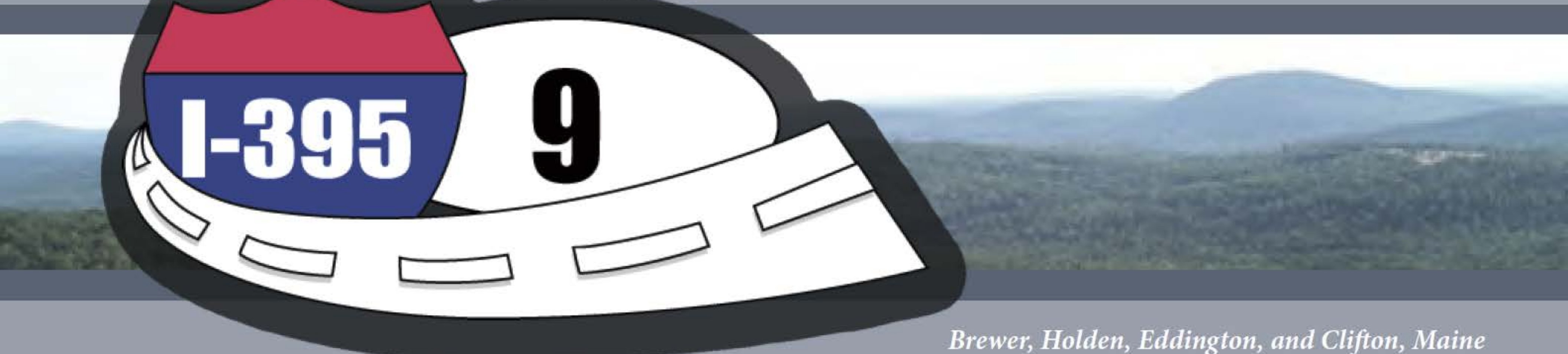
I-395/Route 9 Transportation Study

Draft Environmental Impact Statement and Section 404 Permit Application Supporting Information



Brewer, Holden, Eddington, and Clifton, Maine

FHWA-ME-EIS-12-01-D

MaineDOT Project Identification Number: 008483.20

FHWA: NH-8483(20)E

Submitted Pursuant to 42 U.S.C. 4332 (2)(c) by the

Federal Highway Administration FHWA MaineDOT United States Army Corps of Engineers

and Cooperating Agencies

U.S. Fish & Wildlife Service, U.S. Environmental Protection Agency,
National Oceanic and Atmospheric Administration–National Marine Fisheries Service,
Maine Department of Environmental Protection, and Maine Historic Preservation Commission

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3/7/12
David Bernhardt, P.E. **Date**
Commissioner; Maine Department of Transportation

3/8/2012
Todd D. Jorgensen **Date**
Maine Division Administrator; Federal Highway Administration

The following people may be contacted for additional information regarding this document:

Comments on this Draft EIS/Section 404 Permit Application and supporting information are due by May 15, 2012 and should be sent to either of the following:

Mark Hasselmann
Federal Highway Administration
Edmund S. Muskie Federal Building
40 Western Avenue, Room 614
Augusta, ME 04332
(207) 622-8350

Russell D. Charette, P.E.
Maine Department of Transportation
Director, Mobility Management Division
Bureau of Transportation Systems Planning
16 State House Station
Augusta, Maine 04333
(207) 624-3238

The Maine Department of Transportation (MaineDOT) and the Maine Division of Federal Highway Administration (FHWA) have undertaken the I-395/Route 9 Transportation Study to evaluate transportation alternatives to improve regional system linkage, relieve traffic congestion, and improve safety along Routes 1A and 46, and to improve the current and future flow of traffic and the shipment of goods to the Interstate system. This Environmental Impact Statement (EIS)/Clean Water Act Section 404 Permit Application examines the environmental effects of the "No-Build" Alternative and three build alternatives developed to satisfy the study purpose and needs. The purpose of this EIS/Section 404 Permit Application is to provide the FHWA, the MaineDOT, the USACE, and the public with a full accounting of the environmental impacts to the natural, social, atmospheric, and transportation environments. The EIS/Section 404 Permit Application serves as the primary document to facilitate review of the project by federal, state, and local agencies and the general public.

After careful consideration of the range of alternatives developed in response to the study's purpose and needs and in coordination with its cooperating and participating agencies, the MaineDOT and the FHWA have identified Alternative 2B-2 as its preferred alternative because the MaineDOT and the FHWA believe it best satisfies the study purpose and needs, would fulfill their statutory mission and responsibilities, and has the least adverse environmental impact.

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Summary

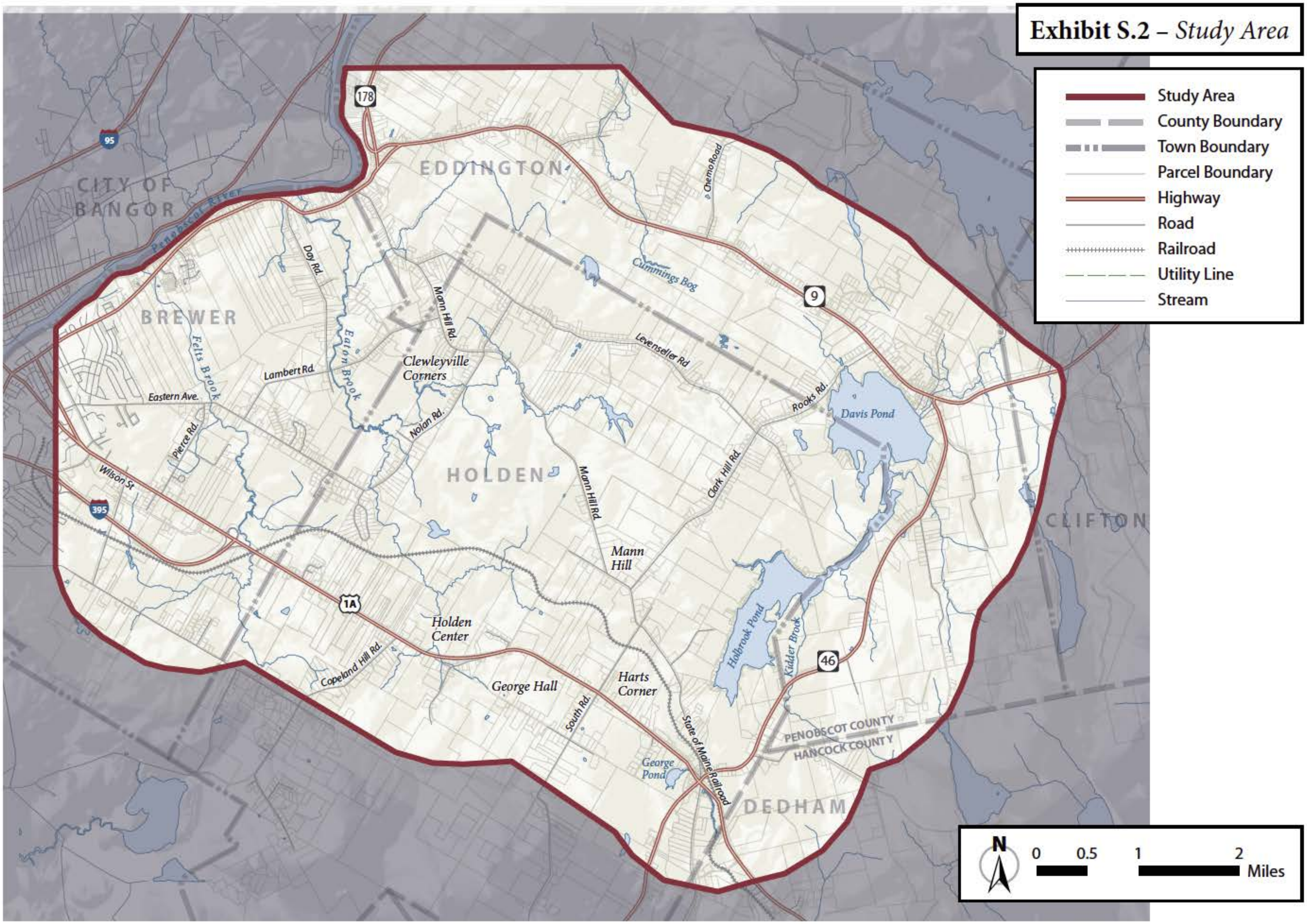
The Maine Department of Transportation (MaineDOT) and the Federal Highway Administration (FHWA) have undertaken the Interstate 395/ Route 9 transportation study to identify a regional solution that would improve transportation-system linkage, safety, and mobility between I-395 and Route 9 along Routes 1A and 46, and to improve the current and future flow of traffic and the shipment of goods to/from the Interstate system in southern Penobscot County, Maine (exhibits S.1 and S.2). The U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration–National Marine Fisheries Service, Maine Department of Environmental Protection, and Maine Historic Preservation Commission acted as cooperating agencies for the study.

> **"Cooperating agency"** means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. A state or local agency of similar qualifications…may by agreement with the lead agency become a cooperating agency (40 CFR 1508.5).

Exhibit S.1 – *Location Map*

Chapter Contents

Exhibit S.2 – *Study Area*



The opening of I-395, the State of Maine's east–west highway initiative, and the creation of the federal National Highway System (NHS) established the impetus for this study.

Purpose

The purposes of the I-395/Route 9 Transportation Study are to (1) identify a section of the NHS in Maine from I-395 in Brewer to Route 9, consistent with the current American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*; (2) improve regional system linkage; (3) improve safety on Routes 1A and 46; and (4) improve the current and future flow of traffic and the shipment of goods to the Interstate system. The logical termini of the project was identified and defined as (1) I-395 near Route 1A and (2) the portion of Route 9 in the study area.

In accordance with Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) is required to prepare a basic purpose statement to determine compliance with the CWA section 404(b)(1) guidelines. Accordingly, the USACE determined that the basic project purpose "…is to provide for the safe and efficient flow of east-west traffic and shipment of goods from Brewer (I-395) to Eddington (Route 9), Maine, for current and projected traffic volumes."

Needs

The need (i.e., the problem) for transportation improvements is based on poor roadway geometry in the study area combined with an increase in local and regional commercial and passenger traffic that has resulted in poor system linkage, safety concerns, and traffic congestion.

Poor System Linkage

Vehicles traveling through the study area from I-395 to Route 9 generally proceed from I-395 to Routes 1A, 46, and 9 — a path that has abrupt transitions in travel speed, roadway geometry, and capacity, as follows:

- I-395 is a principal arterial highway between I-95 in Bangor and Route 1A in the study area. I-395 is a controlled-access highway with two eastbound and two westbound lanes separated by an approximate 50-foot grass median. It connects to Route 1A in Brewer with a partial cloverleaf interchange. I-395 has a posted speed of 55 miles per hour (mph) and has a paved shoulder approximately 10 feet wide.
- Route 1A is a principal arterial highway connecting the greater Bangor and Brewer area with Ellsworth and the coast at Bar Harbor. West of the I-395 interchange, Route 1A has two eastbound lanes and two westbound lanes.

East of the I-395 interchange, Route 1A has one eastbound lane, one westbound lane, and a center turn lane from Brewer to approximately 1.3 miles east of the I-395 interchange. The remainder of Route 1A in the study area and to the coast has one eastbound and one westbound lane with no center turn lane. Access to Route 1A from its adjacent properties is not controlled and is subject to the state's rules on access management. Route 1A in the study area is posted at 25 to 45 mph, depending on location, and has a paved shoulder approximately 6 feet wide. The land uses adjacent to Route 1A in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 1A are becoming increasingly more commercial.

- Route 46 is a two-lane collector road connecting Route 1A to Route 9. Access to Route 46 from adjacent properties is not controlled and is subject to the Maine's rules on access management. Portions of Route 46 are steep and exceed the State of Maine's design criteria. Route 46 is posted at 35 or 45 mph and has a gravel shoulder approximately four feet wide. The land cover adjacent to Route 46 is primarily mature forested areas with scattered residences and open areas. Approaching Route 9, the land uses adjacent to Route 46 are primarily residential. Because of the mature forest canopy, considerable portions of Route 46 are shaded, and snow and ice cover does not melt rapidly.
- Route 9 is a two-lane principal arterial highway connecting the greater Bangor and Brewer area with Washington County and the Canadian Maritime Provinces to the east. Access to Route 9 from its adjacent properties is not controlled and is subject to Maine's rules on access management. Route 9 is posted at 35 or 55 mph with some school zones, depending on location in the study area, and has a paved shoulder approximately eight feet wide. The land uses adjacent to Route 9 in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 9 are becoming increasingly more developed. To the east of the study area, the land uses and land cover adjacent to Route 9 quickly become less developed and more forested, and the speed limit increases to 55 mph. Most of the land adjacent to Route 9 east of the study area to the Canadian border is undeveloped.

The portions of Routes 1A and 46 in the study area do not provide a high-speed, controlled-access arterial highway between I-395 and Route 9 to the east. These two roads do not provide an operationally efficient transportation facility for regional connectivity and mobility through the study area. The results of these deficiencies in system linkage are safety concerns, delays in passenger and freight movement, and conflicts between local and regional traffic.

Safety Concerns

Locations in the study area exhibit higher crash rates than other locations in Maine with similar characteristics. Data were collected and analyzed to identify high crash locations (HCLs) using a critical rate factor (CRF). The CRF of an intersection or roadway section is a statistical measure of that location's crash history as compared to locations with similar geography, traffic volume, and geometric characteristics. When a CRF exceeds 1.00, the intersection or portion of a roadway has a higher-than-expected crash rate. Those locations with a CRF higher than 1.00 and more than eight crashes in a three-year period are considered HCLs. Data were collected and analyzed to identify HCLs in the study area. MaineDOT crash data for January 2004 through December 2008 indicate 10 HCLs that meet the criteria in the study area. The majority of crashes occurred on clear days with dry road conditions.

Traffic Congestion

Since the extension of I-395 from Bangor to Route 1A in 1987, traffic volumes in the study area have increased steadily. This growth has been most pronounced along Route 46 between Routes 1A and 9, which has become more widely used by both passenger vehicles and trucks as a connection among I-95, I-395, and Route 9. Much of the truck traffic in the study area is through-traffic. Most of the truck trips are between the Canadian Maritime Provinces and Washington County at the eastern end, and Penobscot County and the New England states at the western terminus of the trips. Approximately 80 percent of truck traffic on Route 9 uses Route 46, and approximately five of six heavy trucks that use Routes 46 and 1A also use I-395. Route 46 south of Route 9 exhibited the greatest annual growth rate (i.e., annual growth factor of 1.121) in heavy-truck traffic between 1983 and 1996 of all roads in the greater Bangor area.

