWS, 2014).

The I-395/Route 9 connector would result in short-term adverse effects to Atlantic salmon and its critical habitat during construction activities. These effects are small in spatial and temporal scope and in some cases would be reversed upon completion of construction. Construction activities are authorized to take up to 40 juvenile Atlantic salmon and no adult Atlantic salmon. Many of the construction-related adverse effects to Atlantic salmon are not expected to result in mortality, but rather temporarily affect normal behavior through capture and relocation to another part of the stream or blocked access to upstream or downstream habitat that results in temporary disruption of normal activities, such as feeding (USFWS, 2014).

The USFWS concluded that critical habitat, including the habitat upstream of the I-395/Route 9 connector on Felts and Eaton Brooks and their tributaries, would function as suitable and unimpaired after construction is complete and these streams would continue to serve a conservation and recovery role for Atlantic salmon. All life stages should be able to move through the new stream crossing structures and the structures would maintain natural stream channels, given that these structures would be wider than the stream's bankful width and that the properly-sized structure should support a natural stream substrate. Additionally, during the operation and maintenance phase of the I-395/Route 9 connector, stormwater management from new impervious surface areas would be treated in a manner that does not produce adverse thermal effects to critical habitat streams (USFWS, 2014).

To be exempt from the prohibitions of section 9 of the ESA, FHWA, MaineDOT, and all contractors must comply with the following terms and conditions:

1. New impervious surface and discharged stormwater runoff quantity and quality must be treated using best management practices that incorporate

water infiltration and/or filtration, avoiding direct water discharge into designated Atlantic salmon critical habitat or any surface waterway that subsequently directly discharges into critical habitat, raising stream temperatures above pre-construction conditions.

2. All applicable conservation measures described in the BO will be fully implemented.
3. Monitoring of best management practices implementation will be conducted to evaluate compliance throughout the construction period. An annual report will be submitted to the USFWSs' Maine Field Office each December for the previous November through October construction period.
4. Site preparation, including cofferdam installation and removal, and temporary access road establishment, will not cause sedimentation and adverse levels of turbid water discharge into streams following erosion and sedimentation control requirements in MaineDOT's' *Best Management Practices for Erosion and Sedimentation Control* document.
5. Migration/movement barrier/delay due to cofferdam placement will be minimized by limiting cofferdam placement to the time necessary to complete instream activities. The cofferdams will be removed within two days of the completion of instream construction.
6. Instream construction will occur during the low flow period (July 15 to October 1). If MaineDOT determines that any instream construction activity cannot be completed prior to October 1, a bypass channel will be constructed to avoid affecting Atlantic salmon movement in Felts and Eaton Brooks. All bypass channels will be constructed and operating by October 2 to avoid consultation reinitiation.
7. Hydroacoustic impacts from sheet pile installation (if applicable) will not adversely affect Atlantic salmon. MaineDOT will manage noise producing activities to within noise thresholds described in the BO. Hydroacoustic monitoring will be conducted as described and reports will be submitted to the USFWS two weeks after completing each pile driving activity, including cofferdam completion or installed bridge piles for each bridge.
8. Disturbance and construction association with crossing structure placement will not adversely affect Atlantic salmon due to instream construction activities occurring within a cofferdam.
9. Underwater acoustic monitoring will be conducted to track noise levels associated with any sheet pile installation. Acoustic monitoring will be required wherever instream pile driving activities occur in Atlantic salmon critical habitat. A single hydrophone will be placed at 10 meters upstream and downstream of noise producing

activity. MaineDOT will continually monitor noise levels to assure activities that may approach the published threshold values for potentially injuring juvenile salmonid will receive noise attenuation measures immediately, assuring the threshold values are not reached. MaineDOT will provide monitoring reports to the USFWS after the completion of each cofferdam installation or immediately after completion of similar activities.

10. All Atlantic salmon mortalities from electrofishing or other related activities will be reported to the USFWS (Thomas Davidowicz at 207/866-3344, Extension 152; Fax 207/866-335 1) within 48 hours of occurrence. Any dead Atlantic salmon will be immediately preserved (refrigerate or freeze) for delivery to the USFWSs' office in Orono, Maine. If the USFWS is not available, contact the NMFS in Orono, Maine (Dan Tierney; 207/866-3755) to arrange for delivery. Upon completion of each fish evacuation event, MaineDOT will report the total Atlantic salmon mortality level, if any, for that event. An event is defined as any single attempt to evacuate all fish from a single cofferdam. An event is complete when the cofferdam is dewatered and construction activities may begin.
11. Adverse effects to Atlantic salmon's ability to migrate, forage, shelter, and spawn are not expected as road-stream crossing structures in critical habitat will be designed to span perennial streams using a minimal structure horizontal clearance that is 1.2 times each streams' bankful width.
12. To address potential effects to listed species and critical habitat resulting from fill material acquisition outside the roadway corridor and terminal interchange buffers, MaineDOT will include language in the construction contract, via a Special Provision, which states the contractor will avoid all potential effects to listed species and critical habitat when obtaining fill material needed for construction. The USFWS will receive a copy of the Special Provision for review prior to finalization of the Plans, Specifications and Estimate package. This condition is required because the USFWS's BO and the Incidental Take Statement do not evaluate nor authorize any adverse effects or take associated with fill material acquisition outside the roadway corridor buffer and terminal interchange buffers portion of the action area. If avoidance cannot be achieved, FHWA should reinitiate consultation or the contractor would have to apply for an ESA section 10 permit to acquire an incidental take permit, a

time-consuming process that would likely affect the construction schedule.

13. In accordance with Chapter 500 of the Maine Stormwater Law under the Natural Resources Protection Act, MaineDOT and FHWA, for those sections of the proposed alignment that discharge into streams, MaineDOT will design stormwater management systems that provides the greatest thermal buffering (USFWS, 2014).

3.3 Atmospheric Environment

3.3.1 Air Quality

The study area is in a portion of Penobscot County that is classified by the U. S. Environmental Protection Agency (USEPA) as an Attainment Area for ozone, pursuant to the CAA amendments of 1990 (USEPA, 2008).

Vehicles emit primarily carbon monoxide (CO), hydrocarbons (also known as volatile organic compounds, or VOCs), oxides of nitrogen (NOx), and, to a much lesser extent, respirable particulate matter (PM10) and (PM2.5), sulfur dioxide (SO_2), and lead (Pb). To determine compliance with the National Ambient Air Quality Standards (NAAQS), the MDEP Bureau of Air Quality Control conducts long-term air-quality monitoring. The MDEP operates several continuous monitoring sites that measure ambient concentrations of criteria pollutants. For a complete description of air quality, see DEIS Section 3.2.2 Air Quality.

In accordance with FHWA TA6640.8A, Chapter V, Section G.8 (b), the air-quality analysis consists of two components: (1) a qualitative evaluation of the impact of the build alternatives on regional emissions (i.e., a mesoscale assessment); and (2) a qualitative assessment of potential changes in CO concentrations (i.e., a microscale assessment).

3.3.1.1 Mesoscale Assessment

The No-Build Alternative would not worsen air quality in the near future. Over time, air quality would worsen as congestion increases on Routes 1A, 9, and 46.

The build alternatives would result in a reduction in vehicle idling time because the new highway would remove traffic congestion from Routes 1A and 46. The build alternatives would result in emission reductions compared to the No-Build Alternative, thereby providing an air-quality benefit.

3.3.1.2 Microscale Assessment

The potential impacts of the build alternatives on CO concentrations were assessed. The USEPA conformity regulations at 40 CFR 93.116 require that a project neither create or contribute to a new violation of the NAAQS nor worsen existing violations of the NAAQS.

Under the No-Build Alternative, growth in traffic due to normal population growth would result in increased vehicle emissions. The growth in traffic would be offset somewhat by a decrease in motor-vehicle emission factors as older and more polluting vehicles in the nation's fleet are replaced with new vehicles that have lower emission rates.

The build alternatives would introduce traffic into an area where there is comparatively little traffic, causing a slight increase in CO concentrations. However, this would be offset somewhat by an increase in travel speeds with the build alternatives and is not anticipated to lead to violations of the CO standards.

With the build alternatives, traffic would be routed away from Route 1A and traffic idling time would decrease. Therefore, CO concentrations would be reduced from their future No-Build Alternative levels, and violations of the 1-hour and 8-hour CO standards are not anticipated.

3.3.1.3 Mobile Source Air Toxics Analysis

In addition to the criteria air pollutants for which there are NAAQS, the USEPA regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Mobile source air toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned.

Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics result from engine wear or impurities in oil or gasoline.

In March 2001, the USEPA issued the Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17229, March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, the USEPA examined the impacts of existing and newly promulgated mobile source control programs. Based on FHWA projections for 2000 to 2020, these programs would reduce on-highway emissions of four MSATs — benzene, formaldehyde, 1,3-butadiene, and acetaldehyde — by 57 to 65 percent and would reduce on-highway diesel PM emissions by 87 percent. These reductions would occur despite projections that the overall nationwide vehicle miles travelled (VMT) would increase by 64 percent during that timeframe. As a result, the USEPA concluded that no further motor-vehicle emissions standards or fuel standards were necessary to further control MSATs. The USEPA is preparing another rule under authority of CAA Section 202(l) that would address these issues and could make adjustments to the full 21 and the primary 6 MSATs.

This FEIS includes a basic analysis of the likely MSAT emission impacts of these alternatives because the analysis of MSATs is an emerging science — that is, the available technical tools are not sufficient to predict the study-specific health impacts of the emission changes associated with the build alternatives. Evaluating the environmental and health impacts from MSATs on a proposed highway would involve several key elements: emissions modeling; dispersion modeling to estimate ambient concentrations resulting from the estimated emissions; exposure modeling to estimate human exposure to the estimated concentrations; and the final determination of health impacts based on the estimated exposure. Each step is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this study. Because of the uncertainties, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the study level.

The amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the build alternatives is slightly higher than the No-Build Alternative because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. The increase in VMT would lead to higher MSAT emissions for the preferred action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to the USEPA's MOBILE6.2 model (USEPA, 2011b), emissions of all of the priority MSAT except for diesel PM decrease as speed increases. The extent to which these speed-related emission decreases would offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under each of the alternatives is nearly the same, it is expected that there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, 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 build alternatives traffic volume is less than 10,000 vehicles per day and the vehicle speed would increase for the No-Build Alternative. The vehicle mix would not change. Vehicle emissions would decrease for the build alternatives compared to the No-Build Alternative. With an overall decrease in vehicle emissions, the build alternatives would see decrease in MSAT emissions.

3.3.1.4 PM2.5 Hot-Spot Screening Analysis

The analysis consists of answering questions in the process, progressing through Levels 1-3 screening. Each level evaluates study-specific information to determine if the next level of screening is required or if the study qualifies or is disqualified from Hot-Spot Analysis. The study was disqualified from a Hot-Spot Analysis in Level 2 of the screening process because the maximum predicted total traffic volume is fewer than 10,000 vehicles per day. It was determined that the build alternatives would not result in an air-quality impact and that the study meets the CAA's requirements without further PM Hot-Spot Analysis.

3.3.2 Noise

Fourteen general noise-sensitive areas (NSAs), each encompassing many individual receptors, were identified in the study area (exhibit 3.15).

Noise measurements were conducted to determine ambient (i.e., background) noise levels and to validate the FHWA Traffic Noise Model (TNM) at sites influenced by traffic-generated noise. Measurements were taken in accordance with FHWA Report Number FHWA-PD-96-046, Measurement of Highway Related Noise (FHWA, 1996). Noise levels are A-weighted hourly equivalent noise levels in decibels (Leq (h) dBA). The hourly Leq, or equivalent sound level, is the level of constant sound that in an hour would contain the same acoustic energy as the time-varying sound (i.e., the fluctuating sound levels of traffic noise are represented in terms of a steady-state noise level of the same energy content). A-weighting simulates the response of the human ear to noise. For sites affected by highway traffic, concurrent counts of automobiles and medium-weight trucks, and heavy trucks were recorded and speed observations were made for model validation purposes.

Measured noise levels varied considerably in the study area depending on the proximity of sensitive receptors to major roadways. Overall, short-term measurements ranged from 39 to 71 dBA. Along Routes 1A, 9, and 46, traffic was the major source of ambient

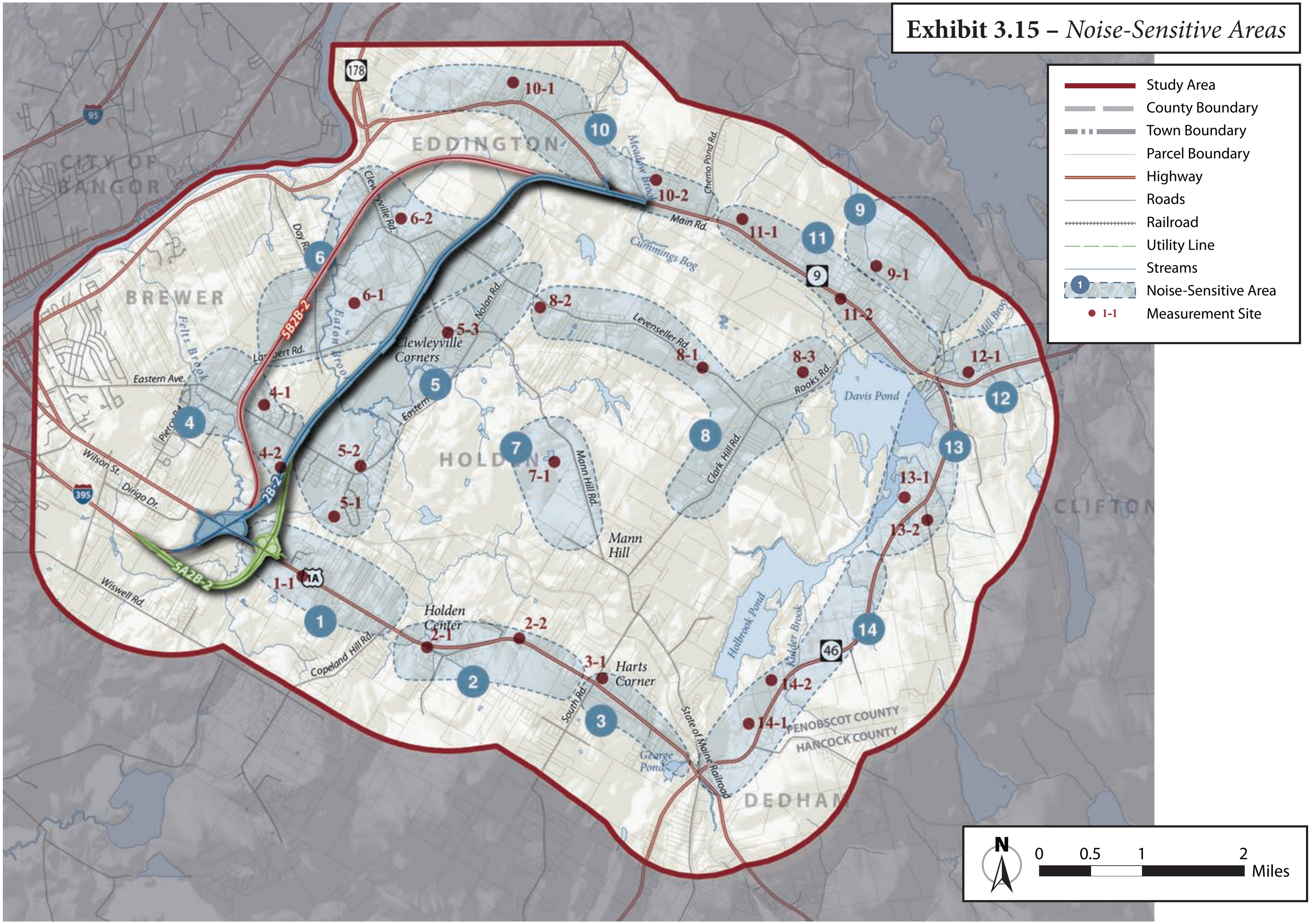


Exhibit 3.15 – Noise-Sensitive Areas
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
Noise-Sensitive Area
Measurement Site
CITY OF BANGOR
EDDINGTON
BREWER
HOLDEN
CLIFTON
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Davis Pond
Holbrook Pond
George Pond
Mann Hill
Holden Center
Harts Corner
Clewleyville Corners
5B2B-2
2B-2
5A2B-2
0 0.5 1 2 Miles
N

noise. Noise levels measured at receptors along these roads ranged from 58 to 71 dBA. Along lightly traveled secondary roads, such as Mann Hill Road, Levenseller Road, and Rooks Road, noise levels ranged from 43 to 55 dBA. In the absence of traffic noise from the secondary roads, distant traffic from major roadways could be heard. Background noise levels in remote locations not influenced by highway traffic ranged from 39 to 46 dBA. In these remote locations, noise from distant roadways was occasionally audible.

Noise evaluation of the No-Build Alternative and build alternatives was conducted based on MaineDOT noise policy.

The Noise Abatement Criteria (NAC) for specific land-use activities were used in the evaluation of traffic-noise impacts. These criteria are based on those in Title 23 Code of Federal Regulations, Part 772; U.S. Department of Transportation; the FHWA, Procedures for Abatement of Highway Traffic Noise and Construction Noise, and guidelines for "increase over existing" (IOE) noise levels as set forth in MaineDOT publication "Highway Traffic Noise Policy". Predicted noise levels were determined using Version 2.5 of the FHWA TNM.

The FHWA and MaineDOT define noise impact based on seven categories of land use. The study area consists of a variety of residential, institutional, commercial, and industrial land uses, the noise analyses considered all Activity Category areas. Individual sites within a given activity category are designated as noise-sensitive receivers.

The noise-level descriptor is the hourly equivalent sound level (Leq(h)). Leq(h) is the steady-state, A-weighted sound level, which contains the same amount of acoustic energy as the actual time-varying A-weighted sound level over a one-hour period.

Exterior receivers evaluated are categorized as Activity Categories B and C, with an applicable noise level of 66 dBA defining an impact. Noise impact is evaluated by comparing the predicted noise levels with existing noise levels. Where the future (year 2035) noise levels are predicted to equal or exceed 66 dBA or where the No-Build Alternative and the build alternatives are predicted to cause a substantial noise increase (i.e., >15 dBA) in the future as compared to existing noise levels, NAC must be considered.

The noise analyses are based on the conceptual design of the build alternatives. As Alternative 2B-2/the Preferred Alternative is developed, details related to the alignment, profile, cross section, drainage features, right-of-way requirements, and structures are refined, resulting in the final configuration of any noise abatement features determined to be feasible and reasonable.

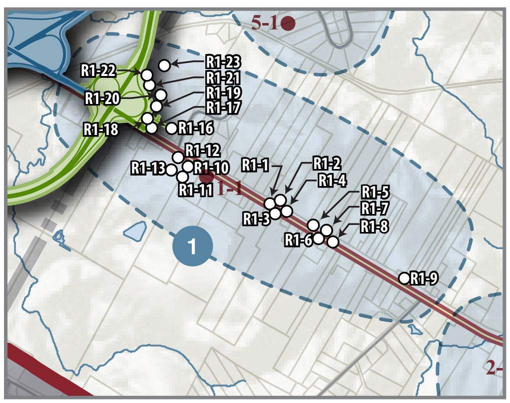
The model used to predict worst-case existing and future noise levels and to evaluate noise-abatement options was the FHWA's TNM, Version 2.5. The FHWA TNM predicts noise levels at selected locations based on traffic data, roadway design, topographic features, and the relationship of the analysis site to the roadway.

The noise levels for receivers for the future year were compared to the absolute NAC levels and to increases over existing-year noise levels using MaineDOT's NAC to determine noise impacts (exhibit 3.16). An activity meeting either of these criteria is designated as meeting the warrants for consideration of noise abatement.

Increases in noise for the future No-Build Alternative as compared to existing conditions are the result of normal traffic growth projected to occur between the present and 2035 and range from 0 to 2 dBA.

Compared to existing noise levels, predicted changes in noise levels resulting from the build alternatives result in either an increase or a decrease of sound levels. These changes reflect traffic growth between the

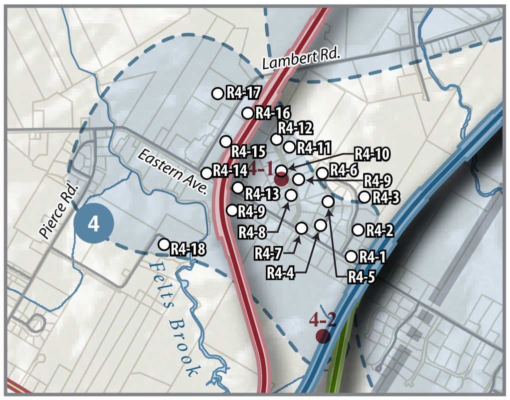
Exhibit 3.16 – *Summary of Predicted Noise Levels*



Site	Existing	No-Build		2B-2/the Preferred Alternative		5A2B-2		5B2B-2	
	Leq	Leq	IOE	Leq	IOE	Leq	IOE	Leq	IOE
Predicted Noise Levels Leq (dBA) NSA 1									
R1-16	56	58	2			56	0		
R1-17	65	67	2			62	-3		
R1-18	61	63	2			60	-1		
R1-19	53	56	2			56	3		
R1-20	50	52	2			53	3		
R1-21	49	51	2			60	11		
R1-22	48	50	2			62	15		
R1-23	45	47	2			55	10		

Notes:
Values calculated to tenth of a dBA and then rounded for presentation purposes.
Leq(h) = Hourly equivalent noise level
dBA = Decibels on the A-weighted scale
IOE = Increase over existing
= Impacts based on noise level of 66 dBA or greater; values > 66 dBA shown for existing conditions and No-Build Alternative for informational purposes.
= Impact based on noise level exceeding existing level by 15 dBA or more.

Exhibit 3.16 – *Summary of Predicted Noise Levels (continued)*



Site	Existing	No-Build		2B-2/the Preferred Alternative		5A2B-2		5B2B-2	
	Leq	Leq	IOE	Leq	IOE	Leq	IOE	Leq	IOE
Predicted Noise Levels Leq (dBA) NSA 4									
R4-1	42	43	1	57	15	57	15		
R4-2	37	39	2	55	18	55	18		
R4-3	34	36	2	51	17	51	17		
R4-4	38	39	1	48	10	48	10		
R4-5	36	38	2	46	10	46	10		
R4-6	35	37	2	44	8	44	8		
R4-7	46	47	1	49	3	49	3		
R4-8	35	37	2					48	13
R4-9	34	36	2					47	13
R4-10	34	36	2					50	16
R4-11	34	36	2					51	17
R4-12	33	35	2					54	20
R4-13	42	43	1					57	15
R4-14	47	48	1					58	12
R4-15	38	39	2					62	25
R4-16	36	38	2					68	32
R4-17	34	36	2					56	22
R4-18	34	36	2					47	13
R4-19	41	42	1					58	17

Notes:

Values calculated to tenth of a dBA and then rounded for presentation purposes.

Leq(h) = Hourly equivalent noise level

dBA = Decibels on the A-weighted scale

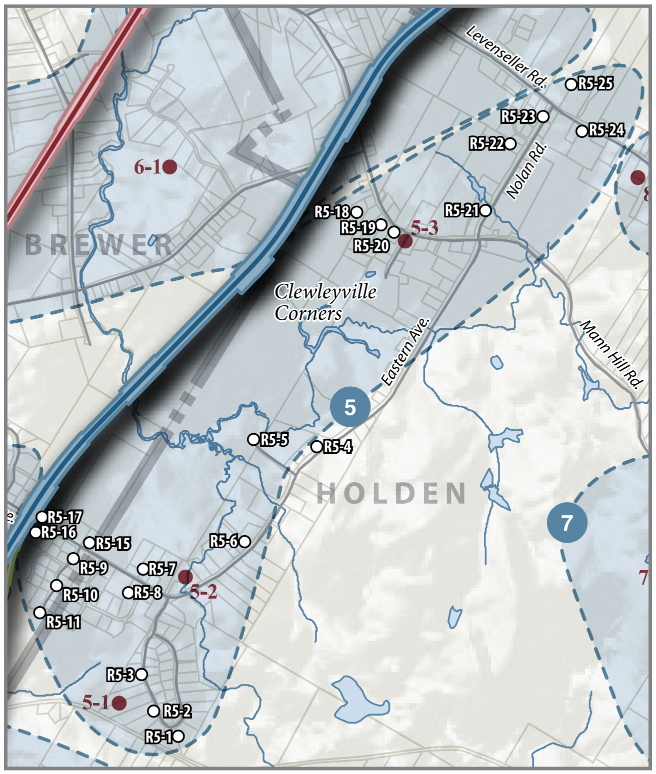
IOE = Increase over existing

[green] = Impacts based on noise level of 66 dBA or greater; values > 66 dBA shown for existing conditions and No-Build Alternative for informational purposes.

[red] = Impact based on noise level exceeding existing level by 15 dBA or more.

Exhibit 3.16 – *Summary of Predicted Noise Levels (continued)*

Site	Existing	No-Build		2B-2/the Preferred Alternative		5A2B-2		5B2B-2	
	Leq	Leq	IOE	Leq	IOE	Leq	IOE	Leq	IOE
Predicted Noise Levels Leq (dBA) NSA 5									
R5-16	45	46	1	58	14	58	14		
R5-17	44	45	1	59	16	59	16		



Notes:

Values calculated to tenth of a dBA and then rounded for presentation purposes.

Leq(h) = Hourly equivalent noise level

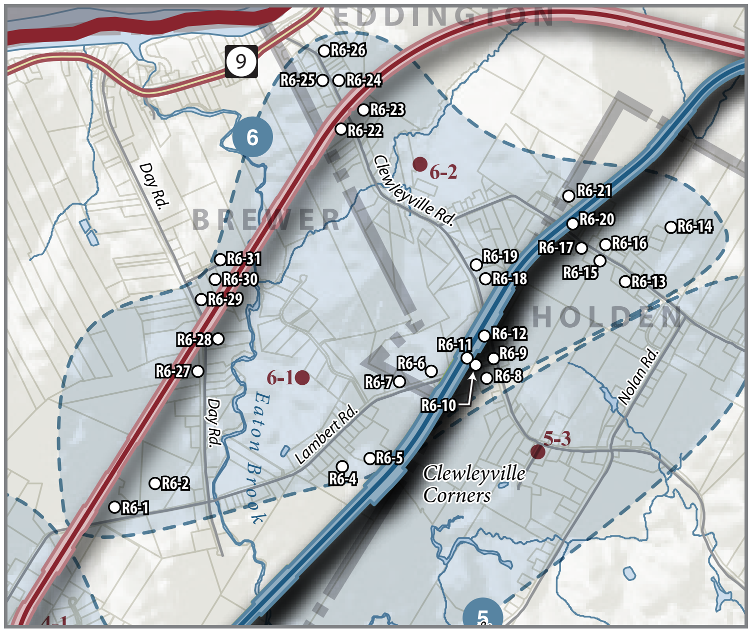
dBA = Decibels on the A-weighted scale

IOE = Increase over existing

(green) = Impacts based on noise level of 66 dBA or greater; values > 66 dBA shown for existing conditions and No-Build Alternative for informational purposes.

(red) = Impact based on noise level exceeding existing level by 15 dBA or more.

Exhibit 3.16 – *Summary of Predicted Noise Levels (continued)*



Site	Existing	No-Build		2B-2/the Preferred Alternative		5A2B-2		5B2B-2	
	Leq	Leq	IOE	Leq	IOE	Leq	IOE	Leq	IOE
Predicted Noise Levels Leq (dBA) NSA 6									
R6-1	33	36	2					54	21
R6-2	32	34	2					49	17
R6-4	33	35	2	53	20	53	20		
R6-5	32	34	2	58	27	58	27		
R6-6	35	37	2	58	24	58	24		
R6-7	35	37	2	51	17	51	17		
R6-8	39	41	2	54	15	54	15		
R6-9	45	47	2	56	10	56	10		
R6-10	42	44	2	58	16	58	16		
R6-11	34	36	2	66	32	66	32		
R6-12	43	45	2	61	18	61	18		
R6-13	41	42	2	45	5	45	5		
R6-14	33	35	2	45	11	45	11		
R6-15	45	47	2	50	5	50	5		
R6-16	41	43	2	50	9	50	9		
R6-17	48	49	2	53	6	53	6		
R6-18	38	40	2	60	22	60	22		
R6-19	41	43	2	55	14	55	14		
R6-20	42	44	2	61	20	61	20		
R6-21	34	36	2	64	30	64	30		
R6-22	39	41	2					59	20
R6-23	35	37	2					57	22
R6-24	42	43	2					59	18

Notes:

Values calculated to tenth of a dBA and then rounded for presentation purposes.
Leq(h) = Hourly equivalent noise level
dBA = Decibels on the A-weighted scale
IOE = Increase over existing

= Impacts based on noise level of 66 dBA or greater; values > 66 dBA shown for existing conditions and No-Build Alternative for informational purposes.
= Impact based on noise level exceeding existing level by 15 dBA or more.

Exhibit 3.16 – *Summary of Predicted Noise Levels (continued)*

Site	Existing	No-Build		2B-2/the Preferred Alternative		5A2B-2		5B2B-2	
	Leq	Leq	IOE	Leq	IOE	Leq	IOE	Leq	IOE
R6-25	44	46	2					56	12
R6-26	40	42	2					50	10
R6-27	30	33	2					56	26
R6-28	30	32	2					55	26
R6-29	29	32	2					63	34
R6-30	29	32	2					64	34
R6-31	29	32	2					60	31

Notes:

Values calculated to tenth of a dBA and then rounded for presentation purposes.

Leq(h) = Hourly equivalent noise level

dBA = Decibels on the A-weighted scale

IOE = Increase over existing

= Impacts based on noise level of 66 dBA or greater; values > 66 dBA shown for existing conditions and No-Build Alternative for informational purposes.

= Impact based on noise level exceeding existing level by 15 dBA or more.

present and 2035 and the redistribution of traffic with the build alternatives.

Noise from the No-Build Alternative would impact one property in NSA 1. The projected 2035 noise level at the property is 67 dBA; the increase over the existing noise level is 2 dBA.

Noise from Alternative 2B-2/the Preferred Alternative would impact fifteen properties: three properties in NSA 4, one property in NSA 5, and eleven properties in NSA 6. The projected 2035 noise levels at the properties range from 44 to 66 dBA; the increase over existing noise levels is 3 to 32 dBA. Noise from Alternative 5A2B-2 would impact sixteen properties: one property in NSA 1, three properties in NSA 4, one property in NSA 5, and eleven properties in NSA 6. The projected 2035 noise levels at the properties range from 44 to 66 dBA; the increase over existing noise levels is 3 to 32 dBA.

Noise from Alternative 5B2B-2 would impact eighteen properties: eight properties in NSA 4 and ten properties in NSA 6. The projected 2035 noise levels at the properties range from 47 to 68 dBA; the increase over existing noise levels is 10 to 34 dBA. Noise abatement was considered for the impacted properties. In evaluating potential abatement measures, noise walls were modeled using the FHWA TNM and results compared to MaineDOT criteria for feasibility and reasonableness. For a barrier to be feasible under MaineDOT noise policy, it must provide at least 7 dBA of reduction (i.e., insertion loss). If a barrier is determined to be feasible, it is evaluated for reasonableness. To be reasonable, MaineDOT requires that the barrier cost not exceed $31,000 per benefited residence, based on a barrier cost of $31 per square foot. A benefited residence is one that receives an insertion loss of 7 dBA or greater.

Barriers were determined to be feasible for impacted receptors in the NSAs (exhibit 3.17). However, no barrier evaluated was determined to be reasonable because all options considered exceeded the $31,000 per benefited residence criteria. Sixteen barrier analysis sites were identified along the three build alternatives.

There would be temporary impacts to air quality and noise during construction from the operation of equipment. Proper implementation and maintenance of control measures (e.g., dust/erosion and sedimentation controls, properly fitted emission control devices and mufflers, etc.) would be used to minimize the temporary impacts. During final design, MaineDOT would consider opportunities to specify the use of diesel retrofits, cleaner fuels, and idle reduction measures to minimize emissions from diesel construction equipment. Temporary impacts would cease upon completion of construction.

Exhibit 3.17 – *Summary of Noise Abatement Analysis*

Alternatives	Barrier Location	Impacted Receptors	Consideration of Abatement Warranted?	Noise Abatement Feasible?	Noise Abatement Reasonable?	Details of Barrier Systems				
						Length (feet)	Average Height (feet)	Cost ($)	Benefited Residences	Cost per Benefited Residence ($)
NSA - 1										
5A2B-2	Wilson St./I-395 Interchange	1	Yes	Yes	No	1,148	16.4	584,904	3	194,968
NSA - 4										
5B2B-2	Lambert Road West	3	Yes	Yes	No	2,258	11.7	817,116	3	272,372
5B2B-2	Eastern Avenue	5	Yes	Yes	No	3,197	17.4	1,719,122	2	859,561
2B-2/the Preferred Alternative, 5A2B-2	Eastern Avenue West	3	Yes	Yes	No	2,510	18.3	1,424,546	2	712,273
NSA - 5										
2B-2/the Preferred Alternative, 5A2B-2	Eastern Avenue East	2	Yes	Yes	No	1,389	18.6	799,440	2	399,720
NSA - 6										
5B2B-2	Lambert Road East	2	Yes	Yes	No	3,509	20.0	2,087,448	2	1,043,724
5B2B-2	Day Road East	2	Yes	Yes	No	2,784	19.4	1,671,069	2	835,535
5B2B-2	Day Road West	3	Yes	Yes	No	1,591	17.0	837,378	3	279,126
5B2B-2	Mann Hill Road East	2	Yes	Yes	No	1,981	17.6	1,080,924	2	540,462
5B2B-2	Mann Hill Road West	1	Yes	Yes	No	1,509	17.3	810,124	1	810,124
2B-2/the Preferred Alternative, 5A2B-2	Lambert Road South	2	Yes	Yes	No	2,391	20.0	1,482,490	2	741,245
2B-2/the Preferred Alternative, 5A2B-2	Lambert Road North	2	Yes	Yes	No	2,195	20.0	1,361,029	2	680,515
2B-2/the Preferred Alternative, 5A2B-2	Mann Hill Road East	4	Yes	Yes	No	2,595	19.1	1,533,904	4	383,476
2B-2/the Preferred Alternative, 5A2B-2	Mann Hill Road West	1	Yes	Yes	No	1,535	15.2	721,871	2	360,909
2B-2/the Preferred Alternative, 5A2B-2	Levenseller Road East	1	Yes	Yes	No	1,306	17.3	698,743	1	698,743
2B-2/the Preferred Alternative, 5A2B-2	Levenseller Road West	1	Yes	Yes	No	1,479	15.1	690,505	1	690,505

Note: *The total cost to mitigate noise for each build alternative is: Alternative 2B-2 - $8,712,528; Alternative 5A2B-2 - $9,297,432; Alternative 5B2B-2 - $9,023,181.*

MaineDOT conducted a review of 2012 vehicle classification data to determine what, if any, impact the recent change in Maine Interstate highway weight limits has had on traffic volumes on Route 9, Route 46, and other selected highways. In November of 2011, the allowable gross vehicle weight of Class 10 vehicles (tractor- trailers with six axles) increased from 80,000 pounds to 100,000 pounds. This change is likely to increase the amount Class 10 traffic on Interstate highways, increase Class 10 traffic on highways that connect to the Interstate, and reduce Class 10 traffic on highways that parallel the Interstate.

In 2012, MaineDOT conducted an extensive short-term vehicle classification counting program in central, eastern, and northern Maine to provide new information on Class 10 travel patterns. These class counts, along with data from permanent classification sites, were compared to 2011 class data to identify corridors where changes in Class 10 volumes and travel patterns have appeared.

To address the question of the law's impact on the study area, 2012 data from selected vehicle class sites was reviewed and compared to class data collected at those same sites in 2011 and 2009.

The principal finding of the data review is that there does not appear to be a substantial shift in long distance Class 10 truck traffic from Route 9 in eastern Maine to I-95 in northern Maine. The best sources of Class 10 volume data come from the permanent long-term classification sites, where vehicular traffic is counted and classified year-round. The permanent vehicle classification station on Route 9 in T22MD has shown slightly fewer daily Class 10 trucks in 2012 than in 2011. Meanwhile, the permanent vehicle classification station on I-95 in Medway has shown an increase in the daily Class 10 volume of more than 100 in the southbound (loaded) direction. Further review of short-term classification data in Lincoln and Mattawamkeag shows that the change on I-95 can be attributed almost entirely to Class 10 traffic diverted from parallel U.S. Route 2, where 100,000 pound Class 10 vehicles have been allowed for many years. Other short-term classification counts on Route 9 and Route 46 show mixed results, indicating a small shift, if any. The conclusion is that the Interstate gross vehicle weight increase to 100,000 pounds has resulted in a shift in shorter-length Class 10 trips on parallel routes such as U.S. Route 2, but has not resulted in significant shift in the longer-length Class 10 trips on Route 9.

3.4 Transportation Environment

3.4.1 Transportation Facilities and Systems

The major roads in the study area are I-395, Route 1A, Route 46, and Route 9. I-395, Route 1A, and Route 9 are designated as part of the NHS. Other important local roads in the study area are Eastern Avenue, Mann Hill Road, Levenseller Road, Lambert Road, and Clark Hill Road. These roadways are two-lane rural roads, without shoulders, that provide local connections between residential areas and major roads.