Estimates of the current and future annual average daily traffic (AADT) for all vehicles and heavy trucks were determined based on MaineDOT traffic count data (exhibit S.3). With the recent economic downturn and increase in the price of gas, traffic in the study area has not grown as fast as previously thought. The MaineDOT and FHWA believe the growth in traffic and traffic volumes originally forecast for the study area for the year 2030 won't materialize until the year

Exhibit S.3 – *Existing and Future Traffic*

Location	1998 AADT	2006 AADT	2010 AADT	2035 AADT	2010 Truck AADT	2035 Truck AADT	% Growth 1998–2035	Growth Per Year 1998–2035
Route 1A east of I-395	18,140	20,370	22,236	33,070	1,569	2,449	82%	2.57%
Route 1A west of Route 46	16,550	15,220	16,976	30,600	1,569	2,449	85%	2.65%
Route 1A east of Route 46	11,220	11,260	12,116	18,870	1,569	2,449	68%	2.13%
Route 46 south of Route 1A	1,920	1,870	2,021	3,130	265	281	63%	1.97%
Route 46 north of Route 1A	2,270	2,270	3,058	8,570	604	1,167	278%	8.67%
Route 9 east of Route 178	6,440	6,870	7,156	8,730	569	662	36%	1.11%
Route 9 west of Route 46	4,780	5,050	5,129	5,410	604	1,167	13%	0.41%
Route 9 east of Route 46	5,100	5,400	5,830	10,940	879	1,535	115%	3.58%

2035. By 2035, traffic volumes on Route 46 between Routes 1A and 9 are forecasted to increase by approximately 6,300 vehicles.

The projected increases in traffic would lead to more traffic congestion. To help measure the traffic-congestion problem and the quality of traffic flow, the MaineDOT modeled existing (1998 and 2006) and future (2035) design hour volumes (DHVs) of traffic for three roadways in the study area: Routes 1A, 9, and 46. The DHV is the 30th highest hour of travel during a year at a given location; therefore, it accurately reflects the heaviest summer travel congestion. The MaineDOT used the DHVs to determine the volume-to-capacity (v/c) ratio, operating speeds, and overall level of service (LOS) for the following five roadway segments within the study area: (1) Route 1A east of the I-395 interchange and west of Route 46; (2) Route 1A east of Route 46; (3) Route 46 between Routes 1A and 9; (4) Route 9 east of Route 178 and west of Route 46; and (5) Route 9 east of Route 46.

The MaineDOT estimated the DHV, v/c ratios, LOS, and average travel speed of these roadway segments using peak season 1998 and 2006 travel conditions and forecasted peak season 2035 travel conditions (exhibit S.4). Route 1A east of the I-395 interchange and west of Route 46 is forecasted to decrease in service from LOS E in 1998 to LOS F by 2035. LOS F represents heavily congested flow with traffic demand exceeding capacity. Route 1A east of Route 46 is forecasted to decrease from LOS D in 1998 to LOS E by 2035. LOS E is defined as traffic flow on two-lane highways having a time delay of greater than 75 percent. Passing under LOS E conditions is virtually impossible. LOS E is seldom attained over extended sections of level terrain on more than a transient condition; most often, small disturbances in traffic flow as LOS E is approached causes a rapid transition to LOS F.

The intersection of Routes 1A and 46 is a signalized intersection. This intersection serves traffic traveling to and from the areas of Downeast Maine and traffic to and from the Ellsworth area and the coast. In 1998, the overall performance of this intersection was estimated using peak-volume conditions at LOS B. By 2035, with increases in traffic volume and corresponding increases in delays, this intersection is forecasted to decline to an overall performance of LOS F. LOS F at a signalized intersection describes a control delay exceeding 80 seconds per vehicle. This LOS occurs when arrival flow rates exceed the capacity of the intersection.

In 1998, the delay on northbound Route 46 to the intersection of Routes 46 and 9 was estimated using peak-volume conditions to be 6.5 seconds (LOS A). By 2035, with increases in traffic volume, this delay is forecasted to increase to 119.4 seconds (LOS F).

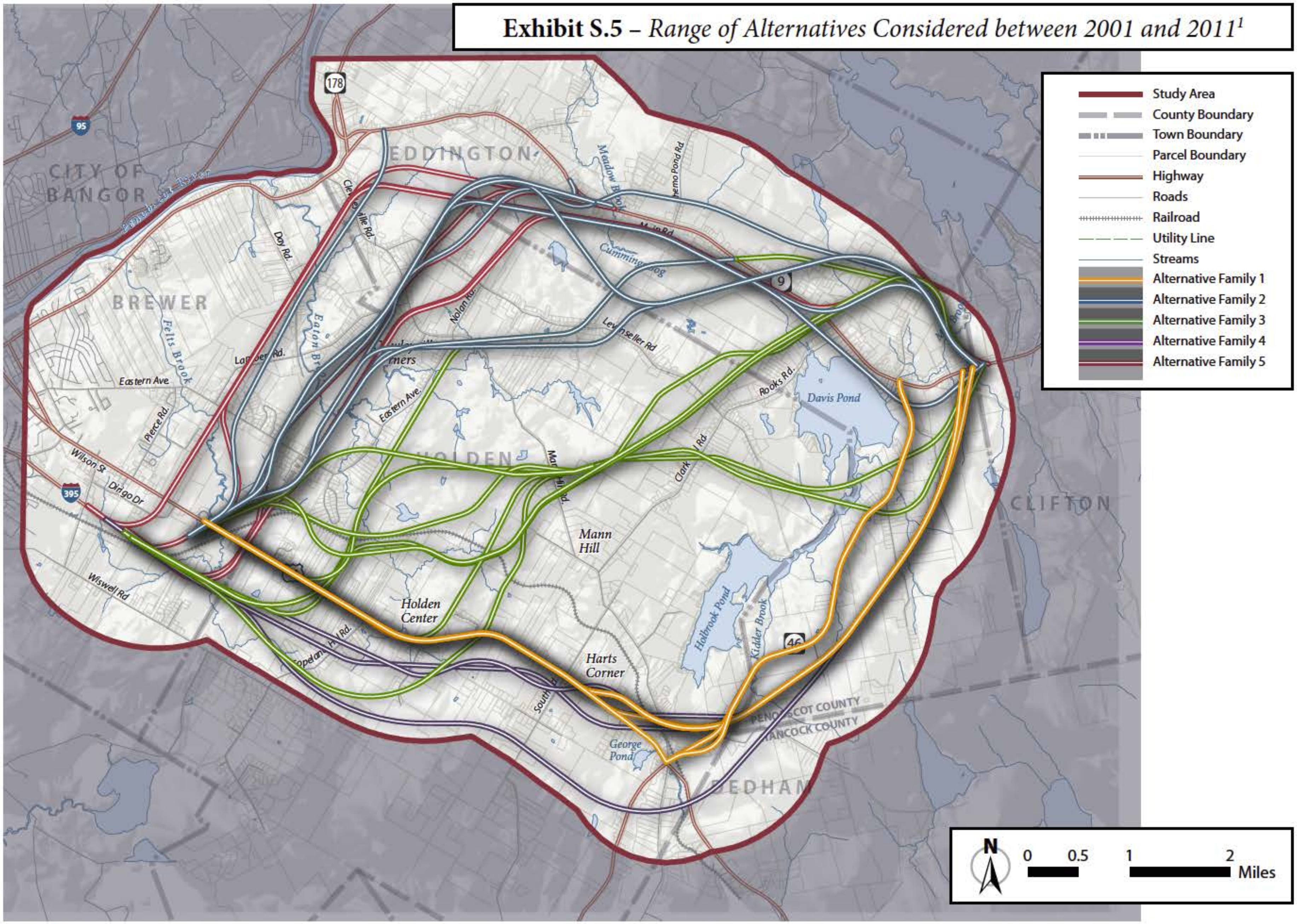
Exhibit S.4 – *DHV, v/c Ratio, LOS, and Average Travel Speed for Roadways Segments*

Year	DHV	v/c Ratio	Average Travel Speed (mph)	LOS Rural Two-Lane Road
Route 1A east of I-395				
1998	1,840	0.63	34.6	E
2006	2,001	0.69	33.2	E
2035	3,269	1.12	varies	F
Route 1A east of Route 46				
1998	1,282	0.43	44.1	D
2006	1,268	0.43	44.2	D
2035	2,123	0.72	37.5	E
Route 46 between Routes 1A and 9				
1998	244	0.14	45.1	C
2006	197	0.12	45.6	C
2035	1,006	0.40	40.8	D
Route 9 east of Route 178				
1998	641	0.27	41.2	D
2006	629	0.26	41.3	D
2035	873	0.36	39.5	E
Route 9 east of Route 46				
1998	505	0.20	43.9	D
2006	573	0.23	43.5	D
2035	1,267	0.46	39.3	E

Alternatives

From 2001 to 2010, the MaineDOT and the FHWA conceptually designed and analyzed the No-Build Alternative and more than 70 build alternatives that could potentially satisfy the study purpose and needs and the USACE basic project purpose (exhibit S.5). The build alternatives would be controlled-access

Exhibit S.5 – *Range of Alternatives Considered between 2001 and 2011*[1]



[1]**Note:** *Alternative alignments shown here have been grouped into families. For a detailed discussion of each family, please refer to Appendix C*

highways and were conceptually designed using the MaineDOT design criteria for freeways.

Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way. In designing and analyzing alternatives, the MaineDOT and the FHWA consulted with regulatory and resource agencies at the state and federal level, local officials, special-interest groups, the Public Advisory Committee (PAC), and the public. At the end of the process of identifying, developing, analyzing, and screening alternatives, four alternatives, including the No-Build Alternative, were retained for further consideration and detailed study.

A screening process, undertaken in several stages, was established to systematically consider the wide range of potential alternatives and to identify a reasonable number to be retained for detailed analysis (see Appendix C). The screening analysis considered alternatives that fit into five broad "families", as follows:

- **Family 1: The Upgrade Alternatives.** Widening and other improvements to Route 1A (from I-395 to Route 46) and Route 46 (from Route 1A to Route 9) approximately 10 miles long. Although one upgrade alternative was initially considered, six upgrade and five partial-upgrade alternatives ultimately were considered.
- **Family 2: The Northern Alternatives.** Alternatives that began at the I-395/Route 1A interchange and generally proceeded in a northerly direction to connect with Route 9. These alternatives were five to 10 miles in length, depending on the distance on Route 9 used as part of the alternative. Twelve alternatives in this family were ultimately studied.
- **Family 3: The Central Alternatives.** Alternatives that began at or near the I-395/Route 1A interchange and generally proceeded east and west through the study area to Route 9 east of Route 46. These alternatives were seven to 11 miles in length, depending on the distance on Route 9 used as part of the alternative. Using all possible combinations of the six western components, the four eastern components, and component 3K, 36 possible central alternatives were initially created. Five other alternatives (for a total of 41) in this family were ultimately developed by modifying some of the initial 36 alternatives.
- **Family 4: The Southern Alternatives.** Alternatives that began near the I-395/Route 1A interchange and that were south of Route 1A and east of Route 46. These alternatives paralleled Routes 1A and 46, and intersected Route 9 in East Eddington. These alternatives were

approximately 11 miles in length. Four alternatives were identified and considered: 4A, 4B, 4C, and 4D.

- **Family 5: Alternatives Paralleling Existing Utility Easements.** Alternatives that began at or near the I-395/Route 9 interchange and proceeded in a northerly direction paralleling the utility easements (to the extent possible) to connect with Route 9 in East Eddington. These alternatives were approximately 11 miles in length. Eight alternatives in this family were ultimately studied.

The No-Build Alternative was fully developed to allow an equal comparison to the build alternatives and was carried through the screening process.

In 2001, the MaineDOT and the FHWA, using results of the preliminary impacts analysis, dismissed from further consideration 37 of the initial 45 alternatives because other alternatives were less environmentally damaging, or it did not meet the purpose or all of the needs of the study. The analysis performed in 2001 retained the alternative from each family with the least adverse impact to the features and resources and resulted in the No-Build Alternative and seven alternatives.

The development of alternatives continued and screening through 2008. New alternatives, modifications of alternatives, and combinations of alternatives were considered. In 2004, alternatives were identified and developed parallel to the utility easements with the Bangor Hydro-Electric Company transmission lines noted as Family 5. The process of identifying, developing, and screening alternatives or modifying alternatives continued. In January 2008, seven new alternatives, including the No-Build Alternative, were preliminarily identified for further consideration and development and detailed study.