The intersection of Routes 1A and 46 is a signalized intersection. To the east and west of the intersection, Route 1A has a left turn lane and a through lane. The northbound and southbound lanes of the Route 46 intersection only have one lane for all traffic movements.

The intersection of Routes 46 and 9 is an unsignalized "T" intersection with a stop sign controlling traffic on Route 46. The Route 46 northbound side of the intersection has one lane, from which vehicles can turn left or right. Route 9, westbound and eastbound, has one through lane in each direction.

For a complete description of transportation facilities and systems, see the DEIS Section 3.3.1 Transportation Facilities and Systems.

The No-Build Alternative would not impact the transportation facilities and systems in the study area and region. However, during routine maintenance, the No-Build Alternative would temporarily impact transportation facilities.

The build alternatives would impact the transportation facilities in the study area by improving consistency in operating speeds and reducing travel time. Alternative 2B-2/the Preferred Alternative and Alternative 5B2B-2 would partially reconstruct the existing I-395 interchange with Route 1A (exhibit 2.5); the extent of reconstruction would be determined during final design of Alternative 2B-2/the Preferred Alternative. Alternative 5A2B-2 would require the realignment of approximately 1.5 miles of I-395 to the east of the existing location, the construction of a new interchange between I-395 and Route 1A, and the removal of the easternmost portion of I-395 and the existing interchange with Route 1A (exhibit 2.8). The build alternatives would either bridge over or pass underneath the roads it crosses (exhibits 2.4, 2.7, and 2.9).

The build alternatives would connect to Route 9 at a "T" intersection (exhibit 2.6). Route 9 eastbound would be controlled with a stop sign.

The build alternatives would create an opportunity to redesignate a portion of the NHS in the study area from Water Street in Bangor to the preferred alternative.

The No-Build Alternative would not impact pedestrians and bicyclists.

Bicyclists and pedestrians would be allowed to use the build alternatives. The build alternatives would function as an extension of the existing Route 9, or like any other one lane non Interstate controlled access facility in the state. An example where bicyclists and pedestrians are allowed is Route 196 in Topsham. The only locations that the State of Maine prohibits bicyclists or pedestrians without a positive separation between the traffic and the pedestrians are facilities with two lanes or more in each direction that function like interstate facilities. It should be noted that some states allow bicyclists on the interstate system (two lanes or more in each direction) without positive separation. Maine does not allow that. Bicyclists would have access to the build alternatives without needing to use the interstate system. The state may consider closing the facility to pedestrians because of the long distance without any outlets.

MaineDOT would work with town officials and evaluate Route 9 for potential improvements to improve safety for pedestrians and bicyclists along Route 9. Providing safe access for pedestrians and bicyclists along the road system typically consists of paved shoulders, sidewalks in highly developed areas, high visibility crossings where warranted, and signage to help alert drivers of the presence of bicyclists and pedestrians on the road system. A road safety audit would be conducted in conjunction with town officials and residents to develop potential immediate and longer term improvements that the town can consider as options to improve safety for pedestrians and bicyclists.

The build alternatives would not impact the bus, air, and rail transportation systems in the study area and region.

3.4.2 System Continuity and Mobility

Poor system continuity was identified as one of the needs for highway improvements in the study area (section 1.3.1). The transitions in travel speed, roadway geometry, and capacity for motorists traveling between I-395 and Route 9 are inconsistent and contribute to safety concerns, delays in passenger and freight movement, and conflicts between local traffic and regional traffic.

Severe traffic congestion exists on Route 1A and it becomes more noticeable in the approach to I-395. Traffic congestion is most pronounced in the summer months. Motorists can experience considerable delays when attempting to turn left across traffic and onto Route 1A, and many serious crashes have occurred on Route 1A.

The No-Build Alternative would not improve system continuity. Traffic would continue to use existing roads – primarily Route 1A and Route 46 – to travel between I-395 and Route 9. Over time, with increasing traffic congestion, system continuity on existing routes would worsen. The transitions in travel speed, roadway geometry, and capacity would increasingly become more inconsistent for travelers with growth in overall traffic volume and changes in traffic composition with increased truck traffic. Improvement of the intersection of Routes 9 and 46 would improve operational capacity (additional through-lanes and dedicated turn lanes) of the intersection but would not substantially improve overall system continuity or mobility for regional travelers.

The build alternatives would improve system continuity for regional travel between I-395 and Route 9 by providing a new controlled-access highway with improved continuity in speeds and roadway geometry. The proposed highway would carry a similar lane configuration throughout the entire length and would be posted at 55 mph. The proposed highway would bypass portions of Routes 1A and 46 in the study area that lack continuity. Delays at the signalized intersection of Routes 1A and 46 would be less than 80 seconds for all movements, with the exception of left turns from westbound Route 1A to southbound Route 46, due to reductions in through-traffic along Route 1A. At the intersection of Routes 9 and 46, delay for vehicles from Route 46 northbound to Route 9 in 2035 would decrease to approximately 21.5 seconds.

3.4.3 Existing and Projected Demand

Future traffic volumes for study-area roadways were forecasted to 2035, which was chosen because it represents the future design year for which alternatives are being evaluated. With the 2008 economic downturn and increase in the price of gas, traffic in the study area has not grown as fast as previously forecast. In December 2009, MaineDOT reexamined the system linkage need and Route 9 in greater detail to determine whether it could reasonably accommodate the future traffic volumes foreseeable within the next 20 years. MaineDOT believes the growth in traffic and traffic volumes originally forecast for Route 9 and the rest of the study area for the year 2030 would not materialize until the year 2035 and Route 9 has adequate capacity and would continue to operate at an acceptable level of service and operating speed up to and beyond the year 2035 (the time period that has been determined to be reasonably foreseeable). The 2035 traffic-volume projections were derived based on a review of traffic forecasts from the statewide travel-demand model and historical traffic-volume increases.

Future 2035 AADT volumes compared with 1998, 2006, and 2010 AADT (exhibit 1.3) depict travel demand growth trends in the study area. Volumes are shown for eight roadway segments that form important links in the area transportation network. The three major roadway segments currently used by drivers from I-395 to Route 9 north of the study area (i.e., Route 1A west of Route 46, Route 46 north of Route 1A, and Route 9 east of Route 46) are projected to have the largest percentage increases in AADT in the local transportation network between 2010 and 2035. These same roadway segments would experience substantial growth in the heavy-truck component of the AADT by 2035.

Estimates of roadway performance were developed using the applicable DHV, v/c ratio, and LOS for five major roadway segments within the study area (exhibit 1.5). Traffic volumes along Route 1A are forecasted to exceed roadway capacity by 2035 under the No-Build Alternative condition, with an accompanying LOS of F and reduction in average travel speed. Route 46 performance would fall to LOS D with a marked reduction in average travel speed, and conditions along Route 9 would decrease to LOS E.

The No-Build Alternative would not improve regional mobility, traffic congestion, or safety in the study area. Over time, with increasing traffic volumes, roadway performance would continue to decline in terms of LOS and travel speeds. Increases in heavy truck traffic, especially along Route 46 between Routes 1A and 9, would further exacerbate capacity and safety issues.

With the build alternatives, roadway-system performance would improve in comparison to the No-Build Alternative (exhibit 3.18). In 2035, the new two-lane highway would carry approximately 20 percent (i.e., 7,745 AADT) of the total traffic through the study area and a majority of the traffic destined between I-395 and Route 9, thereby reducing traffic volumes and increasing mobility and safety on Routes 1A and 46. The study area would experience reductions of regional-through heavy-truck traffic on Routes 1A and 46 because those trips would use the proposed highway, whereas

Exhibit 3.18 – *Changes in Traffic Volumes*

Location	*No-Build Alternative*		*Build Alternatives*		*Change in 2035 AADT No-Build v. Build*	*% Change in 2035 AADT No-Build v. Build*
Total AADT	**2010**	**2035**	**2010**	**2035**		
Route 1A east of I-395	22,236	33,070	20,754	26,410	-6,660	-20.1
Route 1A west of Route 46	16,976	30,600	15,494	23,940	-6,660	-21.8
Route 1A east of Route 46	12,116	18,870	12,116	18,870	0	0.0
Route 46 south of Route 1A	2,021	3,130	2,021	3,130	0	0.0
Route 46 north of Route 1A	3,058	8,570	1,576	1,910	-6,660	-77.7
Route 9 east of Route 178	7,156	8,730	6,071	7,645	-1,085	-12.4
Route 9 west of Route 46	5,129	5,410	6,611	12,070	6,660	123.1
Route 9 east of Route 46	5,830	10,940	5,830	10,940	0	0.0
Truck AADT	**1998**	**2035**	**2035**			
Route 1A east of I-395	1,569	2,449	1,439		-1,010	-41.2
Route 1A west of Route 46	1,569	2,449	1,439		-1,010	-41.2
Route 1A east of Route 46	1,569	2,449	1,439		-1,010	-41.2
Route 46 south of Route 1A	265	281	281		0	0.0
Route 46 north of Route 1A	604	1,167	157		-1,010	-86.5
Route 9 east of Route 178	569	662	447		-215	-32.5
Route 9 west of Route 46	604	1,167	2,177		1,010	86.5
Route 9 east of Route 46	879	1,535	1,535		0	0.0

heavy-truck traffic along Route 9 west of Route 46 would increase over the No-Build Alternative. The build alternatives, including those that use portions of Route 9, would improve the quality of traffic flow at the intersection of Route 9/46 and other physically less intrusive improvements (e.g., adding turn lanes) could be made to the intersection that would further improve the quality of traffic flow at the intersection.

Improvements in LOS, or no further decrease in LOS, would occur on each of the key roadway segments in the study area with implementation of a build alternative (exhibit 3.19).

3.4.4 Crash Reductions

Locations in the study area exhibit higher crash rates than other locations in Maine with similar roadway and traffic characteristics. Of the major roads in

Exhibit 3.19 – *Changes in DHV, v/c Ratio, Travel Speed, and LOS*

Year	DHV	v/c Ratio	Average Travel Speed (mph)	LOS Rural Two-Lane Road
Route 1A east of I-395				
2035 No Build	3,269	1.12	varies	F
2035 Build	2,612	0.9	28	E
Route 1A east of Route 46				
2035 No Build	2,123	0.72	37.5	E
2035 Build	2,123	0.72	37.5	E
Route 46 between Route 1A and Route 9				
2035 No Build	1,006	0.4	40.8	D
2035 Build	346	0.15	45	C
Route 9 east of Route 178				
2035 No Build	873	0.36	39.5	E
2035 Build	764	0.32	40.3	D
Route 9 east of Route 46				
2035 No Build	1,267	0.46	39.3	E
2035 Build	1,267	0.46	39.3	E

the study area, the section of Route 1A between Parkway South and I-395 and the intersection of Route 9 (known locally as North Main Street) and Riverside Drive are the sites of six HCLs (exhibit 1.2).

To evaluate the potential improvement in safety, the No-Build Alternative and the build alternatives were evaluated using the FHWA Interactive Highway Safety Design Model (IHSDM) (FHWA, 2010). IHSDM is a suite of software analysis tools for evaluating the safety and operational effects of highway design. The model is intended to predict the functionality of proposed or existing roadway designs by applying chosen design guidelines and generalized data to predict performance of the design. Although based on engineering design and roadway-environment conditions, estimates from IHSDM are expected values from a statistical sense (i.e., they represent the estimated average performance among a large number of sites with similar characteristics). Actual performance or experiences associated with the roadway may vary over time; therefore, IHSDM estimates are intended to be only one of many inputs into the decision-making process (FHWA, 2003).

Estimates of crashes for the No-Build Alternative and the build alternatives were developed using engineering alignments and the Crash Prediction Module of the IHSDM model. Crash types estimated were Fatal/ Serious Injury, Injury, and Property Damage Only (PDO). The Fatal/Serious Injury crashes generally involve a fatality, disabling injury, or long-term incapacitation. An Injury crash typically involves an injury with a short- to medium-term recovery period. PDO crashes involve no injuries and typically involve only damage to vehicles or other property.

The build alternatives have a lower crash potential than the No-Build Alternative. Alternative 2B-2/the Preferred Alternative would have the lowest number of potential crashes across all three crash types. The major factor providing an advantage to the build alternatives concerning potential crash events is the crossroads and driveway-access points, fewer vehicle conflict points exist with the build alternatives in comparison to the No-Build Alternative. The improved horizontal and vertical grades (i.e., fewer sharp turns and hills than the No-Build Alternative) of the build alternatives contribute to reduced crash potential.

To estimate the potential costs associated with the range and number of predicted crashes, mean cost data were derived as composite results from the FHWA's Crash Cost Estimates by Maximum Police- Reported Injury Severity within Selected Crash Geometries (FHWA, 2005) using undefined crash-geometry estimates. Mean-cost data used were comprehensive estimates, including costs for medical treatment, emergency services, property damage, lost productivity, and adverse effects on quality of life. The crash costs were adjusted to 2011 value using the Consumer Price Index (CPI) for capital-cost components (i.e., medical treatment, emergency services, property damage, and lost productivity) and the Employment Cost Index for quality-of-life effects.

With Alternative 2B-2/the Preferred Alternative, modeled crash costs would provide an approximate 28 percent savings in comparison to the No-Build Alternative. Cost savings of 20 to 22 percent would be realized with Alternatives 5A2B-2 and 5B2B-2 over the No-Build Alternative (exhibit 3.20).

3.4.5 Mobility Benefits, including Economic Benefits

To illustrate the mobility benefits of implementation of a build alternative, VHT and VMT changes were monetized and compared to the No-Build Alternative. VHT and VMT were derived from the shift of traffic from Route 1A and Route 46 to the build alternatives and Route 9.

Exhibit 3.20 – *Crash Estimates and 2035 Annual Costs*

Alternative	*Number of fatal/serious injury crashes*	*Cost for fatal/serious injury crash ($3,493,128 per)*	*Number of injury crashes*	*Cost for injury crash ($83,546 per)*	*Number of PDO crashes*	*Cost for PDO crash ($9,410 per)*	*Total Crash Costs*	*Crash Cost Savings over No-Build*
No-Build	5.14	$17,954,678	9.38	$783,661	19.85	$186,789	$18,925,128	0
2B-2/the Preferred Alternative	3.75	$13,099,230	6.85	$572,290	14.50	$136,445	$13,807,965	$5,117,163
5A2B-2	4.14	$14,461,550	7.56	$631,608	16.00	$150,560	$15,243,718	$3,681,410
5B2B-2	4.02	$14,042,375	7.33	$612,392	15.52	$146,043	$14,800,810	$4,124,318

Note: *Crash output obtained using: Interactive Highway Safety Design Model (IHSDM), FHWA, 2010 Release.*
Crash cost estimates derived from: Crash Cost Estimates by Maximum Police-Reported Injury Severity Within Selected Crash Geometries. FHWA October 2005. Publication No. FHWA HRT-05-051

Monetized benefits for VMT were calculated using only typical variable vehicle-operating costs (i.e., fuel and oil, repair and maintenance, and tires) for passenger vehicles and freight trucks. For passenger vehicles, the average variable operating cost per mile of $0.1774 (a composite value considering costs of small, medium, and large size automobiles) was based on American Automobile Association (AAA) data for 2011. Freight-truck per-mile variable costs of $0.65 were developed using 2010 data from the American Transportation Research Institute (ATRI).

Net present-value cost savings for passenger-vehicle drivers and freight-truck drivers would be approximately six percent with Alternative 2B-2/the Preferred Alternative, whereas drivers with Alternatives 5A2B-2 and 5B2B-2 would spend an additional four percent to seven percent, in comparison to the No-Build Alternative, to travel between I-395 and Route 9. The differences in costs are directly attributable to the length of the build alternatives (exhibit 3.21).

Monetized benefits for vehicle hours travelled (VHT) were calculated using variable vehicle-operating costs, fixed vehicle operating costs (i.e., vehicle financing, insurance, taxes, license and registration, and depreciation), and operator-based costs (i.e., value of personal time, considering wages, benefits, and trip purpose).

Exhibit 3.21 – *Changes in VMT and Vehicle Operating Costs*

Alternative	*AADT*	*Length (miles)*	*Vehicle Miles Traveled*	*Vehicle Operating Costs per Mile*	*Vehicle Operating Costs*	*Operating Cost Savings over No-Build*
Passenger Vehicle[1]						
No-Build	6,520	10.2	23,582,579	0.1774	$4,183,550	$0
2B-2/the Preferred Alternative	6,520	6.1	22,189,907	0.1774	$3,936,490	$247,060
5A2B-2	6,520	7.3	25,114,518	0.1774	$4,455,316	-$271,766
5B2B-2	6,520	7.0	24,394,971	0.1774	$4,327,668	-$144,118
Freight Truck[2]						
No-Build	1,225	10.2	4,430,776	0.65	$2,880,004	$0
2B-2/the Preferred Alternative	1,225	6.1	4,169,116	0.65	$2,709,925	$170,079
5A2B-2	1,225	7.3	4,718,602	0.65	$3,067,091	-$187,087
5B2B-2	1,225	7.0	4,583,411	0.65	$2,979,217	-$99,213

Notes:

[1] *Passenger vehicle-operating costs derived from "Behind the Numbers–Your Driving Costs, 2011 Edition". American Automobile Association (AAA).*

[2] *Freight-truck operating costs derived from: "An Analysis of the Operational Costs of Trucking: 2011 Update". American Transportation Research Institute.*

Using U.S. Department of Transportation guidance on the Valuation of Travel Time in Economic Analysis (USDOT, 2003), values of operator-based costs for passenger vehicles were adjusted to 2011 dollars and estimated to be $20.45 an hour for each "all-purpose" automobile (i.e., a weighted average of business automobile and passenger automobile travelers). Total vehicle operating costs (variable and fixed) were estimated to be $1.00 per hour based on AAA data, resulting in a total VHT value of $21.45 for passenger vehicles.

The value of travel time for freight trucks was based on adjusted 2010 average marginal-cost data for truck operations from the ATRI, resulting in a total VHT value of $59.61 per hour for heavy trucks.

Using VHT as a comparative criterion that considers both the alternative length and travel speed, each build alternative would provide cost savings over the No-Build Alternative. VHT savings with the build alternatives for both passenger and freight trucks range from six percent to 16 percent. VHT and monetized savings are highest with Alternative 2B-2/the Preferred Alternative, whereas savings with Alternative 5A2B-2 are approximately 11 percent less and with Alternative 5B2B-2 are approximately 40 percent less (exhibit 3.22).

Exhibit 3.22 – *Changes in VHT and Vehicle Operating Costs*

Alternative	AADT	Length (miles)	Miles Traveled	Vehicle Hours Traveled	Travel Time Savings over No-Build (Hours Traveled)	Vehicle Total Costs per Hour	Total Vehicle Travel Time Cost Savings over No-Build
Passenger Vehicle[1]							
No-Build	6,520	10.2	23,582,579	524,058	0		
2B-2/the Preferred Alternative	6,520	6.1	22,189,907	438,246	85,812	$21.45	$1,840,667
5A2B-2	6,520	7.3	25,114,518	491,421	32,637	$21.45	$700,064
5B2B-2	6,520	7.0	24,394,971	478,338	45,720	$21.45	$980,694
Freight Truck[2]							
No-Build	1,225	10.2	4,430,776	98,462	0		
2B-2/the Preferred Alternative	1,225	6.1	4,169,116	82,339	16,123	$59.61	$961,092
5A2B-2	1,225	7.3	4,718,602	92,330	6,132	$59.61	$365,529
5B2B-2	1,225	7.0	4,583,411	89,872	8,590	$59.61	$512,050

Notes:

[1] Passenger-vehicle operating costs derived from "Behind the Numbers–Your Driving Costs, 2011 Edition", American Automobile Association, and FHWA "Revised Guidance on the Valuation of Travel Time in Economic Analysis", February 11, 2003.

[2] Freight-truck operating costs derived from "An Analysis of the Operational Costs of Trucking: 2011 Update". American Transportation Research Institute.

3.5 Land Use and Cultural, Social, and Economic Environments

3.5.1 Land Use

3.5.1.1 Land Use and Land Cover

Land use was identified using the USGS "A Land Use and Land Cover Classification System for Use with Remote Sensor Data" (USGS, 1983). Forest land is the dominant land use in the study area, encompassing approximately 66 percent of the area. The second-most dominant land use is shrub, which encompasses approximately 10 percent of the study area. Because these two land uses dominate, most of the study area is sparsely developed. Approximately nine percent of the study area is residential and one percent is commercial. Most commercial development is located along Route 1A in Brewer. For a complete description of land use, see the DEIS Section 3.4.1.1 Land Use and Land Cover.

The No-Build Alternative would result in minimal adverse impacts to land use. Over time, traffic volumes along Routes 1A, 9, and 46 through the study area would increase, resulting in longer delays and congestion. As traffic volumes increase, more local traffic would divert to local roads seeking alternate routes to bypass traffic congestion in and approaching the study area. Increasing traffic volumes on local roads would lead to increased congestion and longer delays for motorists traveling on them, as well as a general decrease in the local quality of life. The increased congestion and longer delays would further exacerbate existing conditions that make it difficult for businesses to thrive and residents to travel unimpeded.

During public-involvement activities, residents in the study area favored keeping the build alternatives as separated from residential areas as possible. They strongly indicated that they placed a higher value on maintaining quiet residential areas than on preserving open space, which they felt was more important in comparison. In general, residents felt that the social environment should be valued more highly than the natural environment.

The build alternatives would impact land use through the acquisition of property and the conversion of land uses to transportation use. The conversion of land use would range from approximately 163 to 215 acres (exhibit 3.23).

For people living and working in proximity to the build alternatives, their view of the landscape in the area would change. The scenic view of some areas would be altered by the build alternatives and the loss of aesthetic resources such as vegetation, forestland, farmland, pastures, and/or streams.

The build alternatives would introduce additional lighting along highways and at the proposed interchanges and possibly lighting at the intersection. The build alternatives would introduce new lighting, to areas with little or no lighting, from headlights.

Exhibit 3.23 – *Impacts to Land Use (acres)*

	No-Build	2B-2/ the Preferred Alternative	5A2B-2	5B2B-2
Residential		7	12	11
Commercial		3	4	3
Agricultural		21	23	29
Transportation, Communications, Utilities		5	7	7
Mowed Grass		5	6	6
Shrub		21	42	28
Dense Shrub		1	2	6
Deciduous Forest		89	98	93
Coniferous Forest		1	1	0
Mixed Forest		9	20	2
Surface Water		1	0[1]	1
Total		163	215	186

Note: *[1] Impact less than a half-acre.*

Lighting at the interchanges and intersection would allow motorists to safely enter and exit the build alternatives. Lighting from vehicles using the build alternatives would affect homes and businesses that are located close to them. Typically, low beam and high beam headlights shine no more than 350 and 450 feet ahead, respectively (Naval Safety Center, 2004).

3.5.1.2 Relocations

The process for property acquisition is explained in the State of Maine, Department of Transportation, A Land Owner's Guide to the Acquisition Process (MaineDOT, 2002). When it is determined that a property or portion of a property is to be acquired, a market assessment is performed. The acquisition and relocation program would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation resources are available to all residential and business relocatees without discrimination. MaineDOT would provide just compensation in accordance with the Uniform Relocation Act for the property to be acquired. If landowners believe that the offer for their property is unfair, an appeals process exists to resolve the differences about the value. The Uniform Relocation Act protects landowners from unfair and inequitable acquisition of property.

The build alternatives would displace 6 to 16 residences. Alternative 5A2B-2 would displace the Brewer Fence Company, Eden Pure Heaters, Mitchell's Landscaping & Garden Center, and Town 'N Country Apartments. Alternative 5B2B-2 would displace the Bangor Hydro-Electric Company building and a compressor station (exhibit 3.24).

For Alternative 2B-2/the Preferred Alternative, the properties of those potentially displaced residents range from approximately 0.50 acre to 20.19 acres, with the majority between 2.0 and 4.0 acres. The assessed value of those potentially displaced properties and residences range from approximately $50,000 to $340,000, with the majority between approximately $147,000 and $323,000.

For Alternative 5A2B-2, the properties of those potentially displaced residents range from approximately 0.50 acre to 20.19 acres, with the majority between 2.0 and 4.0 acres. The assessed value of those potentially displaced properties and residences range from approximately $50,000 to $340,000, with the majority between approximately $147,000 and $323,000.

For Alternative 5B2B-2, the properties of those potentially displaced residents range from approximately 0.50 acre to 20.19 acres, with the majority between 2.0 and 4.0 acres. The assessed value of those potentially displaced properties and residences range from approximately $50,000 to $340,000, with the majority between approximately $124,000 and $242,500.

MaineDOT performed an assessment for comparable replacement housing for those potentially displaced residents in January 2014 and concluded sufficient replacement housing exists in the area. In January 2014, there were approximately 150 homes of comparable size and price range for sale in the City of Brewer and the Towns of Holden and Eddington. When the Towns of Clifton and Dedham are also considered, there were approximately 240 homes of comparable size and price range for sale.

Based on the value of properties to be acquired and the number of homes of similar price and functionality available in the study area and region, it appears that finding a suitable replacement property that meets characteristics, needs, income, preferences, and other factors pertinent for successful relocation of the affected households would be achievable. However, based on their experience with other projects, MaineDOT acknowledges that locating suitable (safe, decent, and sanitary) replacement housing within the financial capability of affected property owners may not be possible in all cases and providing last resort housing may be required. Last resort housing is a procedure in which MaineDOT (under the Federal Relocation Assistance Program) provides financial assistance to a displaced person when comparable decent, safe, and sanitary housing is not available that is within the financial means of the displaced person.

Further, as the Proposed Action is anticipated to be constructed in phases due to financial constraints, the demand for available housing and commercial property stock in the study area and region would be spread

Exhibit 3.24 – *Displacements*

	Residences	Businesses	Business Impacts
No-Build			
2B-2/ the Preferred Alternative	8	None	-
5A2B-2	16	Brewer Fence Company, Eden Pure Heaters, Mitchell's Landscaping & Garden Center, and Town 'N Country Apartments	
5B2B-2	6	Bangor Hydro-Electric Co. Building, and Maritimes and Northeast Pipeline LLC c/o Duke Energy Compressor Station	-

out over a period of years. The acquisition and relocation program would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation resources are available to all residential relocates without discrimination.

Following the availability of the FEIS, MaineDOT would coordinate with those potentially displaced residents to determine special relocation considerations and any measures required to resolve relocation concerns.

The No-Build Alternative would not impact local tax revenues.

The build alternatives would result in a reduction in tax revenue in Brewer, Holden, and Eddington because the land converted to transportation use would no longer be tax-eligible. Annual tax revenue would decrease by approximately:

Alternative 2B-2/the Preferred Alternative

- Brewer: $37,000
- Holden: $7,200
- Eddington: $20,200

Alternative 5A2B-2

- Brewer: $42,700
- Holden: $19,100
- Eddington: $19,400

Alternative 5B2B-2

- Brewer: $159,200
- Holden: $0
- Eddington: $9,400
-

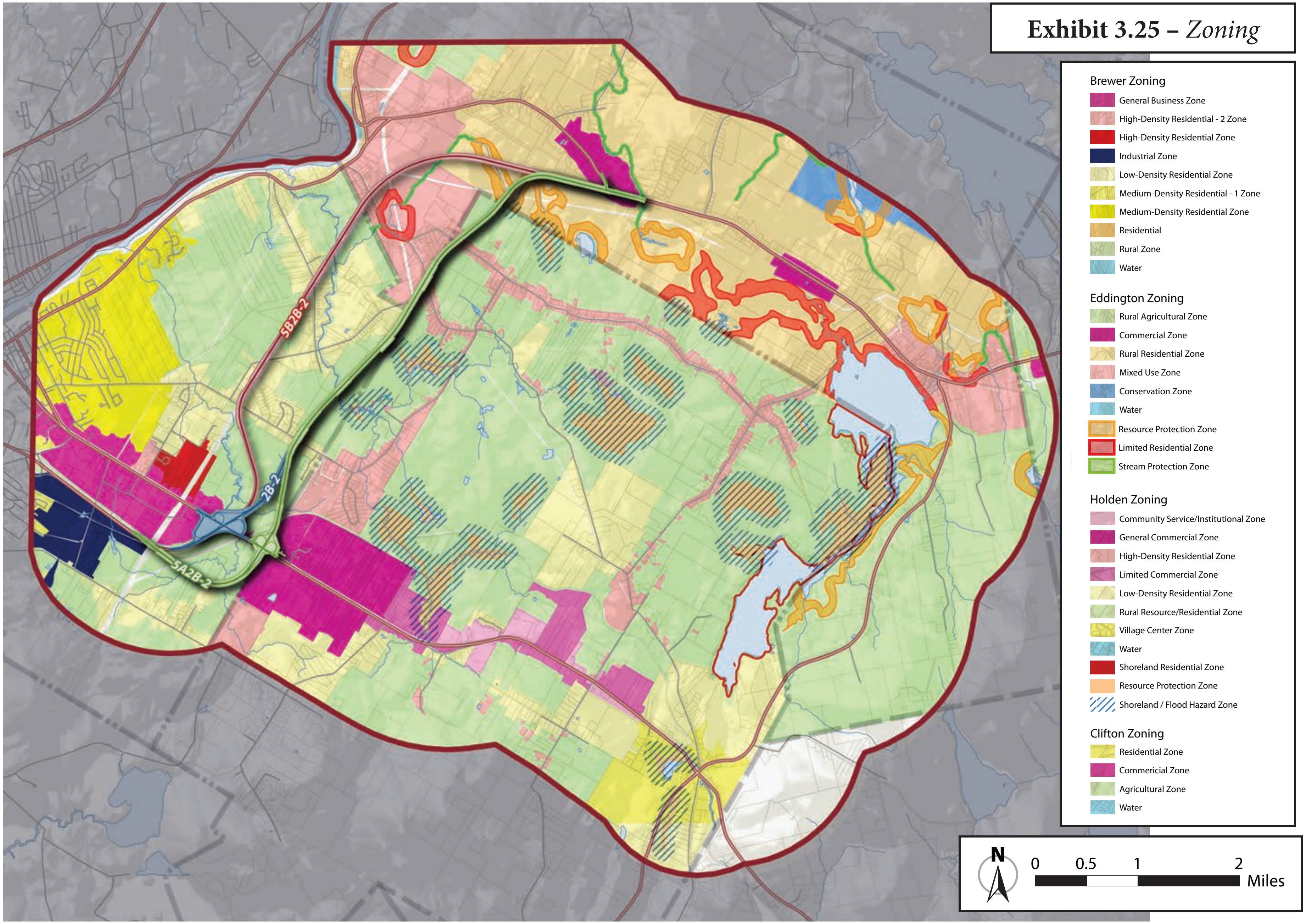
The decreases in revenue represent less than two percent of total tax revenues in each municipality.

3.5.1.3 Future Land Use and Zoning

The comprehensive plans for Brewer, Holden, and Eddington promote the expansion of commercial and residential uses in or near areas of existing development, development of supporting transportation networks, and the protection of open spaces. For a complete discussion on future land use and zoning, see DEIS Section 3.4.1.3 Future Land Use and Zoning.

Much of the land in the study area in Brewer is zoned for rural uses (exhibit 3.25). Most of the land in Holden is zoned rural resource and residential development (exhibit 3.25). Since the circulation of the DEIS, Eddington updated its zoning ordinance. Most of the land in Eddington is zoned for agriculture and farming (exhibit 3.25). Areas zoned for residential and commercial uses exist along Route 9, Route 46, and other local roads (Town of Eddington, 2012). Most of the land in Clifton is zoned as agriculture or rural resource.

The No-Build Alternative would impact future land use and zoning. Future land use in the study area likely would consist of an extension of the existing permitted



Sources: *1)City of Brewer. Land Use Map. June 2010. 2)Town of Eddington. Zoning Ordinance. Enacted March 20, 2012.*
3) Town of Holden, Maine. Zoning Ordinance. Amended December 21, 2009. 4) Clifton Comprehensive Plan. Amended August 2005.

land uses and trends and the future land use plans identified in the Brewer, Holden, and Eddington comprehensive plans. Without relief of traffic congestion, the No-Build Alternative likely would have an adverse impact on future business expansion and new development along Route 1A. With increased traffic volumes, the number of crashes experienced between vehicles entering and exiting businesses along Route 1A could increase.

Although a portion of the build alternatives would be in the limited commercial area along the Route 1A corridor, they are inconsistent with the comprehensive plans of Brewer, Holden, and Eddington because areas designated for rural resource/residential would be converted to transportation use (exhibit 3.26). Implementation of the build alternatives would detract from the rural character in the central and northern portions of the city of Brewer and the towns of Holden and Eddington.

By reducing traffic congestion, the build alternatives would have a beneficial impact on future business expansion and new development along Route 1A and, to a limited extent, along Route 9. The build alternatives would benefit the land uses along Route 46 from reduced traffic.

MaineDOT would work with the town of Eddington to maintain the safety and preserve the capacity of Route 9 in the study area. MaineDOT manages access points with Maine's rules governing access management (driveway and entrance siting). Safety, traffic congestion, and system linkage remains a priority concern of MaineDOT, as is preservation of the capacity of the existing highway system. Activities that could be considered to maintain safety and preserve the capacity of Route 9, in accordance with Maine's rules governing access management (driveway and entrance siting) can go no further than working with the town of Eddington to change zoning, eliminating existing and future curb cuts, and working with individual landowners to acquire property or development rights. That authority already exists to help both MaineDOT and the community ensure that safety is maintained in the corridor. MaineDOT has no authority

Exhibit 3.26 – *Impacts to Land Use with Zoning Designations (acres)*

	Agriculture	Commercial	High-Density Residential	Medium-Density Residential	Low-Density/ Rural Residential	Rural	Total[1]
No-Build							
2B-2/the Preferred Alternative	27	9	2	27	15	76	156
5A2B-2	28	18	2	29	17	112	206
5B2B-2	58	10	0	18	22	69	177

Note: *[1] Total acres do not include area in infrastructure/utility zoning designations or surface water.*

beyond the existing rules to force Eddington to do anything to help reduce traffic conflicts, but MaineDOT is directed by statute to work with Eddington to ensure safety and proper access to the state highway system.

Today, the current AADT along Route 9 in Eddington between the terminus of the Alternative 2B-2/the Preferred Alternative and the Route 46 intersection is approximately 5,000 vehicles per day. The posted speed in this section of Route 9 is predominantly 45 mph, with 35 mph near the Route 46 intersection. Traffic on Route 9 can comfortably travel at the current posted speeds. This segment of Route 9 was constructed to a width that meets current NHS standards for 2-lane highways (12-foot travel lanes and 8-foot shoulders).

With Alternative 2B-2/the Preferred Alternative, the 2035 AADT along this segment of Route 9 is forecast to be approximately 12,000 vehicles per day. At that level of traffic flow, Route 9 can easily be maintained at the current posted speeds. There are many locations in Maine where AADTs of 15,000 to 17,000 are accommodated on 2-lane highways with 35-to-50 mph speeds. Many of these locations have more intense commercial development that Route 9 in Eddington. This indicates that traffic volume growth on Route 9 can be accommodated well beyond the year 2035.

As part of its planning process, MaineDOT regularly monitors traffic volume and traffic safety trends on all state highways, including Route 9. Traffic volumes are updated every three years, and crash data is reviewed annually to identify emerging conditions that would compromise safety and mobility. MaineDOT regulates development access to Route 9 through application of access management rules. These rules require a new development to provide safe access and maintain adequate mobility on the highway.

One way of maintaining safety and mobility along Route 9 as future development occurs is by establishing turn lanes where needed to minimize conflicts between turning traffic and through traffic. This treatment improves the safety of turns while maintaining or improving the flow of through traffic. There are examples in Maine where AADTs of 17,000 to 19,000 are accommodated on 3-lane highways (which have a 2-way left turn lane between the through lanes) with 40-to-50 mph speeds. Route 9 is adaptable within the existing Right-of-Way to this type of treatment, if conditions warrant.

With the capacity to accommodate much more than the forecasted traffic, the regular monitoring of safety and mobility conditions by MaineDOT, and the ability to accommodate additional development in a safe and efficient manner, the transportation benefits of Alternative 2B-2/the Preferred Alternative should be sustainable well beyond 2035.

MaineDOT would work with town officials and evaluate Route 9 for potential improvements to improve safety for pedestrians and bicyclists along Route

9. Providing safe access for pedestrians and bicyclists along the road system typically consists of paved shoulders, sidewalks in highly developed areas, high visibility crossings where warranted, and signage to help alert drivers of the presence of bicyclists and pedestrians on the road system. A road safety audit would be conducted in conjunction with town officials and residents to develop potential immediate and longer term improvements that the town can consider as options to improve safety for pedestrians and bicyclists.

3.5.1.4 Neighborhoods

Brewer is part of the Bangor, Maine, metropolitan area and is divided into the villages of South Brewer and North Brewer. Neighborhoods along Eastern Avenue in Brewer are Felts Brook Green, Timber Ridge, Winter Way, and Beech Ridge. Nature's Way is located along Lambert Road (City of Brewer, 1995). Route 1A divides the town of Holden into two parts: the southern portion and the northern portion.

The neighborhoods in Holden are Barrett Lane along Mann Hill Road; Brookfield Estates along Eastern Avenue; and the houses along Brian Drive, Eaton Ridge, and Gilmore Estates along South Road.

East Eddington exists within the town of Eddington. The neighborhoods are Rae Lorraine and Martin Lane along Main Road and Fifield Estates along Rooks Road. Residents along the primary roads in the study area also define themselves as neighborhoods.