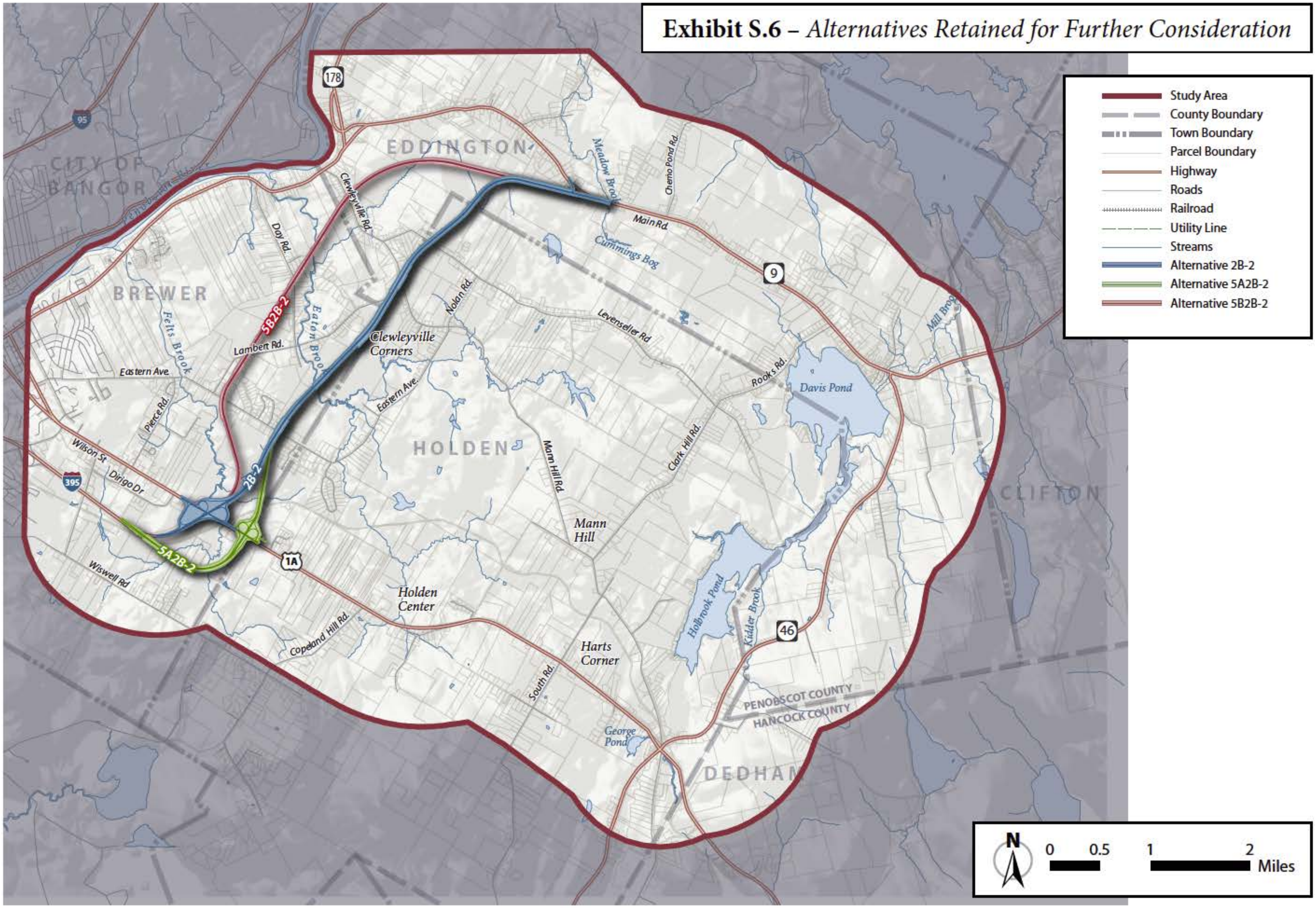
In a continued effort to avoid and minimize adverse impacts in December 2008, six connectors between the three westernmost build alternatives were identified, developed, and analyzed at the beginning of the phase of considering alternatives in detail.

The process of identifying, developing, and screening alternatives or modifying alternatives continued. New alternatives, modifications of alternatives, and combinations of alternatives were considered. In September and December 2010, meetings with the federal cooperating agencies took place, the purpose of which was to solidify the range of alternatives to be considered in detail (see Appendix C in the DEIS).

The following four alternatives were retained for further consideration and detailed study (exhibit S.6):

- No-Build Alternative
- Alternative 2B-2

Exhibit S.6 – *Alternatives Retained for Further Consideration*



- Alternative 5A2B-2
- Alternative 5B2B-2

The cooperating agencies concurred with this range of alternatives to be retained for detailed analysis.

The No-Build Alternative

The No-Build Alternative proposes that there be no new construction or major reconstruction of the transportation system in the study area; regular maintenance to I-395 and Routes 1A, 46, and 9 would be continued at its present level, and the intersection of Routes 46 and 9 would be improved.

Although the No-Build Alternative does not satisfy the study's purpose and needs or the USACE's basic purpose, it is retained for detailed analysis to allow equal comparison to the build alternatives and to help decision makers understand the ramifications of taking no action. The impacts of the No-Build Alternative were fully developed for design year 2035 to demonstrate the full impact of taking no action. Comparing the build alternatives with the current and future No-Build Alternative is essential for measuring the true benefits and adverse impacts of the build alternatives considered in detail.

Alternative 2B-2

Alternative 2B-2 would continue north from the I-395 interchange with Route 1A, roughly paralleling the Brewer/Holden town line, and connect with Route 9 west of Chemo Pond Road. Route 9 would not be widened to four lanes. The existing I-395/Route 1A interchange would be used (to the extent possible) and expanded to become a semidirectional interchange. A semidirectional interchange reduces left turns and cross traffic; the only traffic movement that would require a left turn would be Route 1A south to Alternative 2B-2 north. The land required for the northern portion of the interchange is owned by the State of Maine.

Alternative 2B-2 would bridge over Felts Brook in two locations at the I-395 interchange. It would pass underneath Eastern Avenue between Woodridge Road and Brian Drive. Alternative 2B-2 would bridge over Eaton Brook, bridge over Lambert Road, pass underneath Mann Hill Road, and bridge over Levenseller Road connecting to Route 9 at a "T" intersection. Route 9 eastbound would be controlled with a stop sign.

Alternative 2B-2 would further the study's purpose and satisfy the system linkage need in the near term. Alternative 2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way. Route 9 would not be improved, and it would not provide high-speed, limited access connection to the east of East Eddington village. It would satisfy the study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

Alternative 5A2B-2

Alternative 5A2B-2 would start from I-395 for approximately one mile along the southern side of Route 1A in the town of Holden before turning northward, crossing over Route 1A and paralleling the Bangor Hydro-Electric Company utility easement to connect with Route 9 west of Chemo Pond Road (exhibit S.5). Route 9 would not be widened to four lanes. Alternative 5A2B-2 would connect to Route 1A with a modified diamond interchange, which would provide all traffic movements and require two left turns across traffic. A left-turn lane would be provided on Route 1A to 5A2B-2 north. The modified-diamond interchange design would reduce the amount of property that must be acquired. It would connect to Route 9 at a "T" intersection. Route 9 eastbound would be controlled with a stop sign.

Alternative 5A2B-2 would bridge over Felts Brook in two locations at the I-395 interchange. It would pass underneath Eastern Avenue between Woodridge Road and Brian Drive. Alternative 5A2B-2 would bridge over Eaton Brook, bridge over Lambert Road, pass underneath Mann Hill Road, and bridge over Levenseller Road connecting to Route 9 at a "T" intersection. Route 9 eastbound would be controlled with a stop sign.

Alternative 5A2B-2 would further the study's purpose and satisfy the system linkage need in the near term. Alternative 5A2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way. Route 9 would not be improved, and it would not provide a high-speed, limited-access connection to the east of East Eddington village. It would satisfy the study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

Alternative 5B2B-2

Alternative 5B2B-2 would continue north from the I-395 interchange with Route 1A before turning east and connecting with Route 9 west of Chemo Pond Road (exhibit S.5). Route 9 would not be widened to four lanes. The existing I-395/Route 1A interchange would be used (to the extent possible) and expanded to become a semidirectional interchange. The only traffic movement that would require a left turn would be Route 1A south to Alternative 5B2B-2 north. The land required for the northern portion of the interchange is owned by the State of Maine.

Alternative 5B2B-2 would bridge over Felts Brook in two locations at the I-395 interchange. It would bridge over Eastern Avenue to the immediate east of Lambert Road and bridge over Lambert Road. It would pass under Day Road and Chewleyville Road before turning east and connecting to Route 9 at a "T" intersection. Route 9 eastbound would be controlled with a stop sign.

Alternative 5B2B-2 would further the study's purpose and satisfy the system linkage need in the near term. Alternative 5B2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way. Route 9 would not be improved, and it would not provide a high-speed, limited-access connection to the east of East Eddington village. It would satisfy the study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

Identification of a Preferred Alternative

After careful consideration of the range of alternatives developed in response to the study's purpose and needs and in coordination with its cooperating and participating agencies, the MaineDOT and the FHWA identified Alternative 2B-2 as the preferred alternative because they believe it best satisfies the study purpose and needs, would fulfill their statutory mission and responsibilities, and has the least adverse environmental impact.

In identifying Alternative 2B-2 as the preferred alternative, the MaineDOT and the FHWA believe they have identified the environmentally preferable alternative because it best meets the purpose and needs for the study; causes the least damage to the biological and physical environment; and best protects, preserves, and enhances the historic, cultural, and natural resources of the study area.

As part of the review of this EIS, the MaineDOT and the FHWA invite comments on its decision identifying Alternative 2B-2 as its preferred alternative.

The final selection of an alternative will not be made until comments on this draft EIS and from the public hearing have been received and analyzed by the MaineDOT and FHWA, and comments have been received in response to the USACE's public notice; all reasonable alternatives are under consideration and a decision will be made after the alternatives' impacts and comments on the draft EIS and from the public hearing have been fully evaluated.

Impacts to the Natural and Social Environment

A study area of approximately 34,416 acres encompassing the range of reasonable alternatives 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 Alternative would adversely impact the study area by failing to reduce traffic backsups on Routes 1A, 9, and 46; failing to address safety problems at 10 HCLs; and negatively impacting the community character of Brewer, Holden, and Eddington by not reducing heavy traffic in the study area. Traffic congestion in the study area is projected to worsen under the No-Build Alternative.

From a broad perspective, the build alternatives retained for further consideration are quite similar. They would begin in the same area of I-395 and Route 1A near the Brewer/Holden town line, carry traffic north, and connect with Route 9 in Eddington. The build alternatives would have considerable beneficial impacts to the study area and region. Each alternative would have similar positive impacts to mobility and congestion on Routes 1A, 9, and 46. The build alternatives would have the added benefit of improving safety throughout the study area and region.

Although the majority of the potential adverse impacts from the build alternatives are similar at a high level, a few distinct differences exist (exhibits S.7, S.8, and S.9).

The build alternatives would not impact the physical geography; climate; geological resources; significant sand and gravel aquifers; wild and scenic rivers; essential habitat; tribal trust lands; sites containing uncontrolled petroleum and hazardous wastes; historic resources; archaeological resources; and traditional cultural properties. Section 4(f) states that publicly owned parks, recreation lands, wildlife and waterfowl refuge areas, or historic sites of national, state, or local significance may not be used for USDOT funded projects unless there is no feasible and prudent alternative to the use of such land and such projects include all possible planning to minimize harm to these lands. The build alternatives would not impact public parks or recreation lands or other lands or facilities afforded consideration and protection under Section 4(f) of the USDOT Act of 1966.

Estimated Construction Costs

The estimated construction costs of alternatives include the costs of preliminary engineering, construction engineering, utility relocation, acquisition

Exhibit S.7 – *Direct Impacts of Alternatives*

Alternatives	Physical and Biological															Land Use				
				Streams																
	Wetlands (acres)	Roadway contaminants within 100 feet[1] (acres)	Roadway contaminants within 160 feet[2] (acres)	Bridges and culverts/feet	Roadway contaminants within 100 feet[1] (acres)	Roadway contaminants within 160 feet[2] (acres)	Sediments within 3,300 feet[2] acres)	Floodplains (acres)	Vernal pools[3]/ dispersal habitat (acres)	Waterfowl and wading bird habitat[4] (acres)	Deer-wintering areas (acres)	Endangered Species	Vegetation (acres)	Undeveloped habitat	Area to be acquired (acres)	Historic Properties	4(f) Properties	Residential displacements[5]	Business displacements[6]	Business impacts[7]
No-Build	-	17	64	-	0.3 ac. (17,000 sq. ft.)	0.7 ac. (29,000 sq. ft.)	12 ac.	-	-	-	-	-	-	-	-	-	-	-	-	-
2B-2/the Preferred Alternative	26	31	66	5 bridges 3 culverts/ 554 feet	0.9 ac. (39,100 sq. ft.)	1.8 ac. (78,300 sq. ft.)	13 ac.	10	1/15	9 acres along Eaton Brook and its tributaries	-	Yes	102	Eliminates two blocks; fragments three blocks	163	No	No	8	-	Eastern Maine Healthcare parking lot – 130 parking spaces (20 percent)
5A2B-2	31	34	71	5 bridges 3 culverts/ 567 feet	0.6 ac. (24,300 sq. ft.)	1.5 ac. (63,000 sq. ft.)	18 ac.	2	1/23	20 acres along Felts Brook and 9 acres along Eaton Brook	-	Yes	136	Eliminates two blocks; fragments four blocks	215	No	No	15	Brewer Fence Company, Eden Pure Heaters, Mitchell's Landscaping and Garden Center, Town 'N Country Apartments	-
5B2B-2	32	30	80	6 bridges 1 culvert/ 222 feet	1.0 ac. (43,700 sq. ft.)	2 ac. (90,000 sq. ft)	17 ac.	11	1/6	3 acres along a tributary to Eaton Brook	3 acres along a tributary to Eaton Brook	Yes	102	Fragments four blocks	186	No	No	6	Bangor Hydro-Electric Co. Building, Maritimes and Northeast Pipeline Compressor Station	Eastern Maine Healthcare parking lot – 130 parking spaces (20 percent)

Notes:
Primary road contaminants are salt and lead.
No-Build Alternative consisted of Route 1A from I-395 to Route 46, and Route 46 from Route 1A to Route 9.
[1] ***Source:*** *USACE New England District, "Compensatory Mitigation Guidance" , 2010.*
[2] ***Source:*** *Maine Audubon Society, "Conserving Wildlife On and Around Maine's Roads", 2007.*
[3] *All vernal pools are insignificant.*
[4] *Upland habitat within 250 ft.*
[5] *The taking of a residence*
[6] *The taking of a business*
[7] *An impact to the business without the taking of the business*

Exhibit S.8 – *Indirect Impacts of Alternatives*

Resources		Distances (feet)		Alternative Indirect Impacts (acres)							
		Upslope/ Upwind	Downslope/ Downwind	No-Build Alternative[3] Upslope	No-Build Alternative[3] 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			46%		60%		78%		83%	
	Area	750[2]		480		278		395		146	
	Percent Forested			53%		63%		59%		69%	
Floodplains		0	100[4]	0	1	0	11	0	5	0	15
		160[1]		4		22		8		28	
Wetlands		0	100[4]	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[4]	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] No-Build Alternative consisted of Route 1A from I-395 to Route 46, and Route 46 from Route 1A to Route 9.

[4] USEPA, 2010

Exhibit S.9 – *Cumulative Effects for the Build Alternatives*

Alternative	Surface Waters	Floodplains (acres)	Wetlands (acres)	Forest Vegetation (acres)	Wildlife Habitat (acres)
2B-2/the Preferred Alternative	4,900 feet of streams; unknown impacts from stormwater runoff.	26	182	602	873
5A2B-2	5,000 feet of streams; unknown impacts from stormwater runoff.	18	187	636	924
5B2B-2	4,800 feet of streams; unknown impacts from stormwater runoff.	27	188	602	556

of property for right-of-way, and mitigating environmental impacts. The costs of the build alternatives would range between approximately $61 million and $81 million (in 2011 dollars).

Areas of Controversy

The Interstate 395/ Route 9 transportation study has attracted substantial local interest since the beginning of the scoping process for the Environmental Assessment (EA) in 2000. On October 11, 2005, the I-395/Route 9 transportation study was elevated to an EIS by the FHWA because of the potential impacts to wetlands, unfragmented habitat, and the potential difficulty in compensating for those impacts.

Issues to Be Resolved

There are two primary issues to be resolved. The first is the MaineDOT must obtain a Section 404 permit from the USACE; the second is MaineDOT would need to work with the affected municipalities to develop a corridor-preservation plan to protect the selected corridor from further development.

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit from the USACE before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from regulation (e.g., certain farming and forestry activities). The Section 404(b)(1) guidelines provide guidance to the USACE for issuing permits; compliance with the Section 404(b)(1) guidelines is required for the issuance of a permit. The Section 404(b)(1) guidelines require the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA). Critical to the selection of the LEDPA is the recognition of the full range of alternatives and impacts in determining which alternatives are (1) practicable and (2) environmentally less damaging. The USACE identifies the LEDPA following its review of the permit application and completion of its public-interest finding.

The MaineDOT and the FHWA prepared a permit application in accordance with Section 404 of the CWA for the range of alternatives retained for further consideration, and it was submitted to the USACE. The USACE must identify a LEDPA. A mitigation plan for impacts to waters of the U.S. would be developed during final design.

This Environmental Impact Statement/Section 404 Permit Application Supporting Information is first circulated publicly as a Draft Environmental Impact Statement (DEIS). Following publication of the DEIS, a public hearing would be held to solicit additional public input to the federal decision-making process. Additional public input would be accepted during a minimum 45-day open public-comment period following publication of the DEIS/Section 404 Permit Application Supporting Information.

If a build alternative is selected for construction, the MaineDOT would work with the affected municipalities to develop a corridor-preservation plan to protect the selected corridor from further development. Methods to protect the corridor include development of zoning and local ordinances and selective acquisition of properties as they become available for sale or for further development. The MaineDOT may fund these property acquisitions through its customary programming of state and federal highway-funding mechanisms. Property acquisitions and residential or business relocations would be in accordance with state and federal laws dictating the acquisition of property for highway purposes. However, future development along Route 9 in the study area can impact future traffic flow and the overall benefits of the project.

Once the MaineDOT has a system in place to protect the selected corridor, it would work with regional interests to develop support for a funding plan. In recent years, many states have found that state highway funds, bonding, and federal core apportionments are needed to maintain the system as it exists, with little remaining in additional funds for new capacity projects. Therefore, the MaineDOT would devise funding strategies for property acquisition and, ultimately, construction of the selected build alternative. If the No-Build Alternative is selected, the MaineDOT would continue to work with local and regional authorities to maintain—to the extent possible—the safety and efficiency of Routes 1A, 9, and 46 in Brewer, Holden, and Eddington.

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Glossary

affected environment – The physical features and land area(s) to be influenced or impacted by an alternative alignment under consideration. This term also includes various social and environmental factors and conditions pertinent to an area.

agency coordination – A general term referring to the process whereby government agencies are afforded an opportunity to review and comment on transportation proposals.

alignment studies – A general term describing engineering work involving the vertical and horizontal positioning, adjusting, and refining, as well as comprehensive evaluation of possible connectors through a selected study corridor and considering all relevant features, controls, travel desires, impacts, benefits, and costs. Alignment studies are typically performed to assess the relative feasibility of a proposed transportation facility.

alternative – One of a number of specific transportation-improvement proposals, alignments, options, design choices, and so forth in a defined study area. For a transportation project, alternatives to be studied typically include the No-Build Alternative, an upgrading of the existing roadway alternative, new transportation routes and locations, transportation systems management strategies, multimodal alternatives (if warranted), and any combinations of these.

archaeologically sensitive surficial deposits – Land forms that are likely locations of prehistoric settlements or gathering places, based on a Maine Historic Preservation Commission (MHPC) predictive model that uses surficial geology (i.e., water bodies, alluvium, lake-bottom deposits, glacial outwash, and eskers) to assess sensitivity.

arterials – Roads with high traffic volumes that provide linkage among major cities and towns and developed areas, capable of attracting travel over long distances. Basically, arterials provide service to interstate and inter-county travel demand. The arterial system typically provides for high travel speeds and the longest trip movements. The degree of access control on an arterial may range from full control (i.e., freeways) to entrance control (e.g., on an urban arterial through a densely developed commercial area).

at-grade – The intersection of two roads, or a road and a railway, that cross at the same elevation.

at-risk watershed – Watersheds contributing to water bodies that are at risk of eutrophication due to new development and phosphorus-laden runoff. These water bodies include public drinking-water supplies and waters that currently exhibit algal blooms or other signs of eutrophication. At-risk watersheds are defined according to criteria in the State of Maine Stormwater Law (5 MRSA § 3331).

attainment area – A geographic area in which levels of a criteria air pollutant meet the health-based primary standard (i.e., National Ambient Air Quality Standard) for the pollutant. Attainment areas are defined using federal pollutant limits set by the U.S. Environmental Protection Agency.

avoidance alternative – A general term used to refer to any alignment proposal that has been developed, modified, shifted, or downsized to specifically avoid impacting one or more resources.

Beginning with Habitat Program – A collaborative program of federal, state, and local agencies and nongovernmental organizations. It is a habitat-based approach to conserving wildlife and plant habitat on a landscape scale managed by the Maine Department of Inland Fisheries and Wildlife.

Best Management Practices – Structural and/or management practices employed before, during, and after construction to protect receiving-water quality. These practices provide techniques to either reduce soil erosion or remove sediment and pollutants from surface runoff.

biodiversity – The diversity of genes, species, and ecosystems. This term includes the entire hierarchy of ecological organization and encompasses regional ecosystem diversity (i.e., landscape diversity), local ecosystem diversity (i.e., community diversity), species diversity, and genetic diversity within populations of a species.

carbon monoxide (CO) – A colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel. Fuel-combustion activities (e.g., transportation, industrial processes, and space heating) are the major sources of CO.

CEQ Regulations – Directives issued by the Federal Council on Environmental Quality, published in 40 CFR 1500-1508, which governs the implementation of the National Environmental Policy Act and the development and issuance of environmental policy and procedure for federal actions by public agencies. The regulations contain definitions, spell out applicability and responsibilities, and mandate certain processes and procedures for state agencies with programs that utilize federal-aid funds.

collector roads – Roads characterized by a roughly even distribution of their access and mobility functions. These routes gather traffic from local roads and streets and deliver it to the arterial system. Traffic volumes and speeds are typically lower than those of arterials.

comment period – The duration of time during which written comments or responses may be submitted to an agency that has distributed a document for review and comment. It can be applicable to all types of documents that are circulated as well as to formal presentations, such as those that may be given by transportation-department officials at a public hearing.

community water supply – A public water system that serves at least 25 residents throughout the year; consists of one or multiple wells or reservoirs.

conceptual design – idea or feasibility phase of the design process during which various alternatives are developed and tested. During this phase, various environmental and engineering issues are identified and accounted for prior to advancing a range of alternatives into the preliminary and final design phases.

conceptual mitigation – The early, generalized identification of design, operational, construction, or other measures considered to avoid, minimize, or compensate for anticipated environmental consequences. Typically, conceptual mitigation represents ideas discussed before the concluding stages of an environmental study.

concurrence – Determination by an agency that information to date is adequate and a project can advance to the next stage of project development.

connector – A highway or roadway that connects to another highway or roadway.

construction phase – The phase of the transportation project development process that entails the physical act of building by a contractor of the proposed project according to all plans and specifications developed during final design.

controlled-access facility – A highway where access to abutting properties is restricted or limited by control of the right-of-way.

controlled-access highway – A highway that provides limited points of vehicle access; access is permitted only at interchanges and intersections. Freeways, such as I-395, are controlled-access highways in which access points occur only at interchanges. These highways serve mobility needs and are designed to accommodate higher travel speeds.

cooperating agency – Any organization, other than the lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed action.

cost effectiveness – An economic measure used to evaluate and compare the corridors of a study. Cost effectiveness is defined as the present value of a gross regional product growth per dollar of construction cost. In this way, cost effectiveness compares the relative future economic benefits to the size of the investment required to generate those benefits.

cumulative impacts – Impacts on the environment that result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes other such actions; required under the National Environmental Policy Act (NEPA) by the Council on Environmental Quality (CEQ).

daily traffic volume – The number of vehicles that use a given roadway in both directions during a 24-hour period.

dB – Decibel, a unit of measurement of sound level. Expresses relative difference in power or intensity, usually between two acoustic or electric signals, equal to 10 times the common logarithm of the ratio of the two levels.

dBA – An abbreviation for A-weighted decibel. A decibel is a unit used to describe sound-pressure levels on a logarithmic scale. For a community noise-impact assessment, an A-weighted frequency filter is used to approximate the way humans hear sound.

deciduous – Refers to woody vegetation, such as oak or maple trees, that shed their leaves after the growing season.

deer-wintering area – Areas of softwood-dominated forest that provide food resources and shelter for deer during severe winter conditions.

demand – Vehicular traffic demand (i.e., volume) on a given highway segment, expressed in vehicles per day.

demand shift – The change in demand (i.e., volume) on a given highway segment, expressed in vehicles per day. Demand shifts can be caused by new corridors that provide a faster and/or shorter travel route.

design hour volume (DHV) – The hour used for geometric design of highways, typically the 30th highest traffic volume of the year.

direct impacts – The immediate effects on the social, economic, and physical environment caused by the construction and operation of a highway. These impacts are usually experienced within the right-of-way or in the immediate vicinity of the highway or another element of the proposed action.

disadvantaged population – A group of people, living in one area, that has a median income below the federal poverty level or that exhibits other indicators of economic disadvantage.

displacement – The act of removing businesses, people, or households from structures for transportation right-of-ways.

Draft Environmental Impact Statement (DEIS) – The document prepared by the Federal Highway Administration (FHWA) in accordance with FHWA National Environmental Policy Act regulations (23 CFR Part 771). These regulations require that the DEIS evaluate all reasonable alternatives considered; discuss the reasons that alternatives have been eliminated from detailed study; and summarize the studies, reviews, consultations, and coordination required by environmental laws and Executive Orders.

early coordination – Communication undertaken near the beginning of a transportation-study development process to exchange information and work cooperatively with agencies and the public in an effort to determine the type and scope of studies, level of analysis, and related study requirements.

edge habitat – An area along a transitional zone between two or more vegetation cover types that provide feeding, breeding, nesting, and/or cover habitat for wildlife.

endangered species – Any species that is in danger of extinction throughout all or a significant portion of its range (in reference to the Endangered Species Act [16 USC Chapter 35 Section 3(6)] and the Maine Endangered Species Act).

engineering – A general term that refers to the systematic analysis and development of measurable physical data using applied mathematical, scientific, and technical principles to yield tangible end products that can be made, produced, and constructed.

environment – The complex of social, natural, and cultural conditions that are present in the physical surroundings.

Environmental Assessment (EA) – A document prepared for federal actions that are not categorical exclusions and that do not clearly require an Environmental Impact Statement (EIS). An EA provides the analysis and documentation to determine if an EIS or a Finding of No Significant Impact (FONSI) should be prepared.

environmental baseline – An inventory or summary assessment of environmental features present in a study area, typically conducted during systems planning or early project development. This activity is used to provide environmental-impact information as a basis for developing alternatives.

environmental feature – A general term to denote resources or objects located in or adjacent to an existing or proposed transportation corridor. Features may include natural or physical resources, important structures, community facilities, topographic features, and certain other land uses.

environmental justice – Executive Order 12898 requires each federal agency to "make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental impacts on minority populations and low-income populations."

essential fish habitat (EFH) – Those waters and substrate that are necessary to fish for spawning, breeding, feeding, or growing to maturity, as defined by the National Marine Fisheries Service and the regional Fishery Management Councils. EFH is protected by the Magnuson-Stevens Fishery Conservation and Management Act of 1996.

Farmland Protection Policy Act (FPPA) – A statute enacted in 1981 by the U.S. Department of Agriculture (USDA) to ensure that significant agricultural lands are protected from conversion to nonagricultural uses. For highway projects receiving federal aid, the regulations promulgated under the FPPA (7 CFR Part 658, 1984) require a state highway authority (i.e., the MaineDOT) to coordinate with the USDA Natural Resources Conservation Service. The FPPA regulates four types of farmland soils: prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance.

farmland soils – Soils suited to producing crops; those with soil quality, growing season, and moisture supply needed to produce a sustainable yield when treated and managed using acceptable methods. Specifically, farmland soils are those soil types designated by the Natural Resources Conservation Service in accordance with the Farmland Protection Policy Act of 1981 by the U.S. Department of Agriculture.

farmland soils of statewide importance – Soils that are nearly prime farmland and that produce high yields of crops when treated and managed according to acceptable farming methods (see the definition for prime farmland soil).

feasibility study – A general term that refers to various types of systematic evaluations carried out to better assess the desirability or practicality of further developing a proposed action. Such studies are typically performed during the planning stages.

federal-aid system – The federal-aid system consists of those routes in Maine that are eligible for the categorical federal highway funds.

Federal Emergency Management Agency (FEMA) – A former independent agency that became part of the new Department of Homeland Security in March 2003. It is tasked with responding to, planning for, recovering from, and mitigating against disasters.

Federal Highway Administration (FHWA) – The branch of the U.S. Department of Transportation responsible for administering the funding of federal-aid highway projects.

Federal Register – A daily publication of the U.S. Government Printing Office that contains notices, announcements, rulemaking, and other official pronouncements of the administrative agencies of the U.S. Government. Various announcements and findings related to specific environmental matters and transportation projects and activities appear in this publication.

final design phase – The phase of the transportation project development process that involves the preparation of detailed working drawings as well as specifications and estimates for approved transportation projects.

Final Environmental Impact Statement (FEIS) – The document prepared after circulation of a DEIS (or Supplemental DEIS) and consideration of comments received. The Federal Highway Administration National Environmental Policy Act regulations (23 CFR Part 771.125) require that the FEIS identify a preferred alternative, evaluate all reasonable alternatives considered, discuss and respond to substantive comments on the FEIS, summarize public involvement, and describe the mitigation measures that will be incorporated into the proposed action.