The No-Build Alternative would not impact community cohesion. A community is defined as a group of people living together because of geography, background, or heritage. The town of Holden reported that Route 1A, which bisects the town into southern and northern portions, acts as a physical barrier to community interaction. Increased congestion on Route 1A would increase this barrier effect.

The No-Build Alternative would not impact neighborhoods.

Alternative 2B-2/the Preferred Alternative and Alternative 5A2B-2 would bisect the five-lot Beech Ridge neighborhood in the city of Brewer (exhibit 3.27). These alternatives would be approximately 100 feet east of Winter Way. Alternative 5A2B-2 would be to the immediate west of the Pine Tree Mobile Home Park. Alternative 5B2B-2 would be to the immediate east of Felts Brook Green.

3.5.1.5 Community Facilities and Services

Community facilities and services are listed and discussed in the DEIS Section 3.4.1.5 (exhibit 3.28).

There is a weekly trash collection resulting in stop and go traffic along Route 9 and other roads in the study area.

Exhibit 3.27 – *Impacts to Neighborhoods*

	Felts Brook Green	Brookfield Estates	Pine Tree Mobile Home Park	Brian Drive	Beech Ridge	Easton Ridge	Winter Way	Timber Ridge	Nature's Way	Barrett Lane	Rae Lorraine	Martin Lane	Fifield Estates
No-Build													
2B-2/the Preferred Alternative					Direct Impact		Immediately Adjacent to Neighborhood						
5A2B-2			Immediately Adjacent to Neighborhood		Direct Impact		Immediately Adjacent to Neighborhood						
5B2B-2	Immediately Adjacent to Neighborhood							Within 500 feet of Neighborhood					

Legend: Direct Impact; Immediately Adjacent to Neighborhood; Within 500 feet of Neighborhood

The No-Build Alternative would not impact educational facilities. Over time, increased traffic volumes and congestion could impact the safety of students traveling along Routes 1A, 9, and 46 in proximity to schools. In general, the build alternatives would have a positive impact on student safety by reducing through traffic, including heavy-truck traffic, along school-bus routes. This benefit would be particularly evident on Route 46 (particularly the Holbrook School and Camp Roosevelt Scout Reservation along Route 46), given its terrain and more restricted sight distance. The build alternatives would increase traffic west of Eddington School.

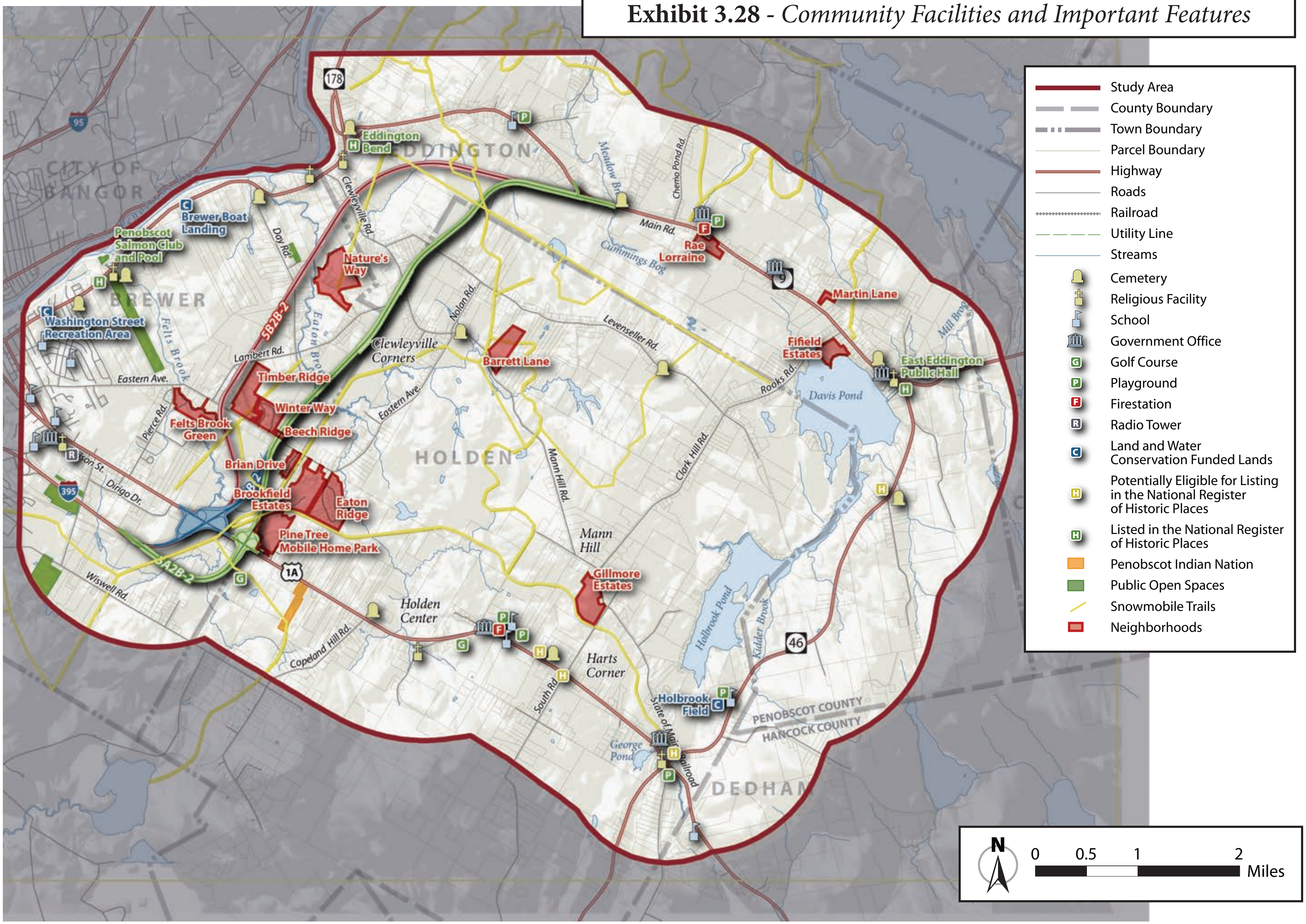
The No-Build Alternative would not impact emergency facilities. Over time, increased traffic volumes and congestion could impact response times of emergency responders.

The build alternatives would positively impact emergency facilities by reducing traffic along Route 1A and a corresponding decrease in emergency vehicle response times. Emergency response services (e.g., fire, police, and ambulance) would benefit from a reduction in traffic congestion on Route 1A from the build alternatives.

The No-Build Alternative and the build alternatives would not impact healthcare facilities.

The No-Build Alternative and the build alternatives would not impact trash collection. Route 9 has sufficient shoulder width to allow trash trucks to operate on the shoulder of the road and vehicles to operate in the travel lane.

Exhibit 3.28 - *Community Facilities and Important Features*



3.5.1.6 Recreation Lands

Part of Maine's Interconnected Trail System (ITS) for snowmobiles crosses through Brewer and Holden (exhibit 3.28)(Maine Snowmobile Association, 2008).

The No-Build Alternative would not impact snowmobile trails.

The build alternatives would cross snowmobile trails maintained by the Eastern Maine Snowmobile Association (MSA) in three to six locations. Alternative 2B-2/the Preferred Alternative would have the least impacts to snowmobile trails by crossing the trails three times, Alternative 5A2B-2 would cross them six times, and Alternative 5B2B-2 would cross them five times. During final design of the selected alternative, MaineDOT would work to maintain the integrity of the existing snowmobile trail system.

3.5.2 Social and Economic Environment

3.5.2.1 Employment and Industry Trends

Construction of one of the build alternatives would create direct, indirect, and induced employment. Direct employment includes workers employed at the highway construction site. Indirect employment includes off-site construction workers (e.g., administrative and clerical) and workers in construction supply industries (e.g., steel and cements products). Induced employment includes workers supported throughout the economy when highway construction workers spend their wages (FHWA, 2008).

The FHWA estimates that for every $1 million in highway infrastructure investment, approximately 28 full-time equivalent jobs are created. These jobs include approximately nine direct jobs, five indirect jobs, and 14 induced jobs (New England Council, 2008). This employment increase represents the total number of jobs created; although these jobs would not be created necessarily in Penobscot County, it is likely that a small increase in employment at the local and county levels would result.

Construction of the build alternatives would cost between $61 million and $81 million, creating approximately 1,700-2,300 full-time equivalent jobs.

The construction of the build alternatives would improve the viability of public and private investments in the Ports of Eastport, Searsport and Bucksport through improved connectivity to the interstate system.

3.5.2.2 Retail Businesses

The No-Build Alternative would adversely impact retail businesses along Route 1A. Traffic congestion, including travel-time delays and difficulty in left-turning movements, adversely affects customers' ability to access and exit businesses along Route 1A. Over time, as congestion worsens, customers may avoid patronizing some businesses along Route 1A.

Although motorists could continue to use the existing roads and travel patterns, the build alternatives would provide an opportunity or choice for travelers to bypass businesses along Route 1A in Holden and Route 9 in Eddington, thereby potentially reducing impulse purchases.

A literature review summarizing the effects of bypasses on communities was compiled. The reviewed research included studies of more than 270 bypassed communities with varying size, demographic composition, and economic characteristics. It was conducted in 1996 by the National Cooperative Highway Research Program (NCHRP), University of Kansas, Washington State University, University of Texas at Austin, and both the Wisconsin and Iowa Departments of Transportation. Data collected ranged from interviews concerning local opinions to origin/destination surveys to statistical analyses and economic impact modeling. The studies summarized in the literature review found that the majority of bypassed towns do not suffer adverse economic impacts from a bypass. According to the studies, a bypass can cause negative impacts to traveler-oriented businesses in a community, but the probable likelihood and severity of these negative impacts differed among studies. More recent studies indicate similar findings (Babcock and Davalos, 2004).

A bypass can result in decreased business for some local businesses, particularly traveler-oriented businesses in communities with populations of fewer than 1,000 people. However, adverse effects do not occur in most traveler-oriented businesses. Sales at traffic-serving businesses along the bypassed route declined in less than 30 percent of cases studied (Buffington et al., 1996).

In 64 percent of cases studied by the NCHRP, overall business activity grows more rapidly where bypasses have been constructed than in comparable "control" communities that are not bypassed (Buffington et al., 1996). Some of this growth may be a reason for construction of the bypass rather than an effect of the bypass.

The Oklahoma DOT (2001) assessed the impact of bypasses on small Oklahoma towns located along U.S. Highway 70. Much of the study was devoted to the development of models to analyze the impact of bypasses; the application of the model to Oklahoma towns with bypasses was limited. The authors concluded that the bypasses did not have a statistically significant impact on the sales-tax base in the affected towns (Rogers and Marshment, 2001).

In nearly all of the communities studied by the NCHRP, the amount of land in commercial or industrial use increased along existing routes (i.e., in 93 of

98 cases) (Buffington et al., 1996). Land values were found to increase along the original route in 47 of the 50 cases studied by the NCHRP; the rates of decline were no greater than 2.4 percent for the remaining three cases (Buffington et al., 1996).

According to the University of Texas at Austin study, negative impacts to traveler-oriented industry sectors begin when certain critical values of traffic reduction are reached: 31 percent for retail sales, 26 percent for eating and drinking places, and 43 percent for service industries. Gasoline service stations are negatively impacted regardless of the level of traffic loss (a finding qualitatively supported in the majority of studies).

The Iowa DOT, Wisconsin DOT, and Washington State University also highlighted the beneficial impact of reduced traffic congestion on a bypassed route. The Iowa DOT found that due to the decrease in through traffic, traffic congestion, and crash rates along the bypassed route, the bypassed business district becomes a more comfortable and safer place to shop. The Wisconsin DOT found that bypasses improved overall accessibility to and from the bypassed communities. The Washington State University and University of Kansas found that bypass routes that improve access to major trading centers may increase economic development opportunities for small towns and increase basic industries present. Growth in basic industry has an indirect benefit on local retail sales and service industries.

Several studies found that signage may reduce the negative impact of a bypass to businesses. The University of Texas Center for Transportation Research states that signs are a simple but potentially effective technique for minimizing negative impacts of a bypass on existing community businesses. The North Carolina Division of Community Assistance similarly noted in a 1991 report that adequate signage is important for minimizing negative impacts of a bypass (North Carolina Division of Community Assistance, 1991). Signage that informs through-travelers of a town's location, as well as businesses and points of interest, can increase the likelihood that travelers would stop.

The build alternatives would have a slight impact on retail businesses. The reduction of traffic along Routes 1A and 9 could cause a small decrease in sales and revenue for the commercial and retail businesses proportionate to the amount of long-distance through-traffic removed from these two highways. Traffic headed to Calais and the Canadian Maritime Provinces, especially truck-freight traffic, would use the build alternatives and bypass Route 1A and a portion of Route 9 in Brewer and Eddington. However, local commuters and tourists headed to destinations such as Acadia National Park would continue to use Route 1A, thereby providing sales and revenue opportunities for businesses. Convenience stores and gasoline service stations along Route 1A could experience a slight decrease in sales as a result of less through-traffic, but this decrease is not projected to substantially impact sales or revenue.

The studies summarized in the literature review found that the majority of bypassed towns do not suffer adverse impacts. Holden and Eddington can be defined as medium-sized communities (i.e., 2,000 to 2,500 people) and Brewer can be defined as a larger community (i.e., more than 5,000 people). Results of the literature review indicate that traffic on the original route (bypassed) was greater than traffic on the bypass for medium and larger communities, which supports the conclusion that traveler- and traffic-oriented businesses along Routes 1A and 9 in Brewer and Eddington would experience few adverse impacts (i.e., loss of sales) from the build alternatives. Results of the literature review also indicate that the majority of retail businesses had not moved from their pre-bypass locations, which suggests that most of the retail businesses along Routes 1A and 9 likely would not relocate.

The removal of a substantial portion of heavy-truck traffic and other through-traffic along Route 1A and a portion of Route 9 in Brewer and Eddington would improve access safety and reduce traffic congestion for customers of businesses along these two highways.

3.6 Coastal Zone Management Act and Probable Consistency Determination

The I-395/Route 9 Transportation Study is a major federal action and a portion of the study area is located in Maine's statutory coastal zone. As such, it requires a federal consistency review under the CZMA. Under the CZMA, the Maine Department of Agriculture, Conservation, and Forestry, Division of Geology, Natural Areas and Coastal Resources is delegated the authority to perform the federal consistency review using their enforceable policies of the approved Maine Coastal Program (MCP).

Maine's coastal zone encompasses political jurisdictions that have land along the coast or a tidal waterway, such as a river or bay. The City of Brewer in the study area is included in Maine's coastal zone. The enforceable policies of the MCP are the 29 Maine statutes listed in Appendix A of the Maine Guide to Federal Consistency Review, Maine Coastal Program, 4th Edition – Update 2, January 2013, including the Natural Resource Protection Act, Erosion Control and Sedimentation Law, Maine Rivers Act, and Coastal Management Policies Act http://www.maine.gov/dacf/mcp/downloads/Final_Maine_Guide-Federal_Consistency_Review_4thed_update2.pdf.

The natural resources and features identified and discussed throughout Chapter 3 are considered in the federal consistency review, as are the potential impacts to them.

MaineDOT's coordination with federal, state, regional, and local agencies and interested parties is ongoing for the I-395-Route 9 Transportation Study. The FHWA and MaineDOT have determined the proposed action described in this FEIS is consistent with the CZMA and the consideration and protections it affords to natural resources and features. A full federal consistency review would be provided with the review and issuance of the NRPA permit.

3.7 Relationship between Short-Term Uses of the Human Environment and Enhancement of Long-Term Productivity

The No-Build Alternative would have a short-term impact on the human environment from regular maintenance of I-395 and Routes 1A, 46, and 9. The No-Build Alternative would have a detrimental impact on long-term productivity on the environment of the study area and region because increasing traffic congestion would lead to an increased congestion and decreased mobility for travelers on Routes 1A, 46, and 9 over the long term.

The build alternatives would have a short-term adverse impact on the human environment but would enhance long-term productivity. The proposed transportation improvements are based on the State of Maine's long-term transportation improvement plan and program, which considers the need for present and future connectivity and traffic requirements within the context of present and future land-use development. The build alternatives are generally similar and would have similar short-term impacts. Short-term uses of the human environment would occur during construction. A build alternative would require staging areas, stockpiling areas, roadway construction, and a temporary increase in traffic around construction areas. Additional short-term impacts would be air-quality degradation from increased emissions from construction activities, noise impacts, and socioeconomic and community impacts from construction effects (e.g., roadway obstruction, traffic detours, and construction debris).

Transportation projects consider state and local comprehensive plans, which acknowledge the present and future traffic requirements based on current and future land-use development. The purpose of the build alternatives is to increase long-term productivity. The projected reduction in traffic congestion on Routes 1A, 46, and 9 and the resulting savings in VHT show that the local short-term impacts and use of resources by the proposed action are consistent with the maintenance and enhancement of long-term productivity in the study area.

The build alternatives would assist in improving the long-term regional connectivity, as well as productivity of DownEast Maine by linking I-395 and Routes 1A, 46, and 9.

3.8 Irreversible and Irretrievable Commitment of Resources

Implementation of the build alternatives entails a commitment of a range of natural, physical, human, and fiscal resources. The commitment of these resources generally would be similar for each of the build alternatives. Land acquired in the construction of a build alternative is considered an irreversible commitment during the period that it is used for a highway facility. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. There is no reason to believe that such a conversion would ever be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway-construction materials (e.g., cement, aggregate, and bituminous material) would be expended during construction. Additionally, labor and natural resources would be used in the fabrication and preparation of construction materials. These materials generally are not retrievable. However, they are not in short supply and their use would not have an adverse effect on continued availability of these resources. Any construction would also require a substantial one-time expenditure of both state and federal funds that are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, state, and region would benefit from the improved quality of the transportation system. The benefits would consist of improved mobility, safety and savings in time.