Finding of No Significant Impact (FONSI) – A document by a federal agency that briefly presents the reasons why an action, not otherwise excluded (§ 1508.4), will not have a significant effect on the human environment and, therefore, for which an environmental impact statement will not be prepared. It will include the environmental assessment or a summary of it and will note any other environmental documents related to it (§ 1501.7(a)(5)). If the assessment is included, the finding need not repeat any of the discussion in the assessment but may incorporate it by reference.

floodplain – The level area adjoining a river channel that is inundated during periods of high flow.

floodway – The channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood may be carried without substantial increases in flood heights.

fragmentation – Subdivision of a forest or other habitat into isolated patches by roads, land-clearing, or other human or natural alterations of the landscape and accompanied by the loss of a certain portion of the original habitat.

freeway – A type of road designed for safer high-speed operation of motor vehicles through the elimination of at-grade intersections. This is accomplished by preventing access to and from adjacent properties and eliminating all cross traffic through the use of grade separations and interchanges.

functional conflict – Highways provide a balance between providing access (with multiple access points) and mobility (with controlled-access points). Freeways are designed to maximize mobility and serve regional traffic demands as opposed to local roads (or collectors) that provide multiple access points to adjacent land uses (residences or businesses). Functional conflicts arise when regional traffic that would be better served on a freeway uses local roads.

Geographic Information System (GIS) – A computer-based application used to perform spatial analysis.

geometric deficiency – A deficiency that occurs when a highway's geometric characteristics (e.g., lane width, shoulder width, horizontal curvature, and vertical grade) do not meet prevailing design standards.

geometric design – Those engineering activities that involve standards and procedures for establishing the horizontal and vertical alignment and dimensions of a highway.

glacial outwash – Surficial sand and gravel sediments deposited ahead of a glacier by glacial meltwater.

grade – The slope of a road along the direction of travel, typically characterized by the vertical rise per unit of longitudinal distance.

grade separation – The intersection of two roads, or a road and a railway, that cross at different elevations. One roadway overpasses or underpasses the other roadway with a structure(s).

gross regional product (GRP) – One of the major economic indices of the socioeconomic development of a region. GRP is equal to the total of added values in the regional economic industries, estimated as a difference between production and intermediate consumption.

Groundwater Recharge Protection Areas – Areas of land designated by water-resource agencies through which rainwater or snowmelt percolate and replenish the underlying aquifer near a public well. These areas require special protection because they directly affect the quality and safety of the public drinking-water supply.

habitat block – Units of habitat uninterrupted by roadways or other disturbances.

high crash location (HCL) – An intersection or highway segment that experiences an abnormally high number of crashes relative to the traffic demands that are served. For the state of Maine, the MaineDOT identifies HCLs.

highway reconstruction/rehabilitation – Reconstruction of an existing highway is undertaken when the pavement structure or alignment of the existing facility is deficient. Reconstruction includes removal and replacement of the entire pavement structure, significant changes in the vertical or horizontal alignment, or addition of lanes. Rehabilitation includes resurfacing and other minor repairs intended to extend the service life of the existing facility and enhance highway safety.

historic resources – Properties, structures, and districts that are listed in or have been determined to be eligible for listing on the National Register of Historic Places.

hourly traffic volume – The number of vehicles that use a given road during a 1-hour period.

hydric soils – 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. Hydric soils correspond to federally and state-regulated wetlands in many circumstances.

hydrologic regime – The frequency and duration of inundation or soil saturation of a given area.

impacts – A term used to describe the positive or negative effects on the natural or human environment as a result of a specific project(s).

impervious surface – Relates to hydrology; a surface through which precipitation cannot penetrate, causing direct runoff or perching (e.g., asphalt paving, roofs, and densely compacted gravel).

independent utility – The ability of a transportation improvement to be a usable and reasonable expenditure even if no additional transportation improvements are made in the area.

indirect effects (or secondary impacts) – Effects caused by a given action occurring later in time or farther removed in distance but that are reasonably foreseeable (e.g., induced changes to land-use patterns, population density, and growth rate).

Integrated Transportation Decision-Making (ITD) Process – The requirements of Maine's Sensible Transportation Policy Act and the National Environmental Policy Act have been integrated within a single ITD process to guide the planning of new transportation construction projects in the state.

Intelligent Transportation Systems (ITS) – The application of technology to goods and people movement to reduce delay and improve safety. The main applications of ITS in place today involve the monitoring of real-time traffic flows and weather conditions and then transmitting this information to the appropriate authorities and the motoring public. The authorities use this information to send response teams to the scene of an accident, whether it is an emergency medical team or a hazardous material team. The motoring public is alerted to potential hazards or delays on roadways through the use of highway advisory radio, variable message signs, or broadcast radio traffic reports.

interagency meeting – One of several scheduled gatherings held during the transportation project development process to present project studies and data to government agencies and to receive comments and responses to assist in further project development. Typically, these meetings are held to discuss data such as plans of study, project-need analyses, alternatives-analysis information, elimination and selection of alternatives, and environmental documents.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) – a United States federal law that posed a major change to transportation planning and policy, as the first U.S. federal legislation on the subject in the post-Interstate Highway System era. It presented an overall intermodal approach to highway and transit funding with collaborative planning requirements, giving significant additional powers to metropolitan planning organizations. Signed into law on December 18, 1991 by President George H. W. Bush, it expired in 1997. It was followed by the Transportation Equity Act for the 21st Century (TEA-21) and most recently in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

interstate – A freeway-type highway that is part of the National Highway System.

Interstate Highway System – The network of interstate highways established by the Federal-Aid Highway Act of 1956. The statute established a 41,000-mile network of controlled-access highways (expanded to 42,000 miles by legislation in 1968) intended to connect all metropolitan areas with populations of more than 50,000 and all state capitals.

Labor Market Area (LMA) – Regional areas with a high concentration of employment opportunities. These are economically integrated units within which workers may readily change jobs without changing their place of residence.

lacustrine – Of and related to lakes.

Land and Water Conservation Fund (LWCF) – A system for funding federal, state, and local parks and conservation areas, created by the Land and Water Conservation Fund Act of 1964.

lead agency – The federal project proponent with primary responsibility for preparing an environmental document.

Least Environmentally Damaging Practicable Alternative (LEDPA) – This is identified by the U.S. Army Corps of Engineers in compliance with Section 404(b)(1) of the U.S. Clean Water Act. Critical to the selection of the LEDPA is the recognition of the full range of National Environmental Policy Act alternatives and impacts in determining which alternatives are (1) practicable, and (2) environmentally less damaging. The U.S. Army Corps of Engineers is the only federal agency that can permit the LEDPA.

legal notice – A formal announcement or finding published in a periodical or newspaper to provide official public notice of an action or approval that is of public interest.

level of detail – A general term referring to the amount of data collected and the scale, scope, extent, and degree to which item-by-item particulars and refinements of specific points are necessary or desirable in carrying out a study. Level of detail is an important factor in the quality of a study, overall study costs, and length of time needed to perform study work.

Level of Service (LOS) – A qualitative measure describing operational conditions in a traffic stream and their perception by motorists and/or passengers. Six levels of service are defined and given letter designations from A to F, with LOS A representing the best operating conditions (i.e., very light, free-flowing traffic) and LOS F the worst (i.e., congested, stop-and-go traffic).

link – A new or existing highway segment between two defined end-points.

local roads and streets – All public roads and streets not classified as arterials or collectors have a local classification. Local roads and streets are characterized by many points of direct access to adjacent properties and have a relatively minor role in accommodating mobility. Speeds and traffic volumes are usually low.

logical termini – Features such as cross-route locations that are considered rational end-points for a transportation improvement and that serve to make it useable.

Magnuson-Stevens Fishery Conservation and Management Act – Legislation (16 USC 1855(b)) governing all fisheries resources within 320 kilometers (200 miles) of the U.S. coast that established regional Fishery Management Councils and required the preparation of Fisheries Management Plans.

MaineDOT Highway Design Guide – A tool developed by the MaineDOT that provides guidance for the design of roads and highways in the State of Maine in addition to the Federal Highway Administration design criteria.

Maine Sensible Transportation Policy Act (STPA) – A state law enacted in 1991 by the citizens of Maine that provides a decision-making framework for examining a range of alternatives. The STPA is applicable to transportation-planning, capital-investment, and project-selection decisions made by the MaineDOT.

major collector road – Collector roads that tend to serve higher traffic volumes than other collector roads. Major collector roads typically link arterials. Traffic volumes and speeds are typically lower than those of principal arterials.

mesoscale air-quality analysis – A regional-level analysis of air for chemical constituents.

microscale air-quality analysis – An analysis of air for chemical constituents, typically conducted for a small study area such as an intersection.

minor arterial – Highways that tend to link collector roads to principal arterials and serve lower traffic volumes than typical arterials. Minor arterials are typically designed at lower travel speeds than principal arterials.

mitigation – Actions that avoid, minimize, or compensate for potential adverse impacts.

mitigation measures – Specific design, commitment, or compensation made during the environmental evaluation and study process that serve to moderate or lessen impacts from a proposed action. In accordance with CEQ Regulations, mitigation includes avoidance, minimization, rectification, reduction, and compensation.

National Ambient Air Quality Standards (NAAQS) – The prescribed level of pollutants in the outside air that cannot be exceeded during a specified time in a specified geographic area.

National Environmental Policy Act (NEPA) of 1969, as amended – Federal legislation that requires an interdisciplinary approach in planning and decision making for federal-aid actions. The Act includes requirements for the contents of Environmental Impact Statements that are to accompany every recommendation for major federal actions significantly affecting the quality of the human environment. The interdisciplinary study approach includes analysis of potential impacts to the natural, social, and economic environments.

National Highway System (NHS) – A system of those highways determined to have the greatest national importance to transportation, commerce, and defense in the United States. It consists of the Interstate Highway System and logical additions to it, selected other principal arterials, and other facilities that meet the requirements of one of the NHS subsystems.

National Historic District – An area consisting of numerous buildings and their setting and identified as historic on the National Register of Historic Places.

National Priority List (NPL) – The "Superfund" statute (42 USC Section 9601) requires the U.S. Environmental Protection Agency to establish a NPL of sites that are to be given top-priority consideration for removal of hazardous substances and remedial action.

National Register of Historic Places (NRHP) – the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

National Wetlands Inventory (NWI) – A program administered by the U.S. Fish & Wildlife Service for mapping and classifying wetlands resources in the United States.

Natural Resources Conservation Service (NRCS) – Formerly the Soil Conservation Service, NRCS is a department in the U.S. Department of Agriculture responsible for conserving all natural resources on private lands and administering the Farmland Protection Policy Act.

needs analysis – Data collection and analysis to document the purpose and need for a project. This document may draw on any number of transportation, master-planning, socioeconomic, traffic, safety, system-linkage, growth-management, or other community or regional issues of importance.

new location highway – A highway proposed to be constructed on land not currently used for transportation facilities.

nitrogen oxides (NOx) – Nitric oxide (NO) and nitrogen dioxide (NO_2) are collectively referred to as nitrogen oxides (NOx). NO forms during the high-temperature combustion process. NO_2 forms when NO further reacts in the atmosphere. NOx reacts with sunlight to form ozone, a colorless gas associated with smog or haze conditions. Ozone is a pollutant regulated by the Clean Air Act Amendments of 1990.

No-Build Alternative – Typically includes short-term, minor restoration types of activities (e.g., safety and maintenance improvements) that maintain the continuing operation of an existing facility. The No-Build Alternative serves as a baseline for the comparison of other alternatives.

noise abatement criteria (NAC) – Noise levels measured in decibels that are used as a basis of comparison for evaluating the impact from predicted design-year noise and for determining whether noise-abatement measures should be considered.

noise abatement measures – Actions that reduce traffic-noise impacts. Noise-abatement measures can be traffic-management measures, alteration of horizontal and vertical alignments, acquisition of property rights for construction of noise barriers, construction of noise barriers, acquisition of real property or interest for buffer zones, or noise insulation of public-use or nonprofit institutional structures.

noise receptor – Locations that may be affected by noise. Sensitive receptors include residences, parks, schools, churches, libraries, hotels, and other public buildings.

non-community drinking water system – A public water system that serves at least 25 people at least 60 days of the year and is not a community or seasonal water system.

non-point source pollution (NPS) – Pollution of water bodies that does not originate at a single specific source, such as an industrial discharge or discharge from a wastewater treatment plant. Sources of NPS include runoff from highways, agricultural fields, golf courses, and lawns.

other principal arterials – Highways that provide access between arterials and a major port, airport, public-transportation facility, or other intermodal-transportation facility. Other principal arterials tend to serve lower traffic demands than principal arterials.

Outstanding River Segment (ORS) – A section of a river or stream designated by the Maine Natural Resources Protection Act (12 MRSA § 403) for protection because of the special resource values of its flowing waters and shorelines.

ozone – A gas that is a variety of oxygen. Ozone is a pollutant regulated by the Clean Air Act Amendments of 1990. Ground-level ozone is the main component of smog. Ozone is not directly emitted by motor vehicles but rather is formed when oxides of nitrogen react with sunlight.

palustrine – The group of vegetated wetlands traditionally called by names such as marsh, swamp, bog, fen, and prairie. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes.

palustrine emergent wetlands (PEM) – A palustrine wetlands dominated by herbaceous species, typically cattails, sedges, and grasses, and commonly referred to as a marsh.

palustrine forested wetlands (PFO) – A palustrine wetlands dominated by trees, commonly referred to as a swamp.

palustrine scrub-shrub wetlands (PSS) – A palustrine wetlands dominated by shrubs.

peak hour – The hour of the day when traffic volume on a given roadway is highest. A separate peak hour can be defined for morning and evening periods.

peak-hour Leq – Represents the noisiest hour of the day/night and usually occurs during peak periods of motor-vehicle traffic. The Leq is the equivalent sound-level measurement, which means it averages background and short-term transient sound levels and provides a uniform method for comparing sound levels that vary over time.

peak-hour volume – The traffic volume that occurs during the peak hour, expressed in vehicles per hour. Peak-hour volumes are typically 10 to 15 percent of daily volumes.

permit – Written permission given by a governmental agency to take certain action during specific steps of a transportation project development process. Permits may include permission for any construction, excavation, depositing of material, or other work in navigable waters (U.S. Corps of Engineers); permission required for the discharge of dredged or fill material into waters of the United States (U.S. Corps of Engineers); and permission to construct bridges, causeways, and drawbridges in navigable waters (U.S. Coast Guard). A permit also may refer certain other clearances or certifications, such as clearance from the Federal Aviation Administration for proposed highway construction in the vicinity of public-use and military airports, and water-quality certifications for the licensing of an action that would result in a discharge into regulated waters. These approvals, as well as certain others relating to solid-waste management, underground storage tanks, coastal zone areas, and so forth, involve approvals and documentation commonly referred to as permits.

plan of study – A detailed, item-by-item outline of the objectives, scope, methodology, and schedules for the analysis and development of a specific transportation project.

posted speed limit – The speed posted for a facility based on engineering and traffic investigations.

preliminary engineering – A general term to describe early phases of technical studies undertaken to determine all relevant aspects of transportation location, to identify feasible route alternatives or design options, and to assess various cost and benefit parameters before advancing the project into more detailed final design.

prime farmland soil – Soil map units that are designated by the Natural Resources Conservation Service as having the properties needed to produce sustained high-yield crops when managed with modern farming techniques.

principal arterials – Highways in rural and urban areas that connect urban areas, international border crossings, major ports, airports, public-transportation facilities, or other intermodal-transportation facilities.

project development – The overall process of advancing a transportation project from concept to implementation. Project development typically encompasses environmental and engineering tasks including planning, location, preliminary design, final design, and construction.

public hearing – A meeting designed to afford the public the fullest opportunity to express opinions on a transportation project. A verbatim record (i.e., transcript) of the proceedings is made part of the project record.

public involvement – Activities that present information to the public, seek public comments, and serve to ensure consideration of public opinion.

public meeting – An announced meeting conducted by transportation officials designed to facilitate participation in the decision-making process and to assist the public in gaining an informed view of a proposed project at any level of the transportation project development process. Such a gathering may be referred to as a public information meeting.

rare and exemplary natural community – An assemblage of interacting plants and animals and their common environment, recurring across the landscape, in which the effects of recent human interference are minimal. Rare natural communities are those that occur infrequently. Exemplary natural communities are exceptional representatives of more common natural communities.