3.9 Indirect Impacts and Cumulative Impacts

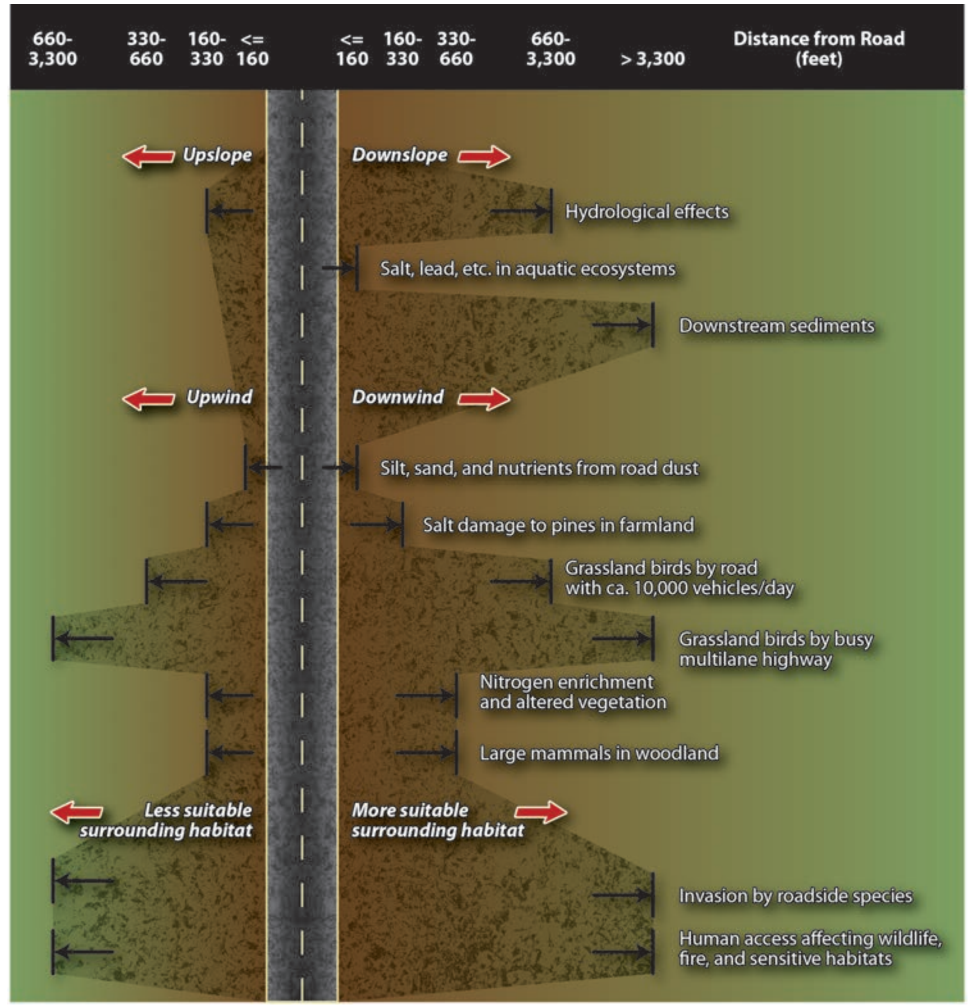
3.9.1 Indirect Impacts

Indirect (or secondary) impacts are defined as reasonably foreseeable future consequences to the environment that are caused by the proposed action but that would occur either in the future (i.e., later in time) or in the vicinity of but not at the exact location as direct impacts associated with the build alternative. In the Council on Environmental Quality regulations, indirect impacts are defined as those that are "… caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts include growth-inducing impacts and other impacts related to induced changes in the pattern of land use, population density or growth rate, and related impacts on air and water and other natural systems, including ecosystems" (40 CFR 1508.8b).

Traffic noise, visual disturbance, chemicals, and pollutants create indirect impacts particularly to aquatic systems, wildlife, and wildlife habitat (Maine Audubon Society, 2007) (exhibit 3.29). The build alternatives create a road-effect zone in which indirect impacts extend beyond the road and the immediate surrounding areas (exhibit 3.30). Distances of indirect impacts to the natural environment were based on these road-effect zones and the USACE *New England District Compensatory Mitigation Guidance*. Distances used to analyze indirect impacts were based on the minimum distance for that resource (Maine Audubon Society, 2007; USACE, 2010), with the exception of resources with distances of zero to 160, in which 160 was used. Wetlands and vernal-pool impacts were based on the indirect impact distances in the USACE's mitigation guidance.

Soils. Indirect impacts of the build alternatives on soils would vary in scale depending on the preferred alternative. Changes to soil in specific areas would impact soil-dependent species (i.e., vegetation and wildlife). Erosion from cut slopes would affect water quality in surface waters during and after construction. Erosion and sedimentation control measures would be incorporated into the design and implemented

Exhibit 3.29 – *Approximate Distances of Road-Effect Zones*



Source: *Maine Audubon Society, 2007*

Exhibit 3.30 – *Indirect Impacts of Alternatives*

Resources		Distances (feet)		Alternative Indirect Impacts (acres)							
		Upslope/ Upwind	Downslope/ Downwind	No-Build Alternative[4] Upslope	No-Build Alternative[4] Downslope	2B-2/the Preferred Alternative Upslope	2B-2/the Preferred Alternative Downslope	5A2B-2 Upslope	5A2B-2 Downslope	5B2B-2 Upslope	5B2B-2 Downslope
Soils		Erosion could affect water quality in surface waters.									
Surface Waters	Contaminants	160[1]		0.7		1.8		1.5		2.0	
	Sediments	0[1]	3,300[1]	12		0	13	0	18	0	17
Groundwater		No indirect impacts									
Aquatic Habitat and Fisheries		160[1]		0.7		1.8		1.5		2	
Vernal Pools	Area	250[2]		54		17		25		8	
	Percent Forested			25 (46%)		10 (60%)		20 (78%)		7 (83%)	
	Percent Wetland			17 (31%)		8 (47%)		20 (80%)		4 (50%)	
	Percent Upland			37 (69%)		9 (53%)		5 (20%)		4 (50%)	
	Area	750[2]		480		278		395		146	
	Percent Forested			254 (53%)		175 (63%)		233 (59%)		101 (69%)	
	Percent Wetland			101 (21%)		109 (39%)		177 (45%)		49 (34%)	
	Percent Upland			379 (79%)		169 (61%)		218 (55%)		97 (66%)	
Floodplains		0	100[3]	0	1	0	11	0	5	0	15
		160[1]		4		22		8		28	
Wetlands		0	100[3]	0	17	0	31	0	34	0	30
		160[1]		64		66		71		80	
Vegetation	Contaminants	160[1]		164		232		252		202	
	Nitrogen enrichment and altered vegetation	160[1]	330[1]	95	187	88	292	92	312	116	240
	Invasive species	660[1]	3,300[1]	753	3,920	329	4,407	398	4,346	498	2,944
Wildlife	Large mammals	160[1]	330[1]	0	0	74	128	69	173	89	103
	Grassland birds	330[1]	660[1]	0	80	146	250	136	334	178	204
	IWWH	0	100[3]	0	2	0	10	0	19	0	4
Wildlife Habitat		660[1]	3,300[1]	84	2,189	278	1,416	255	1,669	423	893

Notes:
[1]Source: Maine Audubon Society, "Conserving Wildlife On and Around Maine's Roads", 2007.
[2]Source: USACE, New England District, "Compensatory Mitigation Guidance", 2010.
[3] USEPA, 2010
[4] No-Build Alternative consisted of Route 1A from I-395 to Route 46, and Route 46 from Route 1A to Route 9.

during construction in accordance with Section II of the MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a). Redundancy of controls would be included in each watershed that would be impacted to minimize potential control failures that could deliver sediment-laden runoff to streams during and after construction.

Surface Waters. An increase in the potential for sediment loading and roadway contaminants introduced to surface waters exists for the No-Build Alternative and the build alternatives. Impacts from sedimentation caused by construction would be temporary. During final design, a highway drainage system would be designed to minimize the transport of sediments and other particulates to surface waters. Erosion and sedimentation control measures would be incorporated into the design and implemented during construction in accordance with Section II of the MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a) and designed in accordance with the MDEP/MaineDOT Memorandum of Agreement, Stormwater Management, November 14, 2007 and Chapter 500 Rules. Redundancy of controls would be included in each watershed that would be impacted to minimize potential control failures that could deliver sediment-laden runoff to streams.

As part of winter maintenance, anti-icing chemicals with chlorides (i.e., primarily rock salt) are used to combat the effects of snow, sleet, and ice. The use of anti-icing materials for winter maintenance would not impact the availability of potable water supplies. MaineDOT investigates and evaluates snow and ice-control industry standards and updates its salt-priority program to use salt judiciously while providing safe and effective traffic movement. In the unlikely event that a localized issue is observed, MaineDOT would implement corrective actions as mandated by state law (23 MRSA § 652). The project would be designed in compliance with applicable Maine water quality standards and with the requirements of the Section 401 Water Quality Certification.

MaineDOT has collaborated with the Margaret Chase Smith Policy Center at the University of Maine to publish a study entitled MaineDOT's winter maintenance activities: Maine Winter Roads: Salt, Safety, Environment and Cost. The goals identified in the study include: maintain safety while reducing salt and sand use; reduce salt use through improved practices, new materials and equipment, and changes in levels of service; and increase public awareness of winter practices, costs, and environmental impacts. The key findings from the study are:

- Anti-icing practices are being widely adopted by state agencies across the U.S. MaineDOT, Maine Turnpike Authority and some municipalities have incorporated anti-icing practices.

- Eighteen percent of the State of Maine's public roads are maintained by MaineDOT, one percent by the Maine Turnpike Authority with the remaining eighty one percent being maintained by 488 municipalities and three Indian reservations.
- Using federal guidelines for the costs of injuries and deaths, Maine accident data show a 10 year average cost of $1.5 billion dollars annually.
- In winter months between 1989 and 2008, there was a significant reduction in the number of fatalities on state highways. This reduction does not occur on town roads and state-aid highways. This is consistent with the finding of a statistically significant decrease in fatalities on state highways since MaineDOT's anti-icing policy was implemented. It is unknown whether the anti-icing policy is the cause of the decrease.

Since the mid-1990s MaineDOT has adopted procedures recommended by the FHWA for anti-icing. MaineDOT uses anti-icing chemicals to maintain safer roadways for the traveling public. MaineDOT is continually investigating and evaluating snow and ice control methods, and updating its maintenance program to balance maintaining water quality with providing safer conditions for the public. Early application of salt brine and rock salt are being used on many roads to prevent snow and ice from bonding to the road surface. This anti-icing application reduces the amounts of anti-icing chemicals used. This approach reduces the amount of chlorides and sodium in highway runoff. MaineDOT snow and ice control operations are guided by a policy which classifies the level of service of roadways by priority corridors. Each level of service has a defined cycle of service time, plow route length, and prescribed amount of time to return the road to normal winter driving conditions.

- Priority 1 corridors (26% of total miles maintained by MaineDOT) would be treated and bare pavement provided following a storm as soon as practicable, at most within 3-6 daylight hours.
- For Priority 2 corridors (36% of total miles maintained by MaineDOT) bare pavement would be restored as soon as practicable after Priority 1 corridors, and within 8 daylight hours. Pre-treatment is provided on Priority 1 and 2 corridors to prevent ice from bonding with the road surface.
- Priority 3 corridors (38% of total miles maintained by MaineDOT) are treated within 24 hours, providing one-third bare pavement in the middle of the road as soon as practicable. For Priority 3 corridor sand routes, roads would

be plowed and sand applied, yet the road surface may be snow covered during a storm.

MaineDOT practices pre- and post-construction sampling of potable water supplies to ensure that any impacts from construction are noted and remediated. MaineDOT is required by law to remediate any impacts to potable water supplies from winter maintenance activities. MaineDOT's winter maintenance program is centered on minimizing the use of any anti-icing chemical; however, when necessary for public safety, MaineDOT uses Ice-B-Gone, which was noted by EPA to be a "green" anti-icing material.

Anti-icing salts can impact groundwater in ways similar to surface waters.

Aquatic Habitat and Fisheries. Indirect impacts would result from the disruption of aquatic-organism passage. This may result in the reduction of upstream populations of stream-dependent organisms. Long-term impacts to the fisheries are not likely as long as aquatic-organism passage is maintained and best management practices are used to prevent short- and long-term erosion and sedimentation (MaineDOT, 2008a).

Potential erosion and sedimentation from construction of road-stream crossings would impact water quality and aquatic habitat and fisheries would occur within 160 feet. Erosion and sedimentation control measures would be incorporated into the design and implemented during construction in accordance with Section II of the MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a).

Vernal Pools. Amphibians commonly disperse more than 750 feet from a vernal pool into upland and wetland forested (generally) habitat. The NRPA rules (effective in September 2007) regulate a 250-foot critical habitat area around "significant" vernal pools. Each vernal pool was identified and analyzed with a uniform 250-foot and a 750-foot radius. Land area that would be removed within the 250-foot radius and 750-foot radius was considered an indirect impact. The impacts to vernal pools range from 8 acres to 25 acres for the 250-foot radius and from 146 acres to 278 acres for the 750-foot radius (see exhibit 3.30).

Floodplains and Wetlands. Indirect impacts to floodplains and wetlands would occur at a certain distance from the edge of permanent disturbance (i.e., grading cut-and-fill boundary) necessary to construct the build alternatives. Within this area, changes in the value and/or function of wetlands would be altered due to changes in adjacent land use and topography.

The USACE recommendation for water quality-protection prescribes an effective area width of 100 feet, which provides adequate filtering of runoff to trap sediments and pollutants that affect water quality. The range of area width is tied to adjacent slopes, where for low to moderate slopes, the majority of effective filtering occurs within the first 30 feet.

The USACE recommendation for stabilization protection prescribes an effective area width of 30 to 65 feet. This width is generally adequate to attenuate overland flow and regulate soil moisture-conditions to maintain adequate soil stability.

The build alternatives would indirectly impact between 66 and 80 acres of land within 160 feet of identified wetlands. Indirect impacts to wetlands would consist of changes to hydrology to existing wetlands, sediment input to wetlands adjacent to earthwork, and shading. Shading is most likely to occur where new bridges are constructed. Shading impacts to vegetation can reduce or eliminate wildlife habitat and water-quality functions. Shading can lower water temperature. Wetlands that are not directly filled or excavated but in which their functions have been reduced are also indirect impacts. Habitat functions of wetlands can be indirectly impacted (see section 3.2.2.4).

Vegetation. Vegetation along existing and new highway right-of-ways tends to be disturbed and exhibit a higher percentage of exotic or invasive plant species. Roadways often introduce invasive plant species (e.g., purple loosestrife and Eurasian milfoil) that can degrade wildlife habitat. The build alternatives have the potential to introduce invasive species in areas previously vegetated with native species as well as nitrogen enrichment and altered vegetation. The build alternatives have the potential to introduce roadway contaminants (e.g., salt and lead) to vegetation. The build alternatives have an indirect impact of cover type conversion along the right-of-way in excess of that needed for the roadway footprint. The operation of traffic on the build alternatives and maintenance of the right-of-way have the potential to alter the vegetation communities adjacent to it.

Wildlife and Wildlife Habitat. The types and number of animals killed by vehicles are related to road width, traffic volume, vehicle speed, and location of the road in terms of wildlife habitat, particularly travel corridors or migration habitat for particular species. Amphibians and reptiles have the highest mortality rates on two-lane roads with low to moderate amounts of traffic, whereas large and midsize mammals are more susceptible to collisions on two-lane, high-speed roads. Birds and smaller mammals are more at risk from collisions on wider, high-speed highways. In addition, roads through and adjacent to wetlands, ponds, and other waterways have some of the highest road-kill rates. Although wildlife–vehicle collisions do not put the health of large-mammal populations (e.g., deer and moose) at risk, these collisions pose a hazard for motorists (Maine Audubon Society, 2007).

Road salt, particularly sodium chloride, is toxic to many species of plants, fish, and other aquatic organisms. In addition, concentrations of salt along roadsides attract deer and moose, thereby increasing the risk of collisions with vehicles.

Other indirect impacts are wildlife avoidance of roads, which can indirectly affect dispersal and breeding behavior and noise disturbance for wildlife along the roads. Traffic noise can interfere with the ability of songbirds to hear mating calls and recognize warning calls. Because noise travels farther in open habitats, a decrease in population density adjacent to roads is greatest for grassland birds, less for birds in deciduous woods, and least for birds in coniferous woods. Researchers found that negative impacts on the density and nesting success of grassland birds extend more than a quarter-mile from a rural road and more than a half-mile from a highly traveled, four-lane highway (Maine Audubon Society, 2007).

Indirect impacts to wildlife habitat from the build alternatives are the creation of smaller undeveloped habitat blocks, which have value as roosting, foraging, or cover habitat for some species tolerant of disturbance (e.g., deer, raccoon, and certain birds).

Roads in or through a natural area result in the "edge effect," thereby reducing its value for area-sensitive species. Where roads are built, habitat is lost or changed. In addition, roads increase human access to natural areas, resulting in increased human disturbance (Maine Audubon Society, 2007).

Chemicals introduced along roadways from vehicles, anti-icing salts, road-surface wear, and herbicide and pesticide use can pollute wildlife habitat by providing a source of heavy metals, salt, organic pollutants, and excessive nutrients. Such water and soil pollution poses a lethal risk to wildlife that depends on the resources. Contamination of soil, plants, and animals extends as much as 66 feet from a road, and elevated levels of heavy metals often extend 650 feet or more from the road, occurring in greater concentrations along roads with high traffic volume (Maine Audubon Society, 2007).

Land Use. The No-Build Alternative would result in continued adverse impacts to land use. Over time, traffic volumes along Routes 1A, 9, and 46 through the study area would increase, resulting in longer delays and more congestion. As traffic volumes increase, more local traffic would divert to local roads seeking alternate routes to bypass the traffic congestion in and approaching the study area. Increasing traffic volumes on local roads would lead to more congestion and longer delays for motorists, as well as a general decrease in the quality of life. The increased congestion and delay would further exacerbate existing conditions that make it difficult for businesses to thrive and residents to travel unimpeded.

3.9.2 Induced Development or Growth

Another form of indirect impacts – induced development or growth – can be associated with the consequences of land-use development that would be indirectly supported by changes in local access or mobility. Induced development would include a variety of alterations such as changes in land use, economic vitality, property value, and population density. The potential for indirect impacts to occur is determined in part by local land-use and development-planning objectives and the physical location of a proposed action.

The build alternatives would have controlled access, without access to local roads, except for the interchange at Route 1A near the Brewer–Holden boundary, and Route 9 east of Route 178 (Chapter 2).

Because the build alternatives are intended to serve long-distance through- and regional-traffic, development induced by them likely would be traveler-oriented businesses (e.g., commercial uses such as gasoline stations, motels, restaurants, and convenience stores) within approximately a half-mile of the interchanges and intersections. The farther removed in distance and time from the interchange and intersection, the less induced growth effects can be expected. Oregon DOT's *Guidebook for Evaluating the Indirect Land Use and Growth Impacts of Highway Improvements* recommends studying a half-mile radius surrounding a highway improvement as the primary area of induced growth (Oregon DOT, 2001).

The affected area of induced growth is limited because the build alternatives would have controlled access, the population growth rate in the study area is low, and local zoning precludes intensive development. The projected population for 2020 is expected to experience minor changes from existing levels: Brewer is projected to experience a decrease in population of about 0.8 percent; Holden is projected to experience an increase in population of about 8 percent; and Eddington is projected to experience an increase in population of about 5.7 percent by 2020. Most of the land in the study area is zoned agricultural and rural residential limiting development. Development would occur in the study area, whether or not the build alternatives are constructed.

Assuming that induced development would occur within this distance, a worst-case analysis of land use was conducted for areas surrounding the proposed interchanges and intersection.