RCRA generator – An entity that produces hazardous waste regulated under the Resource Conservation and Recovery Act (RCRA) (42 USC Section 6901), which mandates the appropriate identification, tracking, and disposal of hazardous waste.

Record of Decision (ROD) – The document, prepared by the Federal Highway Administration, that presents the basis for the federal-agency action, summarizes any mitigation measures to be incorporated, and documents any required Section 4(f) approvals. No federal-agency action may be undertaken until a ROD has been signed. A ROD is prepared no sooner than 30 days after the public release of the Final EIS (FEIS).

relocations – The displacement of a residence, business, or other structure from a property owner, for public use, that requires the residents or business to be moved to an alternate location.

REMI Model – The Regional Economic Models, Inc., is a widely used and accepted econometric model maintained and updated by the Center for Business and Economic Research at the University of Southern Maine.

right-of-way – Land acquired by purchase, gift, or eminent domain to build and maintain a public road, bridge, railroad, or public utility.

riparian – An area of land that is adjacent to a stream or other water body.

riverine – Of and relating to rivers.

rural – A rural community is defined as an area with a population of fewer than 2,500 people or a population between 2,500 and 6,000 people and a worker-to-resident-worker ratio less than 1.0.

safety deficiency – In the context of this study, a safety deficiency is a highway segment or intersection that contains a high crash location.

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC Section 303) (Section 4(f)) – Legislation protecting publicly owned parks, public recreation areas, historic properties, or wildlife and waterfowl refuges. The statute states that no Department of Transportation project may use land from these areas unless it has been demonstrated that there is to be no prudent and feasible alternative to using the land and that the project includes all possible planning to minimize harm resulting from the use.

Section 6(f) of the Land and Water Conservation Fund Act of 1963 (Section 6(f)) – Legislation that provides for the public purchase and preservation of tracts of land.

Section 10 of the Rivers and Harbors Act of 1899 (Section 10) – Legislation (33 USC Section 403) that resulted in a permit being required from the U.S. Army Corps of Engineers (USACE) for projects requiring construction in or over navigable waters, the excavation from or dredging or disposal of materials in such waters, or any obstruction or alteration in a navigable water (e.g., stream channelization).

Section 106 of the National Historic Preservation Act (Section 106) – The National Historic Preservation Act of 1966 (16 USC 470f), Section 106, requires federal agencies to consider the effect of their undertakings on properties included in or eligible for inclusion on the National Register of Historic Places and to afford the Advisory Council on Historic Preservation the opportunity to comment on such undertakings.

Section 404 of the Clean Water Act (Section 404) – The Federal Water Pollution Control Act Amendments of 1972 (33 USC 401 et seq.) is the legislation for protection of waters of the United States by the USACE and the U.S. Environmental Protection Agency. In accordance with Section 404 of the Clean Water Act, a permit is required from the USACE for projects requiring discharge of dredged or fill material into waters of the United States.

shrub – A woody plant of relatively low height, having several stems arising from the base and lacking a single trunk.

sight distance – The distance that a driver can see along the roadway before curvature or obstructions block the view.

significant impacts – Any number of social, environmental, or economic effects or influences that may occur as a result of the implementation of a transportation improvement. "Significant impacts" may include effects that are direct, secondary, or cumulative. The term *significant* is used to measure both context and intensity and interpreted by the Federal Highway Administration in determining that type of National Environmental Policy Act document is appropriate. Categorical exclusions are those actions that do not involve significant effects. In most cases, Environmental Impact Statement projects can and do involve significant impacts.

significant wildlife habitat – as defined by Maine Law – Wildlife habitats, including deer-wintering yards, waterfowl and wading-bird habitat, seabird-nesting habitat, and significant vernal pools, that are protected under the State of Maine's 38 MRSA § 480-B.

State Implementation Plan (SIP) – A plan created under the 1990 Clean Air Act Amendments that establishes emission-reduction requirements for ozone and carbon-monoxide nonattainment areas. Proposed projects must demonstrate that the impacts of emissions are consistent with the appropriate SIP.

Stormwater Pollution Prevention Plan (SWPPP) – A plan required for major construction projects under the U.S. Environmental Protection Agency National Pollutant Discharge and Elimination System general permit for construction activities. The SWPPP is required to address measures to prevent erosion, sedimentation, and other potential discharges of pollutants to water bodies and wetlands.

stormwater runoff – The portion of precipitation that flows toward stream channels, lakes, or other water bodies as surface flow.

study area – An identified expanse of land or topography selected and defined at the outset of engineering or environmental evaluations that is sufficiently adequate in size to fully identify, analyze, and document impacts and effects for proposed projects within its boundaries.

study need – A detailed explanation of the specific transportation problems or deficiencies that have generated the search for improvements. It refers to technical information, as necessary, such as measures of traffic efficiency or demand (e.g., origin–destination patterns, modal links, queue lengths, motorist delays, and level of service) and other goals (e.g., economic development, safety improvement, and legislative directives). Much of this information should be generated by the transportation planning process at an early stage. The explanation of need should be a problem-statement discussion, not a solution-oriented discussion.

study purpose – A broad statement of the overall intended objective to be achieved by a proposed transportation facility. Typically, the purpose can be defined in a few sentences. For instance, it may address expanded capacity in a given transportation corridor to facilitate the safe and efficient movement of people and goods or improved access to a given area or community.

Supplemental Draft Environmental Impact Statement (SDEIS) – The document prepared by the Federal Highway Administration (FHWA) in accordance with FHWA National Environmental Policy Act regulations (23 CFR Part 771.130). A DEIS will be supplemented when the FHWA determines that (1) changes to the proposed action would result in significant impacts not evaluated in the DEIS, or (2) new information or circumstances relevant to environmental concerns and bearings on the proposed action or its impacts would result in significant environmental impacts not evaluated in the DEIS. An SDEIS document generally presents new and updated information with regard to changes in the study and environment that have occurred since the publication of a DEIS.

Surface-water supply watershed – The watershed that contributes to a public drinking-water supply.

system compatibility – Describes how well alternatives, either new highways or upgrades, fit into an existing highway network and the transportation-improvement plan.

system continuity – Defined by how often highways transition between wide, higher-speed segments to narrow, lower-speed segments.

system linkage – A planning concept that refers to the interconnecting of roadways that comprise an overall transportation network. A discussion about how a proposed project fits into an existing and future transportation system (i.e., network) and how it contributes to developing a sound transportation network in an area or region is termed *system linkage*. In describing this concept, the terms *connector road, missing link, gap completion,* and *circumferential link* are sometimes used.

system planning – A methodical approach to the formulation of plans and programs for safe, efficient, and balanced transportation networks. The process includes the setting of goals and objectives; the collection of data of existing conditions; the simulation of future activities; the formulation of alternative planned changes; the evaluation of the changes against the desired goals and objectives; and the decisions about recommendations that are feasible, desirable, and appropriate.

threatened species – Any species that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range (in reference to the Endangered Species Act [16 U.S.C. Chapter 35 Section 3(20)] and the Maine Endangered Species Act).

Traditional Cultural Property (TCP) – A property or site that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important to maintaining the continuing cultural identity of the community.

transportation deficiencies – A highway-related facility that is unable to safely and efficiently satisfy travel demands because of the intensity of traffic volumes, capacity, and/or safety.

Transportation Demand Management (TDM) – A system of actions whose purpose is to alleviate traffic problems through improved management of vehicle trip demand as opposed to adding new highway segments.

transportation project development process – An interactive, multiphase series of activities typically spanning a period of years that involves comprehensive planning, prioritization, detailed engineering and environmental studies, and agency and public involvement that lead to the selection, design, and construction of identified transportation improvements.

Transportation Systems Management (TSM) – Relatively low-cost measures to increase capacity and/or provide safety improvements on an existing transportation system. These measures typically include traffic-signal timing or phasing adjustments, designation of turning lanes at specific intersections or driveways, access-management improvements, and enhanced signage or markings.

unfragmented habitat block – An undeveloped area that is not impacted by roads, vegetation clearing, or development.

upgrade – A geometric improvement to an existing highway segment.

urban – An urban community is defined as an area with a population of more than 7,500 people or a population between 2,500 and 7,500 people and a worker-to-resident-worker ratio greater than 1.0.

U.S. Army Corps of Engineers (USACE) – A federal agency that administers Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Its regulatory programs address wetlands and waterways protection.

U.S. Department of Agriculture (USDA) – A federal agency responsible for administering programs that address farming issues.

U.S. Environmental Protection Agency (USEPA) – A federal agency responsible for administering programs that address environmental issues.

U.S. Fish & Wildlife Service (USFWS) – A federal agency responsible for addressing the protection of fish and wildlife including rare, threatened, or endangered species. The USFWS has an advisory role in the Section 404 regulatory program administered by the U.S. Army Corps of Engineers.

vegetation cover type – A biological community characterized by certain vegetation characteristics, such as hardwood forest, mixed forest, shrub, herbaceous, and urban or residential managed vegetation.

vehicle-hours traveled (VHT) – A measure of automobile use and trip time. One vehicle traveling 1 hour constitutes 1 vehicle-hour.

vehicle-miles traveled (VMT) – A measure of automobile use and trip length. One vehicle traveling 1 mile constitutes 1 vehicle-mile.

vernal pool – A temporary pool of surface water that provides breeding habitat for certain amphibian and invertebrate species.

volatile organic compounds (VOCs) – Colorless gaseous compounds originating, in part, from the evaporation and incomplete combustion of fuels. In the presence of sunlight, VOCs react to form ozone, a pollutant regulated by the Clean Air Act Amendments.

waterfowl and wading bird habitat (WWH) – Wetlands that provide habitat for waterfowl (i.e., geese, brant, and ducks) and wading birds (i.e., heron, egrets, bitterns, and rails) and meet certain criteria for size, quality, and percentage of open water as established by the Maine Department of Inland Fisheries and Wildlife regulations.

watershed – A region or area that contains all land ultimately draining to a water course, body of water, or aquifer.

wellhead protection area (WPA) – Areas of land in which human activities are regulated to protect the quality of groundwater that supplies public drinking-water wells.

wetlands – Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support – and that under typical circumstances do support – a prevalence of vegetation typically adapted for life in saturated soil conditions.

wild and scenic river – A river or river segment designated by the National Park Service because of the outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values (16 USC 1271-1287).

Acronyms

AADT	Average annual daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ac.	Acre
ACHP	Advisory Council on Historic Preservation
ADT	Average daily traffic
APE	Area of potential effect
BACTS	Bangor Area Comprehensive Transportation System
BMP	Best management practices
BCWP	Biennial Capital Work Plan
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
CRF	Critical Rate Factor
CWA	Clean Water Act (U.S.)
cy	Cubic yards
CZMA	Coastal Zone Management Act
dBA	Decibels using an A-weighted frequency filter
DEIS	Draft environmental impact statement
DHV	Design hour volume
DPS	Distinct population segment
EA	Environmental assessment
EFH	Essential fish habitat
EIS	Environmental impact statement
EO	Executive order
ESA	Endangered Species Act (U.S.)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FEIS	Final environmental impact statement
FONSI	Finding of no significant impact
FPPA	Farmland Protection Policy Act (U.S.)
GAP	Gap Analysis Program (Maine)
GOM	Gulf of Maine
gpm	Gallons per minute
HAPC	Habitat area of particular concern
HCL	High crash location
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITS	Intelligent transportation systems
IWWH	Inland waterfowl and wading bird habitat
LAWCON	Land and Water Conservation Fund Act of 1965

LEDPA	Least environmentally damaging practicable alternative
Leq(h)	One-hour equivalent sound level
LMA	Labor market area
LOS	Level of service
MaineDOT	Maine Department of Transportation
MASC	Maine Atlantic Salmon Commission
MASCP	Maine Atlantic Salmon Conservation Plan
MCP	Maine Coastal Program
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
MDOC	Maine Department of Conservation
MGS	Maine Geological Survey
MHPC	Maine Historic Preservation Commission
mi.	Mile
MNAP	Maine Natural Areas Program
MOA	Memorandum of agreement
mph	Miles per hour
MRSA	Maine Revised Statutes Annotated
MSAT	Mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NCHRP	National Cooperative Highway Research Program
NAC	Noise abatement criteria
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHS	National Highway System
NMFS	National Marine Fisheries Service
NNEPRA	Northern New England Passenger Rail Authority
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of intent
NOx	Nitrogen Oxide
NPDES	Nationial Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPA	Natural Resources Protection Act
NSA	Noise sensitive area
NWI	National Wetlands Inventory
PAC	Public Advisory Committee
Pb	Lead
PEM	Palustrine emergent wetlands
PFO	Palustrine forested wetlands
PM	Particulate matter
ppm	Parts per million
ppt	Parts per thousand
PSS	Palustrine scrub-shrub wetlands
ROD	Record of decision
SADT	Summer average daily traffic
SHPO	State Historic Preservation Officer
SO2	Sulfur dioxide
SPO	State Planning Office
STPA	Maine Sensible Transportation Policy Act
TDM	Travel demand management

TNM	Traffic Noise Model
TSM	Transportation systems management
TSS	Total suspended solids
TWWH	Tidal waterfowl and wading-bird habitats
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground storage tank
v/c	Volume to capacity ratio
VOCs	Volatile organic compounds
VHT	Vehicle hours traveled
VMT	Vehicle miles traveled
vpd	Vehicles Per Day
vph	Vehicles per hour
YOY	Young of the year

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Chapter 1
Purpose and Need

Chapter 1 details the underlying purpose and need to which the projects sponsors are responding with alternatives in Chapter 2. Chapter 1 provides an overview of the decision makers and decision-making process and provides a foundation for the remainder of the document.

The Maine Department of Transportation (MaineDOT) and the Federal Highway Administration (FHWA) have undertaken the Interstate 395/ Route 9 transportation study to identify a regional solution that will improve transportation-system linkage, safety, and mobility between I-395 and Route 9 in southern Penobscot County, Maine (exhibit 1.1).

The study area is located east of the City of Bangor and I-95 (exhibit 1.2). The City of Brewer and the Towns of Holden and Eddington comprise the majority of the study area. Small portions of the town of Clifton and the town of Dedham in Hancock County are also in the study area. The study area is generally bounded by the Penobscot River to the west, Route 1A to the south, Route 9 to the north, and Route 46 to the east, encompassing approximately 54 square miles.

The greater Bangor area is the economic and employment center for the north-central Maine region and a center for goods movement because of its proximity to the Interstate system and Canadian markets.

Exhibit 1.1 – *Location Map*

Chapter Contents

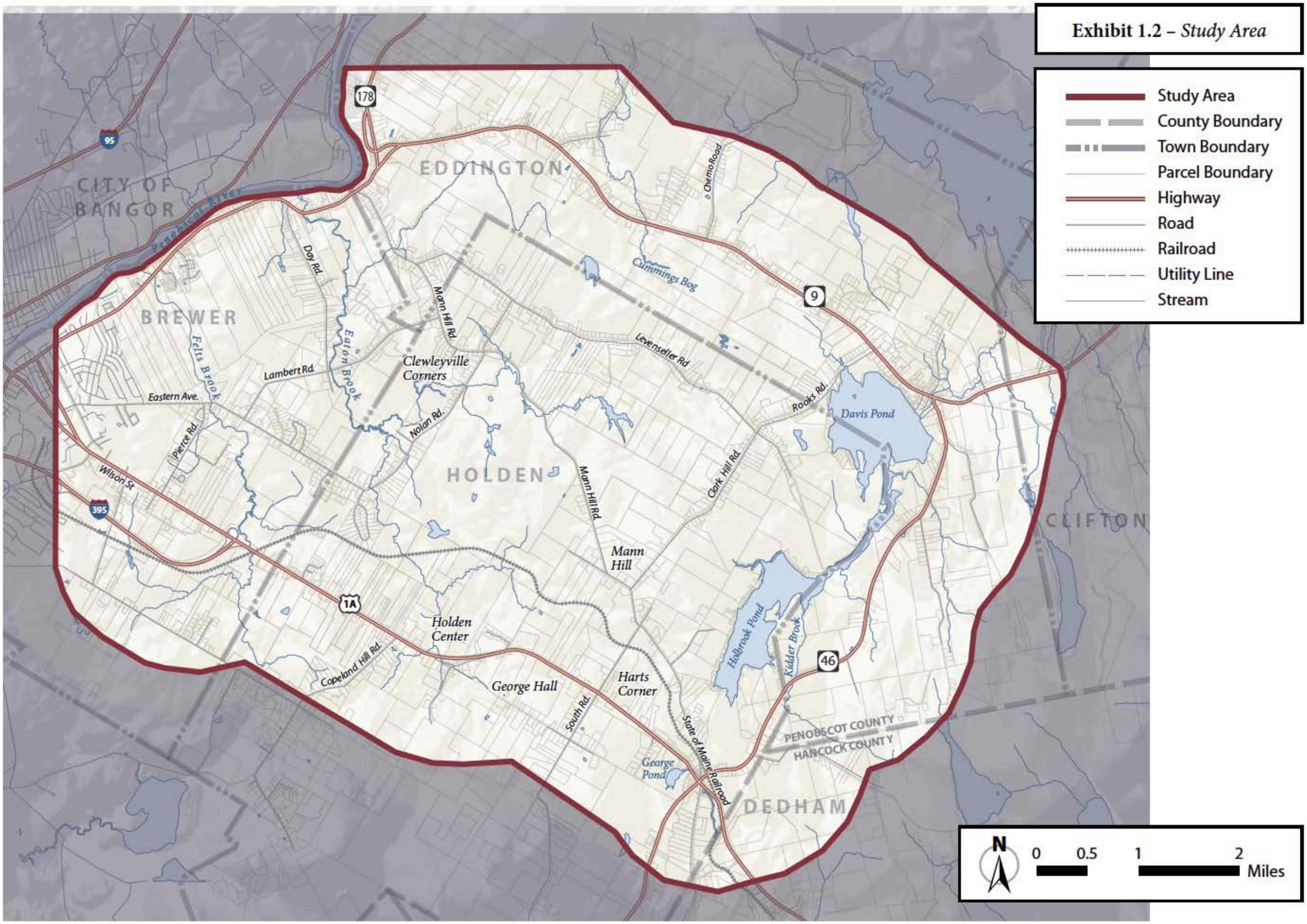


Exhibit 1.2 – Study Area
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
0
0.5
1
2
Miles
N
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Penobscot River
Cummings Bog
Davis Pond
Holbrook Pond
Kidder Brook
George Pond
Felts Brook
Eaton Brook
Clewleyville Corners
Mann Hill
Holden Center
George Hall
Harts Corner
Day Rd.
Mann Hill Rd.
Lambert Rd.
Eastern Ave.
Pierce Rd.
Nolan Rd.
Wilson St
Levenseller Rd
Rooks Rd.
Clark Hill Rd.
Chemo Road
Copeland Hill Rd.
South Rd.
State of Maine Railroad
95
395
178
9
1A
46

1.1 Study History

The opening of I-395, the State of Maine's east–west highway initiative, and the creation of the federal National Highway System (NHS) established the impetus for this study.

1.1.1 Opening of Interstate 395

In 1987, I-395 was extended from Bangor to Route 1A in the study area to provide a direct connection between I-95 and Route 1A. This direct connection was needed to accommodate increased seasonal tourist traffic destined for Acadia National Park and other coastal destinations. By establishing a direct connection between I-95 and Route 1A, seasonal tourist traffic could avoid travel through the urbanized Bangor/Brewer area.

The construction of I-395 also provided a new highway connection for motorists and commercial freight traveling between the Bangor/Brewer area and the Downeast portion of Maine and the Canadian provinces of New Brunswick and Nova Scotia via Route 9. The construction of I-395 allows traffic destined to the international border crossing at Calais, Maine, and other points to the east to use Routes 1A and 46, connecting with Route 9 in Eddington — thereby avoiding travel on local streets through the Bangor/Brewer area. This change in travel patterns generated a distinct change in the movement of regional passengers and goods through the study area and contributed to an increase in traffic and safety concerns along local roadways in the study area as drivers try to avoid the more congested state roads.

1.1.2 Maine East–West Highway Initiative

In 1997, the 118th Maine Legislature passed a law requiring the MaineDOT to conduct a study of the costs, benefits, and social and environmental impacts relative to the development of an east–west highway in Maine, linking Maine to the Canadian Maritime Provinces to the east and the larger markets of Quebec, Ontario, and the Midwestern United States to the west (MRSA 1997, Chapter 643, Part BB). The goal of an east–west highway in Maine is to capitalize on geographic opportunities for international trade and tourism through improved transportation infrastructure.

In 1999, the MaineDOT completed an extensive study of five corridors proposed to accommodate an east–west highway in Maine.

One improvement that was specifically identified by the study to meet the goals set forth for the east–west highway was of I-395, Routes 1A, 46, and 9 in the Brewer area (exhibit 1.3) (MaineDOT, 1999b).

The development of an east–west highway in Maine is partly in response to the economic potential of increased trade between Maine businesses and those in neighboring Canada. Canada has consistently been

Exhibit 1.3 – *Proposed East–West Highway*

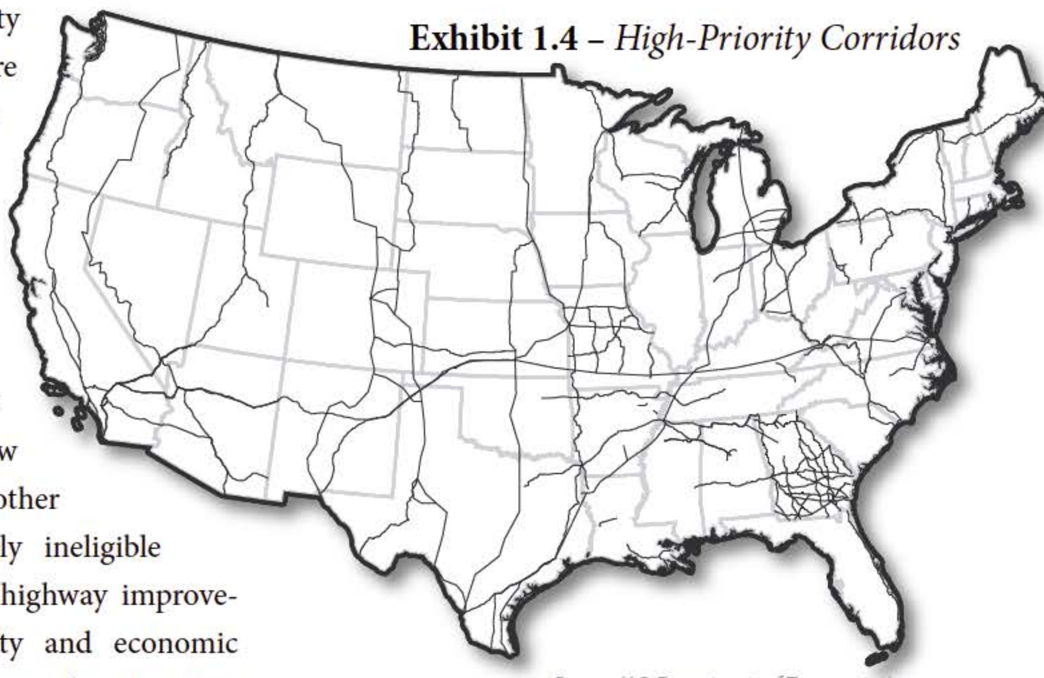
Maine's largest export market, representing nearly a third of all Maine exports in 2007 with $890 million of Maine products sold. This represents approximately $2.4 million in sales per day (Maine International Trade Center, 2008).

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 established a number of "Congressional High-Priority Corridors" (exhibit 1.4). The high-priority corridors were determined to be those that link nationally important regions and serve the travel and economic development needs of those regions (USDOT, 2008).

Until recently, there were no high-priority corridors in Maine or throughout most of the New England states. Maine and the other New England states were largely ineligible for federal funding set aside for highway improvements to assist regional mobility and economic development in those designated corridors. In 2005, the east–west corridor from Watertown, New York — continuing northeast through New York, Vermont, and New Hampshire to Calais, Maine — was designated as a congressional high-priority corridor (USDOT, 2008).

Highways are vital to the economy of Maine. They are used to move approximately 90 percent of the total weight of all Maine commodities, accounting for approximately 75 percent of the total value of all shipments (USDOT, 1996). Without improved highway infrastructure in Maine, long-term economic viability for the state may be jeopardized.

Exhibit 1.4 – *High-Priority Corridors*



Source: U.S. Department of Transportation, Federal Highway Administration 2008.

1.1.3 National Highway System

The ISTEA required Congress to establish the NHS. The purpose of the NHS is to provide an interconnected system of principal arterial highways that will serve major population centers, international border crossings, ports, airports, public transportation facilities, and other intermodal transportation facilities; meet national defense requirements; and serve interstate and interregional travel. The NHS has 163,734 designated miles of highway, which includes 46,380 miles of interstate highway and 117,354 miles of other freeways, expressways, and principal arterial highways across the nation (US DOT, 2001). Although accounting for only four percent of the total road miles in the Unites States, the NHS carries approximately 40 percent of all highway traffic, 75 percent of heavy truck traffic, and 90 percent of tourist traffic (Slater, 1996).

In Maine, 1,283 miles of highways and other roads are part of the NHS (USDOT, 1996). In the study area, I-395, Routes 1A, and 9 are part of the NHS. The MaineDOT and FHWA desire a better connection in the NHS between Routes 1A and 9. Outside the study area, Route 9 in Bangor (also known as Main Street) is part of the NHS, but it is posted at 25 miles per hour (mph) and has several signalized intersections before connecting with I-395 in Bangor. Although it is designated as part of the NHS, Main Street does not provide the level of mobility and regional connectivity envisioned as part of the NHS.

1.2 Study Purpose

In 2000, the statement of purpose and need for the I-395/Route 9 transportation study was developed in consideration of existing and projected transportation trends and conditions — and their affect on the mobility and safety of motorists and citizens within the study area and region.

The purposes of the I-395/Route 9 transportation study are to (1) identify a section of the NHS in Maine from I-395 in Brewer to Route 9, consistent with the current American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*; (2) improve regional system linkage; (3) improve safety on Routes 1A and 46; and (4) improve the current and future flow of traffic and the shipment of goods to the interstate system.

The logical termini of the project was identified and defined as (1) I-395 near Route 1A and (2) the portion of Route 9 in the study area.

The segment of highway connecting I-395 to Route 9 would have independent utility as Route 9 would continue to operate with sufficient capacity and at virtually the same operating speed without the need for improvement.

General Requirements for a Discussion of Purpose and Needs in an Environmental Impact Statement

- The requirement for a discussion of purpose and needs in an Environmental Impact Statement is to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." (40 CFR1502.13)
- The purpose and needs section is in many ways the most important part of a study and chapter of an EIS :
  - » It establishes why agencies are proposing to spend potentially large amounts of money while at the same time causing environmental impacts.
  - » A clear, well-justified purpose and need section explains that the expenditure of money is necessary and worthwhile and the priority that the action resulting from the study will be given relative to other needed highway projects.
  - » Although environmental impacts are expected to be caused by the project implemented resulting from the study, the purpose and needs section should justify why impacts are acceptable based on the project's importance.
- The discussion of purpose and needs should be as concise and understandable as possible. This discussion, which can be as short as one or two paragraphs, is important for general context and understanding, as well as to provide the framework in which "reasonable alternatives" to the proposed action will be identified. The discussion does not include a description of alternatives.

The purpose should be stated in only a few sentences.