The purpose of a general business zone in Brewer is to provide for various types of commercial uses, including highway-oriented uses. This zone is intended to be the location of the community's major shopping facilities, including shopping centers. The purpose of the general business zone in Holden is to provide locations for business activities requiring large-scale buildings, large outdoor display and wholesale areas, and extensive site development to provide employment and services beyond the immediate neighborhood or community. Land adjacent to the I-395 interchange with Route 1A used by Alternative 2B-2/the Preferred Alternative and Alternative 5B2B-2 is zoned general business and rural by the city of Brewer and the town of Holden.

Land adjacent to the proposed interchange between Alternative 5A2B-2 and Route 1A is zoned rural and general commercial by the city of Brewer and the town of Holden.

The town of Eddington's commercial zone is intended primarily for commercial uses to which the public requires easy and frequent access. The residential B zone is established as a zone for residential use of existing housing and new multifamily housing. The agricultural zone is intended for the types of uses that traditionally predominate in rural Maine: forestry and farming, farm residences, and a scattering of varied uses consistent with a generally open, non-intensive pattern of land use.

Land adjacent to the proposed intersection of Route 9 and the build alternatives is zoned commercial and residential B by the town of Eddington.

A build-out analysis was performed using the following method:

1. The geographic boundary for the analysis was an area within a half-mile of the interchange with Route 1A and the intersection with Route 9.
2. The lots that fall within that area were identified.
3. Lots that would not be built on (e.g., because they are too small or are wetlands) were removed from the analysis.
4. Zoning for each lot was identified.
5. The total number of structures permitted by the zoning ordinance was determined; existing structures were subtracted and the number of new structures were determined.
6. The lots, their land uses, and the number of acres most susceptible to secondary impacts from induced development were determined.
7. Only the parcels with road frontage were projected to be subdivided and built out.

Based on the analysis of the interchanges and intersection, each interchange could impact between 14 and 19 acres of forest and grassland areas in the general business zone in Brewer and Holden (exhibit 3.31). The number of new businesses is unknown because the purpose of zoning is to provide for various commercial uses such as shopping facilities with an unknown number of businesses. The intersection could result in 16 new residences within a half-mile.

Alternative 2B-2/the Preferred Alternative and Alternative 5B2B-2 could induce development that may impact wetlands; up to 2 acres of wetlands (1 acre at the interchange with I-395 and 1 acre at the intersection with Route 9) could be impacted. Alternative 5A2B-2 could induce development that may impact up to 1 acre of wetlands (at the intersection with Route 9).

If induced development in the areas with the new interchanges and intersection was primarily commercial and traveler-oriented businesses, it would be generally consistent with existing land uses and zoning. The impacts to existing residential uses from induced development (if the existing uses are not converted to commercial or other use) would consist of an increase in the suburban character of the area from increased development, with the associated aesthetic impacts on neighboring residents.

Exhibit 3.31 - *Potential Induced Development by Alternative within a Half- Mile of Interchanges and Intersections*

	Interchange at Route 1A	Intersection at Route 9 between Chemo Pond and Davis Roads
No-Build		
2B-2/the Preferred Alternative	Permitted uses within general business district (Approximately 19 acres forested and grassland)	16 Residences (16 acres forested and grassland)
5A2B-2	Permitted uses within general business district (Approximately 14 acres forested and grassland)	16 Residences (16 acres forested and grassland)
5B2B-2	Permitted uses within general business district (Approximately 19 acres forested and grassland)	16 Residences (16 acres forested and grassland)

Commercial and residential development would occur with the No-Build Alternative; however, it could occur more quickly with the build alternatives because of the strong connection between transportation and land use. Because commercial and residential development would occur without implementation of a build alternative, it would not be considered a secondary impact solely related to the build alternatives. Other dynamic regional economic and development trends would have a more important influence on the establishment of those uses than construction of the build alternatives. The city of Brewer and the towns of Holden and Eddington would control new development in those areas through their planning and approval processes. Development would be guided by local comprehensive plans and zoning ordinances.

3.9.3 Cumulative Impacts

Consideration of cumulative effects entails an assessment of the total effect on a resource or ecosystem from past, present, and future actions that have altered the quantity, quality, or context of those resources within a broad geographic scope. Under the Council on Environmental Quality regulations, cumulative effects are defined as "…the impact on the environment which results from the incremental impact of the actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). The cumulative-effects analysis considers the aggregate effects of direct and indirect impacts – from federal, non-federal, public, or private actions – on the quality or quantity of a resource.

The intent of the cumulative-effects analysis is to determine the magnitude and significance of cumulative effects, both beneficial and adverse, and to determine the contribution of the proposed action to those aggregate effects. Contributions to cumulative effects from the build alternatives on resources is limited to those that are substantially impacted. Therefore, cumulative effects on the following resources were analyzed:

- surface waters and floodplains
- wetlands and aquatic habitat
- vegetation and wildlife

The cumulative impact of the proposed action to climate change was considered. Because the build alternatives would result in a slight reduction of CO_2 emissions, no further analysis was conducted.

The study area used to analyze cumulative effects was defined as the areas where past, present, or future actions would impact surface waters, floodplains, wetlands, and aquatic habitat. This area encompasses most of the city of Brewer and the towns of Holden and Eddington and includes small portions of the towns of Clifton, Dedham, Bradley, and Orrington. The study area used for the analysis of cumulative effects for these resources consisted of approximately 73 square miles (exhibit 3.32).

The year 1987 was used as the limit for the timeframe of past actions considered. It was chosen because the extension of I-395 from I-95 to Route 1A was completed and opened to traffic in late 1986. The I-395 extension influenced the study area by providing easier regional access to Brewer, Holden, and Eddington. The 2035 design year of the build alternatives was used as the future limit for the cumulative-effects discussion.

The past, present, and reasonably foreseeable future actions in the study area were identified and the environmental consequences of these actions on the resources were analyzed (exhibit 3.33). Reasonably foreseeable future actions were limited to those for which a plan or study was completed or funding has been committed, and anticipated environmental impacts can be at least qualitatively characterized. Other actions that would occur would be the continuing practice of agriculture and logging, and while these

Exhibit 3.32 - *Cumulative-Effects Study Area*

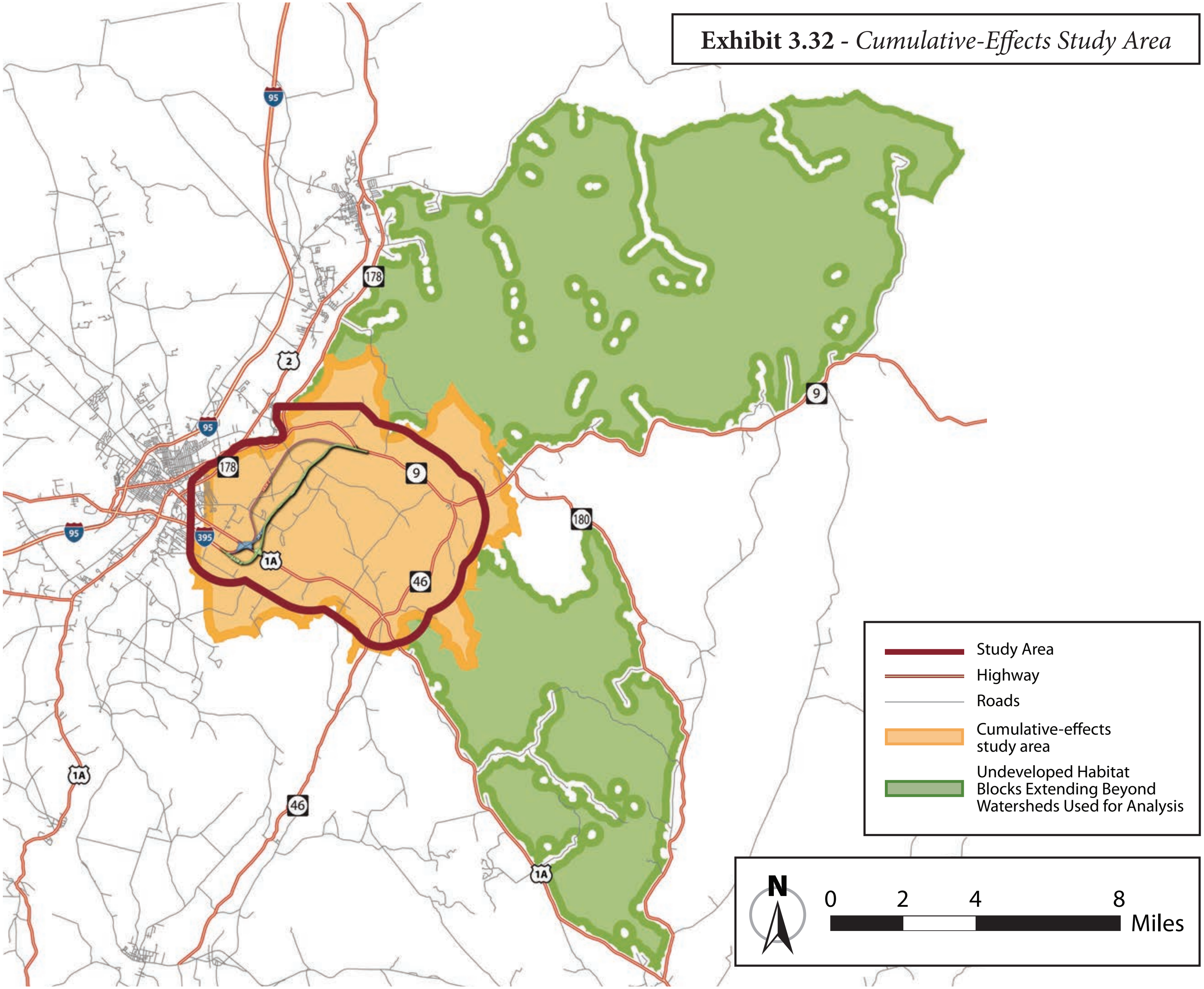


Exhibit 3.33 - *Cumulative Impacts*

Past, Present, and Reasonably Foreseeable Actions	Direct Impacts				
	Surface Waters	Floodplains (acres)	Wetlands (acres)	Vegetation	Wildlife Habitat (acres)
Past Actions 1987-2010					
Extension of I-395 from Main Street, Bangor, to Route 1A, Brewer (November 1986)	200-foot impact to unnamed tributary to Felts Brook		Unknown	Conversion of 72 acres of rural land to transportation use	Unknown
Holden: Continued development of DeBeck Business Park (approximately 44-acre site)	Increase in impervious surfaces affecting stormwater runoff	5	3	Conversion of 6 acres of forests/ vegetation land to commercial use	7
Brewer: Walmart Supercenter off of outer Wilson Street (approximately 3.6-acre site)			3		
Brewer: Construction of parallel service road along Wilson Street (Route 1A)			Unknown	Conversion of 10 acres of urban/ suburban land to transportation	
Brewer: Penobscot Landing Trail preliminary engineering and right-of-way acquisition					
Brewer: Beech Ridge - approximately 4 residential lots (approximately 6.8-acre site)	Increase in impervious surfaces affecting stormwater runoff			Conversion of 8 acres of forests/ vegetation land to residential use	
Brewer: Nature's Way - approximately 15 residential lots (approximately 93-acre site)	Increase in impervious surfaces affecting stormwater runoff; 332-foot impact to Eaton Brook and an unnamed tributary to Eaton Brook	3	11	Conversion of 31 acres of forests/ vegetation land to residential use	
Brewer: Timber Ridge - approximately 19 residential lots (approximately 72.6-acre site)	Increase in impervious surfaces affecting stormwater runoff		2	Conversion of 19 acres of forests/ vegetation land to residential use	
Brewer: Felts Brook Green Phase I - approximately 5 residential lots (approximately 6.5-acre site)	Increase in impervious surfaces affecting stormwater runoff; 218-foot impact to Felts Brook	1	1	Unknown	
Brewer: Lowe's Home and Garden Center on Wilson Street (approximately 4-acre site)	Increase in impervious surfaces affecting stormwater runoff			Conversion of 5 acres of forests/ vegetation land to commercial use	16
Brewer: Diringo Drive Office Park Phase I - approximately 25.4-acre site.			20	Conversion of 23 acres of forests/ vegetation land to commercial use	
Brewer/Holden: Bangor Hydro-electric Company Northeast Reliability Interconnect Electric Transmission Upgrade		1	8	Conversion of 18 acres of forests/ vegetation land to utility use	21

Exhibit 3.33 – *Cumulative Impacts (continued)*

Past, Present, and Reasonably Foreseeable Actions	Direct Impacts				
	Surface Waters	Floodplains (acres)	Wetlands (acres)	Vegetation	Wildlife Habitat (acres)
Holden: Barrett Lane - approximately 9 residential lots (approximately 54.5-acre site)	Increase in impervious surfaces affecting stormwater runoff; 418-foot impact to unnamed tributary to Eaton Brook	2	19	Conversion of 54 acres of forests/ vegetation land to residential use	
Holden: Brookfield Estates Phase I - approximately 16 residential lots (approximately 44.6-acre site)	Increase in impervious surfaces affecting stormwater runoff		4	Conversion of 42 acres of forests/ vegetation land to residential use	
Holden: Gilmore Estates - approximately 6 residential lots (approximately 66-acre site)				Conversion of 43 acres of forests/ vegetation land to residential use	
Eddington: Rae Lorraine - approximately 5 residential lots (approximately 27.3-acre site)			1	Conversion of 23 acres of forests/ vegetation land to residential use	
Eddington: Martin Lane - approximately 5 residential lots (approximately 10.5-acre site)				Conversion of 7 acres of forests/ vegetation land to residential use	
Eddington: Fifield Estates - approximately 8 residential lots (approximately 33.7-acre site)			20	Conversion of 32 acres of forests/ vegetation land to residential use	
Holden: Natural Gas Compressor Station			Unknown	Unknown	
Present Actions 2011-2015					
Brewer: Brewer Professional Center - commercial and professional development (approximately 64.5 acres).	Increase in impervious surfaces affecting stormwater runoff		2	Conversion of 21 acres of forests/ vegetation land to commercial use	
Brewer: Diringo Drive Office Park Phase II - commercial and professional development (Approximately 31.6 acres).			30	Conversion of 31 acres of forests/ vegetation land to commercial use	
Reasonably Foreseeable Actions 2015-2035					
I-395 Connector - 2-Lane Highway: (2B-2/the Preferred Alternative, 5A2B-2, 5B2B-2)	Increase in impervious surfaces affecting stormwater runoff; 222- to 567-foot impact to surface water	2-11	26-32	Conversion of 14-20 acres of agricultural, 17-36 acres of grassland, and 71-85 acres of forests to transportation use	512-880
Improve the most heavily congested section of Route 1A from I-395 to Route 46 and the Intersection of Routes 46 and 9					

Exhibit 3.33 – *Cumulative Impacts (continued)*

Past, Present, and Reasonably Foreseeable Actions	Direct Impacts				
	Surface Waters	Floodplains (acres)	Wetlands (acres)	Vegetation	Wildlife Habitat (acres)
Brewer: Feltsbrook Green Phase II (approximately 38.2-acre site)	Increase in impervious surfaces affecting stormwater runoff; 1,589-foot impact to Eaton Brook and an unnamed tributary to Eaton Brook	3	2	Conversion of 7 acres of forests/ vegetation land to residential use	
Holden: Brookfield Estates Phase II (approximately 49.3-acre site)	Increase in impervious surfaces affecting stormwater runoff; 1,831-foot impact to unnamed tributary to Felts Brook	1	30	Conversion of 48 acres of forests/ vegetation land to residential use	
Cumulative Effects for 2B-2/the Preferred Alternative	***4,900 feet of streams; unknown impacts from stormwater runoff***	***26***	***182***	***600 acres to forests/vegetation***	***873***
Cumulative Effects for 5A2B-2	***4,900 feet of streams; unknown impacts from stormwater runoff***	***18***	***187***	***640 acres to forests/vegetation***	***924***
Cumulative Effects for 5B2B-2	***4,900 feet of streams; unknown impacts from stormwater runoff***	***27***	***188***	***600 acres to forests/vegetation***	***556***

impacts were not qualitatively characterized, they were acknowledged. Many of the future cumulative impacts on resources within the study area are projected to be generated by future residential and commercial development that cannot be fully characterized.

Potential cumulative impacts to those resources analyzed, with and without one of the build alternatives, would generally follow existing patterns and development trends. Residential and commercial development likely would continue to occur within the region at the same rate and with the same characteristics with either the No-Build Alternative or one of the build alternatives, and it would serve as the major source of land-use conversion and contribution to cumulative resource effects. Few other reasonably foreseeable future actions were identified that would contribute to the cumulative impact of the resources analyzed.

Within the study area, population and housing are projected to grow at a slow rate from 2010 to 2020 (Maine State Planning Office, 2003; 2008a; 2008b). The most substantial changes are projected to occur in Holden (which has the highest growth rate in the study area of eight percent and the housing growth rate of 5.4 percent) and in Eddington (an increase of 5.7 percent in population and 8.8 percent in housing). Brewer is projected to experience a decrease of about 0.8 percent (approximately 71 fewer people) by 2020. These projections demonstrate the current land use trends in the study area, which show residents and housing moving from the more urban areas in Brewer and other parts of Bangor to adjacent suburban and rural areas. Although the number of housing units is slowly increasing through 2015 with an overall growth rate of 5.1 percent, overall population growth in the study area through 2020 remains generally flat at 2.4 percent, demonstrating movement of the existing population within the study area rather than a large influx of new residents. The trend is supported by 2020 projections for the city of Bangor (the major population center in the region), which show housing-unit growth of 2.3 percent but a decrease in population equal to approximately -15.5 percent.

According to Maine's Beginning with Habitat program, unfragmented habitat blocks are defined as areas that encompass 100 acres and are at least 500 feet from development and improved roads (Beginning with Habitat, 2008). The area analyzed for vegetation and habitat encompasses approximately 296 square miles because it includes the unfragmented habitat blocks in their entirety that extend beyond the study area. The cumulative impacts of the build alternatives on unfragmented habitat blocks are between 550 and 925 acres.

Surface Waters and Floodplains. Surface waters have been and would continue to be influenced by land use and development. The cumulative effect of the past, present, and reasonably foreseeable future impacts consists of an increase in impervious surfaces. Cumulative impacts on surface waters and floodplains would be largely influenced during the next 20 years by additional roadway and bridge construction. With the exception of construction of a build alternative, no new major roads are anticipated and local road and bridge projects are not expected to have a substantial effect on surface waters and floodplains. The build alternatives would add impervious surface to the study area. Residential and commercial development would have a continued effect on surface waters by increasing stormwater runoff as more impervious surfaces are created. Increased stormwater runoff would cause the water level of nearby streams to rise more quickly during storms.

The build alternatives would directly impact between approximately 200 feet of stream and two to 11 acres of floodplains. The cumulative effects of the past, present, and reasonably foreseeable future actions would impact approximately 4,900 feet of stream and 18 to 27 acres of floodplains. The cumulative effect of the past, present, and reasonably foreseeable future impacts to stormwater runoff result from an estimated 695-acre increase in impervious surfaces. The increase in surface water quantity would be accompanied by a decrease in surface water quality from non-point source pollutants (e.g., oil from automobiles) that are carried by stormwater runoff into receiving streams and the Penobscot River.

Buffers improve water quality by helping to filter pollutants in run-off both during and after construction.

Wetlands and Aquatic Habitat. Cumulative effects on wetlands and aquatic habitat are likely to continue as development occurs; however, important aquatic habitat would remain protected through conservation laws. The build alternatives would directly impact between 26 and 32 acres of wetlands. The cumulative effects of the past, present, and reasonably foreseeable future impacts to wetlands would be approximately 180 to 188 acres.

Future wetlands loss would be limited by state and federal laws protecting those resources through mandatory mitigation for both public and private initiatives. Important aquatic habitat is projected to remain protected through conservation laws; however, changes in the upstream watershed from increased suburban development would continue to affect water quality and habitat in the study-area water environments.

Vegetation and Wildlife Habitat. Vegetation and wildlife habitat would continue to decrease and habitat would become more fragmented as more land is converted from forest and grasslands to residential and commercial uses. The build alternatives would directly impact between 71 and 85 acres of forests. The cumulative effect of the past, present, and reasonably foreseeable future impacts to forested areas would be approximately 556 to 924 acres.

The decision to pursue residential and commercial development is influenced most by local and regional development trends and prevailing economic conditions. Therefore, the difference in the cumulative-effects contribution of the No-Build Alternative and one of the build alternatives is limited to the difference in direct impacts associated with each build alternative.

The incremental impacts of any of the build alternatives are not expected to have a substantial effect on surface waters, floodplains, wetlands, vegetation, and wildlife habitat.

3.10 Mitigation and Commitments

This section describes the mitigation measures and commitments being considered in support of the development of Alternative 2B-2/the Preferred Alternative.

3.10.1 Mitigation

MaineDOT would mitigate the impacts to streams and vernal pools from Alternative 2B-2/Preferred Alternative. MaineDOT would coordinate with the federal and state regulatory and resource agencies during the development of the mitigation plan for impacts to streams, wetlands, vernal pools, and other natural resources.

Prospective compensatory mitigation opportunities for the unavoidable wetlands impacts from the build alternatives were identified within the Penobscot River and neighboring sub-watersheds. The build alternatives are largely on new alignments and no on-site opportunities exist to restore wetlands previously filled by highway construction. Opportunities were identified primarily through the use of existing reports, GIS information, and field data. Initial contacts were made with representatives from the MDIFW, MDOC, MDEP, Maine Forest Service, Maine State Planning Office, Penobscot River Restoration Trust, the Nature Conservancy, and the Forest Society of Maine to learn about local conservation initiatives that could provide suitable mitigation. These opportunities were specific restoration sites and broader areas identified as local or regional conservation priorities. The mitigation opportunities described here are conceptual and additional information would be prepared.

Felts Brook Parcel. This 120-acre site is located in Brewer and was acquired by the MaineDOT in 1982 as part of the I-395 construction project. The site consists of agricultural fields and wetlands. The mitigation potential consists of enhancement through planting of riparian vegetation, some potential creation opportunities, and preservation.

Lower Penobscot River Stream Barrier Removal. This study was conducted by the Maine Forest Service in cooperation with the USFWS and Gulf of Maine Coastal Program. There are 287 crossings (the majority are culverts) surveyed in the Lower Penobscot drainage that have been identified as aquatic-organism barriers primarily due to structural deficiencies. Crossings surveyed consist of a variety of problems: inlet blockages, inlet drops, perched inlets and outlets, shallow water depths, high velocities, and lack of natural substrates. The most prevalent problem is perched outlets at 204 crossings. There are numerous opportunities identified in this study to begin the process of passage restoration using mitigation funds from the I-395/Route 9 transportation study.

Sears Island Wetland Bank. This bank site consists of primarily preservation credit with two areas having restoration and creation opportunities. The restoration opportunity would involve a half-acre fill removal and replanting. The creation opportunity would be a two-acre forested wetland that consisting of grading, drainage, and planting.

Maine Natural Resources Conservation Fund. This is an MDEP program that provides permit applicants the option to pay a square-foot price for wetlands impacts that exceed regulatory thresholds. This program may be used to augment a compensation package that has inadequate mitigation for loss of specific wetlands functions and values.

Lower Penobscot Forest Project. The Lower Penobscot Forest Project is a partnership between the Nature Conservancy and the Forest Society of Maine that would conserve more than 42,000 acres. This project would be the window to a broader view of conservation in the region — a view that connects the wetlands and woods of Central Maine to the coastal forests and waters of Penobscot Bay and Machias Bay. The streams of the Lower Penobscot Forests drain into Sunkhaze Meadows National Wildlife Refuge — founded in the late 1980s when the Nature Conservancy purchased more than 10,000 acres of raised dome peat lands to protect them from peat mining. The Conservancy would purchase a conservation easement on more than 12,000 acres along the southeastern border of Sunkhaze to establish an ecological reserve. The reserve would border MDOC lands and the Lower Penobscot Forest Easement, which would be conserved by an easement purchased by the Conservancy and transferred to the state. To the south, the remote ponds and red-pine woodlands of the Amherst Tract would be conserved by fee and easement purchases by the Forest Society of Maine. To the northeast, Lower Penobscot forest lands neighbor those protected by the state and the Conservancy in the Upper Machias River Watershed. The Nature Conservancy is raising public and private funds for this project. Placing these forests under conservation is part of a larger vision of conserved lands stretching from Bangor to Acadia National Park. There are opportunities to assist the Nature Conservancy and the Forest Society of Maine with land acquisition and/or easements.

Holden Conservation Parcels. The Holden Land Trust (HLT) is looking to preserve a large undeveloped land holding under the name of Wrentham Woods. This land consists of two adjacent parcels totaling 1,628 acres in the heart of Holden. This large tract of land was recently for sale and is under real and imminent development threat due to its proximity to the Bangor-Brewer area. The property is surrounded by development.

The Wrentham Woods has exceptional value and significance to the region as it is one of the largest undivided tracts in the greater Bangor area. It is well situated locally in the region so it can be reached within a twenty minute drive of over 50,000 Mainers. It is strategically ready for easy trail connectivity between Holden and the surrounding communities. The property has good access from Mann Hill Road, Eastern Avenue, from snowmobile trails and from the abutting inactive railroad corridor. Wrentham Woods contains open space, forests, an extensive ridge with views of the greater Bangor area, streams and ponds with beaver dams, wetlands containing a great blue heron rookery and other waterfowl and wading birds, and a variety of other wildlife such as deer, moose, bear, bobcat, fox, coyote and turkeys. Besides maintaining the land as a working forest, HLT envisions this unique property being made available to the public for low-impact recreation such as hiking, biking, cross-country skiing, fishing, trapping, horseback riding, hunting, snow-shoeing and snowmobiling.

Holden has no conserved property to date. HLT's desire to conserve this land is consistent with the goals of the 2007 Holden Comprehensive Plan, the 2010 Holden Open Space Plan, and the 2009 Penobscot Valley Community Greenprint to help secure a high quality of life for generations of citizens.

Fish Passage. Ideally, to pass fish effectively and minimize impacts to EFHs, crossings must satisfy the following criteria:

1. Design Peak Flow: This represents the optimal design that minimizes the expected cost associated with flooding.
2. Maximum Velocity: Determining approximate maximum water velocities for assessing whether the target fish population could swim upstream against the current at critical periods.
3. Minimum Depth: Providing minimum depth ensures adequate water depth during periods of simultaneous low flow and fish movement. New and replacement pipes should be sized for consistency with the natural channel bank full width and depth, with the implicit assumption that such sizing would produce automatically the desired flow velocities and depths.
4. Gradient: Culverts should be installed at the proper elevation to avoid perched outlets that fish cannot access. Pipes should be embedded and allowed to fill in to maintain a continuous, natural gradient.

3.10.2 Commitments

The following is a summary of the commitments from the MaineDOT and the FHWA in support of the development of Alternative 2B-2/the Preferred Alternative to avoid and minimize impacts to a variety of natural resources:

- Alternative 2B-2/the Preferred Alternative would be a controlled-access facility; motorists would be permitted to enter and exit from I-395 in Brewer and Route 9 in Eddington.
- The highway drainage and stormwater management system would be designed in accordance with the MDEP/MaineDOT/Maine Turnpike Authority Memorandum of Agreement, Stormwater Management, May 30, 2003. Under the memorandum of agreement, the MaineDOT would be required to meet the General Standards under Chapter 500 to the extent practicable as

determined through consultation with and agreement by DEP. Under the Chapter 500 General Standards for a linear project, MaineDOT would be required to treat 75% of the linear portion of Alternative 2B-2/the Preferred Alternative's impervious area and 50% of the developed area that is impervious or landscaped for water quality. To meet the General Standards, a project's stormwater management system must include treatment measures that would mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts.

- During final design of Alternative 2B-2/the Preferred Alternative, MaineDOT would be conduct a Pre-Construction Potable Water Supply Characterization Assessment prior to construction. This assessment is undertaken to establish a baseline relative to the quality of water extracted from residential and commercial potable water supplies located along the project corridor.
- Erosion and sedimentation control measures would be developed and incorporated into the final design of Alternative 2B-2/the Preferred Alternative and implemented during construction, in accordance with section II of the MaineDOT's *Best Management Practices Manual for Erosion and Sedimentation Control* (MaineDOT, 2008a).
- MaineDOT would consider green infrastructure and low-impact development practices such as reducing impervious surfaces, using vegetated swales and revegetation, protecting and restoring riparian corridors, and using porous pavements.
- During final design of Alternative 2B-2/the Preferred Alternative, the MaineDOT would further evaluate opportunities to shorten the width of road-stream crossings and preserve the natural stream bottoms in the road-stream crossings to promote the passage of aquatic organisms. Road-stream crossings would be designed in accordance with the MaineDOT Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e), except in cases where the drainage is not a stream The proposed road-stream crossings would span the streams at a width that is 1.2 times the bankful width (i.e., 20 percent larger than a full stream) and use either a bottomless structure or a four-sided structure with stream simulation design and natural substrate installed.
- During final design of Alternative 2B-2/the Preferred Alternative, the MaineDOT would work to further avoid and minimize the impacts to streams, wetlands, dispersal habitat for vernal pools, and floodplains. Further minimization of the impact

to streams, wetlands, and floodplains would occur through minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material, which could reduce the amount of fill material placed in wetlands and floodplains. Hydraulic analysis to size the culverts would be performed during final design.

- The build alternatives would each have two wildlife passage structures, large enough to pass moose and deer, on both sides of Eaton Brook. Wildlife passages would be designed in accordance with the MaineDOT Waterway and Wildlife Crossing Policy and Design Guide (MaineDOT, 2008e) and current passage strategies.
- MaineDOT would coordinate the identification and development of compensatory mitigation with federal and state regulatory and resource agencies. MaineDOT would contact the Brewer Land Trust during the development of the mitigation plan for the I-395/Route 9 connector.
- MaineDOT's commitment to consider measures to reduce construction period impacts during project design should not be construed as a project-specific commitment. MaineDOT has long-standing and broadly-applied policies in place to mitigate air quality impacts during construction (e.g., idle reduction policy). These policies translate into standard practices for all projects undertaken by MaineDOT and its contractors; standard language requiring contractor compliance is part of construction contracts and compliance is a presumptive part of project planning, including NEPA.
- The MaineDOT is committed to improving the intersection of Routes 9 and 46. The improvements to this intersection could be accomplished within the existing rights-of-way of Routes 9 and 46 with no impact to the natural and social features adjacent to the intersection. Given the future need and the limited scope of the improvements to the intersection, a timeframe has not been established for these intersection improvements. The proposed intersection would be studied and further developed during final design and discussed at a future public meeting.
- The MaineDOT is committed to further improving the most heavily congested section of Route 1A in the study area to the south of the I-395 interchange with Route 1A. These improvements could be accomplished within the existing right-of-way of Route 1A. Given the future need for the improvements to Route 1A, a timeframe has not been established.
- The MaineDOT would work with the town of Eddington to maintain the safety and preserve the capacity of Route 9 in the study area. The

range of possible activities that could be considered to maintain the safety and preserve the capacity of Route 9, in accordance with Maine's rules governing access management, are working with the town of Eddington to change zoning, eliminate existing and minimize future curb cuts, and working with individual landowners to acquire property or development rights.

- MaineDOT would work with town officials and evaluate Route 9 for potential improvements to improve safety for pedestrians and bicyclists along Route 9. Providing safe access for pedestrians and bicyclists along the road system typically consists of paved shoulders, sidewalks in highly developed areas, high visibility crossings where warranted, and signage to help alert drivers of the presence of bicyclists and pedestrians on the road system. A road safety audit would be conducted in conjunction with town officials and residents to develop potential immediate and longer term improvements that the town can consider as options to improve safety for pedestrians and bicyclists.
- During final design of the selected alternative, the MaineDOT would work to maintain the integrity of the existing snowmobile trail system.
- MaineDOT and FHWA would re-initiate Section 7 consultation with the USFWS when the NLEB and/or its critical habitat become officially listed under the ESA.

The USFWS set forth commitments within the BO as Reasonable and Prudent Measures and Terms and Conditions for MaineDOT and FHWA to follow during construction of Alternative 2B-2/the Preferred Alternative.

The Reasonable and Prudent Measures are as follows:

- Minimize the adverse effects to, and incidental take of, Atlantic salmon by employing construction techniques that avoid or minimize adverse effects to water quality, aquatic and riparian habitats, and all aquatic organisms;
- Minimize the adverse effects to, and incidental take of, Atlantic salmon related to aquatic habitat connectivity and fish passage by ensuring that the project is built as proposed;
- Minimize changes to stream water quality including stream velocity, turbidity levels and temperature from existing conditions through stormwater management, application of best management practice measures during construction and as part of the roadway operation and maintenance period;
- Ensure completion of a monitoring, evaluation, and reporting program to confirm that this project has been effective in minimizing

incidental take from the FHWA-funded activity and that the amount of allowable incidental take is not exceeded;

- Construction impacts shall be confined to the minimum area necessary to complete the project;
- Minimize effects of runoff from disturbed sites during construction through implementation of best management practices measures for erosion and sediment control;
- Monitor project implementation and compliance with conservation and best management practices measures; and
- Construction shall not inhibit Atlantic salmon passage through road-stream crossing structures or degrade critical habitat quality after project completion during the maintenance and operation period.

The Terms and Conditions listed in the BO are:

1. New impervious surface and discharged stormwater runoff quantity and quality must be treated using best management practices that incorporate water infiltration and/or filtration, avoiding direct water discharge into designated Atlantic salmon critical habitat or any surface waterway that subsequently directly discharges into critical habitat, raising stream temperatures above pre-construction conditions.
2. All applicable conservation measures described in the BO will be fully implemented.
3. Monitoring of best management practice implementation will be conducted by MaineDOT to evaluate compliance throughout the construction period. An annual report will be submitted to the USFWS's Maine Field Office each December for the previous November through October construction period.
4. Site preparation, including cofferdam installation and removal, and temporary access road establishment, will not cause sedimentation and adverse levels of turbid water discharge into streams following erosion and sedimentation control requirements in MaineDOT's' *Best Management Practices for Erosion and Sedimentation Control* document.
5. Migration/movement barrier/delay due to cofferdam placement will be minimized by limiting cofferdam placement to the time necessary to complete instream activities. The cofferdams will be removed within two days of the completion of instream construction.
6. Instream construction shall occur during the low flow period (July 15 to October 1). If MaineDOT determines that any instream

construction activity cannot be completed prior to October 1, a bypass channel shall be constructed to avoid affecting Atlantic salmon movement in Felts and Eaton Brooks. All bypass channels shall be constructed and operating by October 2 to avoid consultation reinitiation.

7. Hydroacoustic impacts from sheet pile installation (if applicable) will not adversely affect Atlantic salmon. MaineDOT shall manage noise producing activities to within noise thresholds described in this BO. Hydroacoustic monitoring shall be conducted as described and reports shall be submitted to the USFWS two weeks after completing each pile driving activity, including cofferdam completion or installed bridge piles for each bridge.
8. Disturbance and construction association with crossing structure placement will not adversely affect Atlantic salmon due to instream construction activities occurring within a cofferdam.
9. Underwater acoustic monitoring will be conducted to track noise levels associated with any sheet pile installation. Acoustic monitoring will be required wherever instream pile driving activities occur in Atlantic salmon critical habitat. A single hydrophone will be placed at 10 meters upstream and downstream of noise producing activity. MaineDOT shall continually monitor noise levels to assure activities that may approach the published threshold values for potentially injuring juvenile salmonid will receive noise attenuation measures immediately, assuring the threshold values are not reached. MaineDOT shall provide monitoring reports to the USFWS after the completion of each cofferdam installation or immediately after completion of similar activities.
10. All Atlantic salmon mortalities from electrofishing or other related activities shall be reported to USFWS within 48 hours of occurrence. Any dead Atlantic salmon shall be immediately preserved (refrigerate or freeze) for delivery to the USFWS's office in Orono, Maine. If the USFWS is not available, contact NMFS in Orono, Maine to arrange for delivery. Upon completion of each fish evacuation event, the MaineDOT shall report the total Atlantic salmon mortality level, if any, for that event. An event is defined as any single attempt to evacuate all fish from a single cofferdam. An event is complete when the cofferdam is dewatered and construction activities may begin.
11. Adverse effects to Atlantic salmon's ability to migrate, forage, shelter, and spawn are not expected as road-stream crossing structures in critical habitat will be designed to span perennial streams using a minimal structure horizontal clearance that is 1.2 times each streams' bankfull width.

12. To address potential effects to listed species and critical habitat resulting from fill material acquisition outside the roadway corridor and terminal interchange buffers, the MaineDOT will include language in the construction contract, via a Special Provision, which states the contractor shall avoid all potential effects to listed species and critical habitat when obtaining fill material needed for construction. The USFWS will receive a copy of this Special Provision for review prior to finalization of the Plans, Specifications and Estimate (PS&E) package. This condition is required because the USFWS's BO and the Incidental Take Statement do not evaluate nor authorize any adverse effects or take associated with fill material acquisition outside the roadway corridor buffer and terminal interchange buffers portion of the action area. If avoidance cannot be achieved, the FHWA should reinitiate consultation or the contractor would have to apply for an ESA section 10 permit to acquire an incidental take permit, a time-consuming process that would likely affect the construction schedule.
13. For those sections of the proposed alignment that discharge into streams, MaineDOT shall design stormwater management systems that provides the greatest thermal buffering.