Section 404 of the Clean Water Act requires a permit from the U.S. Army Corps of Engineers (USACE) for the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404(b)(1) of the Clean Water Act provides guidance to the USACE for issuing permits; compliance with the 404(b)(1) guidelines is required. The 404(b)(1) guidelines require the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA).

In compliance with Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) is required to prepare a basic purpose statement to determine compliance with the 404(b)(1) guidelines. Accordingly, the USACE determined that the basic project purpose "…is to provide for the safe and efficient flow of east–west traffic and shipment of goods from Brewer (I-395) to Eddington (Route 9), Maine, for current and projected traffic volumes" (Appendix A).

In support of this study, a public advisory committee (PAC) was assembled (Appendix B). The PAC consisted of volunteer citizens who are representatives of city and towns in the study area and the adjoining areas. The role of the PAC is to meet periodically throughout the study to review and comment on the activities and work performed and to provide insight to local features, issues, and concerns. The PAC assisted in developing the statement of the study's purposes and why it is needed.

In recognition of these overall study purposes, the PAC developed the following set of goals that the study should seek to address:

- safer travel from Route I-395 to Route 9
- travel efficiency
- neighborhood protection
- economic development

- environmental protection
- long-range, comprehensive planning
- connectivity with other roads and towns
- access for emergency vehicles and general traffic
- historical/archeological preservation
- financial return for investment

1.3 Study Need

The need (i.e., the problem) for transportation improvements is based on poor roadway geometry in the study area combined with an increase in local and regional commercial and passenger traffic that has resulted in poor system linkage, safety concerns, and traffic congestion.

1.3.1 Poor System Linkage

Continuity in the transportation system is essential for efficient vehicle movements and travel patterns and safety. System continuity can be defined and measured by how often an existing highway transitions between wider, higher-speed segments to narrower, lower-speed segments. System linkage and improved mobility results from smooth interconnections and transitions between regional, high-speed, high-capacity highways. In connecting these types of highways, highway-design principles attempt to provide for gradual and consistent transitions in travel speed, roadway geometry, and capacity.

Vehicles traveling through the study area from I-395 to Route 9 generally proceed from I-395 to Routes 1A, 46, and 9 — a path that has abrupt transitions in travel speed, roadway geometry, and capacity, as follows:

- I-395 is a principal arterial highway between I-95 in Bangor and Route 1A in the study area. I-395 is a controlled-access highway with two eastbound and two westbound lanes separated by an approximate 50-foot grass median. It connects to Route 1A, in Brewer with a partial cloverleaf interchange. I-395 has a posted speed of 55 mph and has a paved shoulder approximately 10 feet wide.
- Route 1A is a principal arterial highway connecting the greater Bangor and Brewer area with Ellsworth and the coast at Bar Harbor. West of the I-395 interchange, Route 1A has two eastbound lanes and two westbound lanes. East of the I-395 interchange, Route 1A has one eastbound lane, one westbound lane, and a center turn lane from Brewer to approximately 1.3 miles east of the I-395 interchange. The remainder of Route 1A in the study area and to the coast has one eastbound and one westbound lane with no center turn lane. Access to Route 1A from its adjacent properties is not controlled and is subject to the state's rules on

Logical termini are features such as cross-route locations that are considered rational end-points for a transportation improvement and that serve to make it useable.

A principal arterial highway is a highway found in both urban and rural areas that connects urban areas, international border crossings, major ports, airports, public transportation facilities, and other intermodal transportation facilities.

A controlled-access highway is a highway that provides limited points of access. Interstate highways are controlled-access highways in which access points occur only at interchanges.

Access Management
The 119th Maine Legislature approved LD 2550, An Act to Ensure Cost-Effective and Safe Highways in Maine. The purpose of the Act is to ensure the safety of the traveling public and protect highways against negative impacts of unmanaged access.

The Act specifically directs the MaineDOT and authorized municipalities to promulgate rules to ensure safety and proper access on all state and state-aid highways with a focus on maintaining posted speeds on arterial highways outside urban compact areas.

More information can be found at http://www.state.me.us/mdot/planning-process-programs/amprogram.php.

access management. Route 1A in the study area is posted at 25 to 45 mph, depending on location, and has a paved shoulder approximately 6 feet wide. The land uses adjacent to Route 1A in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 1A are becoming increasingly more commercial.

- Route 46 is a two-lane collector road connecting Route 1A to Route 9. Access to Route 46 from adjacent properties is not controlled and is subject to Maine's rules on access management. Portions of Route 46 are steep and exceed the State of Maine's design criteria. Route 46 is posted at 35 or 45 mph and has a gravel shoulder approximately four feet wide. The land cover adjacent to Route 46 is primarily mature forested areas with scattered residences and open areas. Approaching Route 9, the land uses adjacent to Route 46 are primarily residential. Because of the mature forest canopy, considerable portions of Route 46 are shaded, and snow and ice cover does not melt rapidly.
- Route 9 is a two-lane principal arterial highway connecting the greater Bangor and Brewer area with Washington County and the Canadian Maritime Provinces to the east. Access to Route 9 from its adjacent properties is not controlled and is subject to the Maine's rules on access management. Route 9 is posted at 35 or 55 mph with some school zones, depending on location in the study area, and has a paved shoulder approximately eight feet wide. The land uses adjacent to Route 9 in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 9 are becoming increasingly more developed. To the east of the study area, the land uses and land cover adjacent to Route 9 quickly become less developed and more forested, and the speed limit increases to 55 mph. Most of the land adjacent to Route 9 east of the study area to the Canadian border is undeveloped.

The portions of Routes 1A and 46 in the study area do not provide a high-speed, controlled-access arterial highway between I-395 and Route 9 to the east. These two roads do not provide an operationally efficient transportation facility for regional connectivity and mobility through the study area. The results of these deficiencies in system linkage are safety concerns, delays in passenger and freight movement, and conflicts between local and regional traffic.

1.3.2 Safety Concerns

Locations in the study area exhibit higher crash rates than other locations in Maine with similar characteristics.

Data were collected and analyzed to identify high crash locations (HCLs) using a critical rate factor (CRF). The CRF of an intersection or roadway section is a statistical measure of that location's crash history as compared to locations with similar geography, traffic volume, and geometric characteristics. When a CRF exceeds 1.00, the intersection or portion of a roadway has a higher-than-expected crash rate. Those locations with a CRF higher than 1.00 and more than eight crashes in a three year-period are considered HCLs.

Data were collected and analyzed to identify HCLs in the study area (exhibit 1.5). MaineDOT crash data for January 2004 through December 2008 indicate 10 HCLs that meet the criteria in the study area (MaineDOT, 2007b; MaineDOT, 2010).

The majority of crashes occurred on clear days with dry road conditions (MaineDOT, 2000b).

1.3.3 Traffic Congestion

Since the extension of I-395 from Bangor to Route 1A in 1987, traffic volumes in the study area have increased steadily. This growth has been most pronounced along Route 46 between Routes 1A and 9, which has become more widely used by both passenger vehicles and trucks as a connection among I-95, I-395, and Route 9.

Much of the truck traffic in the study area is through-traffic. Most of the truck trips are between the Canadian Maritime Provinces and Washington County at the eastern end, and Penobscot County and the New England states at the western terminus of the trips (MaineDOT, 2000a). Approximately 80 percent of truck traffic on Route 9 uses Route 46, and approximately five of six heavy trucks that use Routes 46 and 1A also use I-395 (MaineDOT, 2001). Route 46 south of Route 9 exhibited the greatest annual growth rate (i.e., annual growth factor of 1.121) in heavy-truck traffic between 1983 and 1996 of all roadways in the greater Bangor area (BACTS, 1998).

Estimates of the current and future annual average daily traffic (AADT) for all vehicles and heavy trucks were determined based on MaineDOT traffic count data (exhibit 1.6).

With the recent economic downturn and increase in the price of gas, traffic in the study area has not grown as fast as previously thought. The MaineDOT and FHWA anticipate the growth in traffic and traffic volumes originally forecast for the study area for the year 2030 won't materialize until the year 2035. By 2035, traffic volumes on Route 46 between Routes

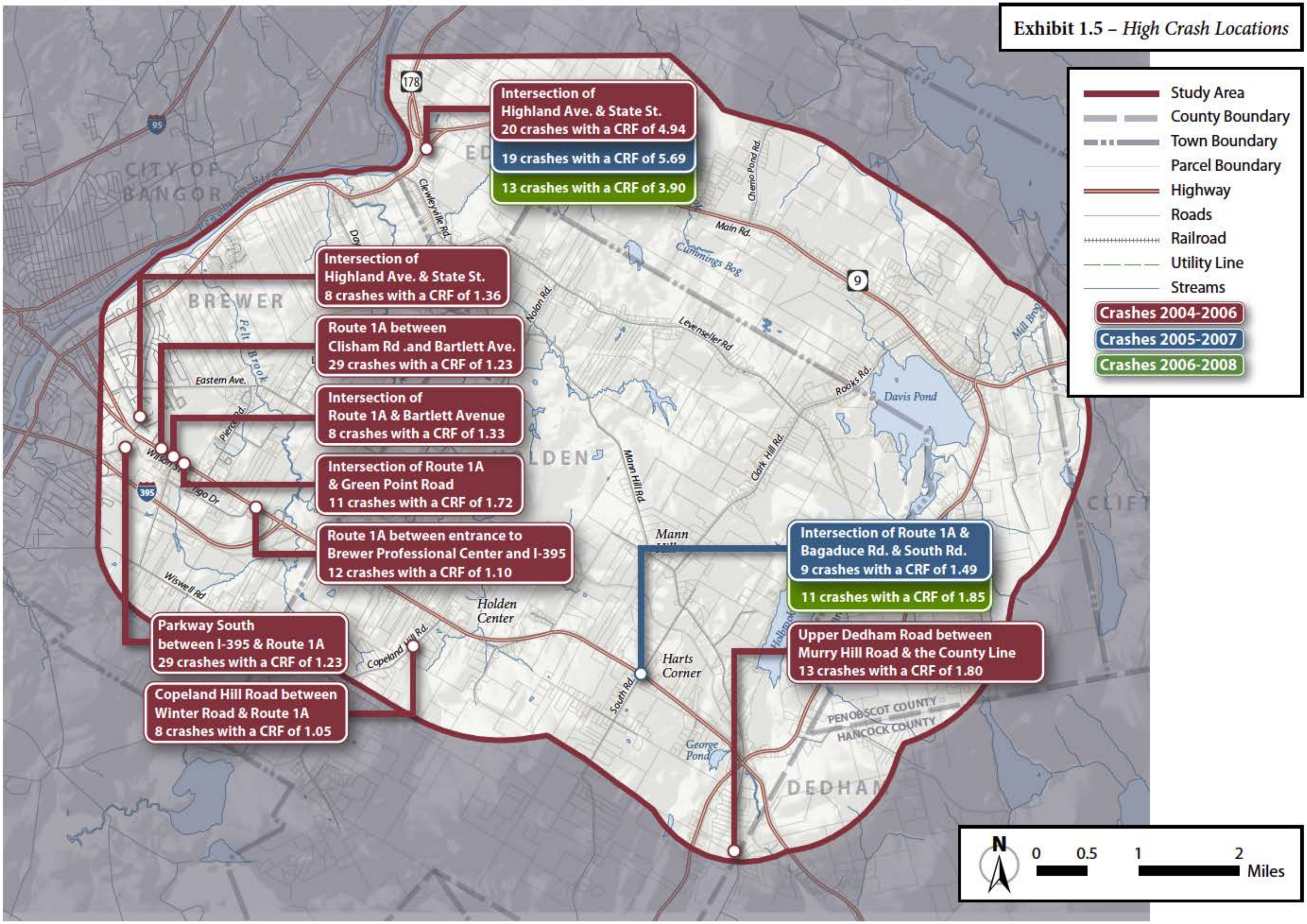


Exhibit 1.5 – High Crash Locations
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
Crashes 2004-2006
Crashes 2005-2007
Crashes 2006-2008
Intersection of Highland Ave. & State St. 20 crashes with a CRF of 4.94
19 crashes with a CRF of 5.69
13 crashes with a CRF of 3.90
Intersection of Highland Ave. & State St. 8 crashes with a CRF of 1.36
Route 1A between Clisham Rd .and Bartlett Ave. 29 crashes with a CRF of 1.23
Intersection of Route 1A & Bartlett Avenue 8 crashes with a CRF of 1.33
Intersection of Route 1A & Green Point Road 11 crashes with a CRF of 1.72
Route 1A between entrance to Brewer Professional Center and I-395 12 crashes with a CRF of 1.10
Parkway South between I-395 & Route 1A 29 crashes with a CRF of 1.23
Copeland Hill Road between Winter Road & Route 1A 8 crashes with a CRF of 1.05
Intersection of Route 1A & Bagaduce Rd. & South Rd. 9 crashes with a CRF of 1.49
11 crashes with a CRF of 1.85
Upper Dedham Road between Murry Hill Road & the County Line 13 crashes with a CRF of 1.80
CITY OF BANGOR
BREWER
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Holden Center
Harts Corner
Davis Pond
George Pond
Cummings Bog
Main Rd.
Levenseller Rd
Rooks Rd.
Clark Hill Rd.
Mann Hill Rd.
Chemo Pond Rd.
Nolan Rd.
Clewleyville Rd.
Eastern Ave.
Wiswell Rd
South Rd.
Copeland Hill Rd.
N
0 0.5 1 2 Miles

Exhibit 1.6 – *Existing and Future Traffic*

Location	1998 AADT	2006 AADT	2010 AADT	2035 AADT	2010 Truck AADT	2035 Truck AADT	% Growth 1998–2035	Growth Per Year 1998–2035
Route 1A east of I-395	18,140	20,370	22,236	33,070	1,569	2,449	82%	2.57%
Route 1A west of Route 46	16,550	15,220	16,976	30,600	1,569	2,449	85%	2.65%
Route 1A east of Route 46	11,220	11,260	12,116	18,870	1,569	2,449	68%	2.13%
Route 46 south of Route 1A	1,920	1,870	2,021	3,130	265	281	63%	1.97%
Route 46 north of Route 1A	2,270	2,270	3,058	8,570	604	1,167	278%	8.67%
Route 9 east of Route 178	6,440	6,870	7,156	8,730	569	662	36%	1.11%
Route 9 west of Route 46	4,780	5,050	5,129	5,410	604	1,167	13%	0.41%
Route 9 east of Route 46	5,100	5,400	5,830	10,940	879	1,535	115%	3.58%

1A and 9 are forecasted to increase by approximately 6,300 vehicles (i.e., 278 percent) (MaineDOT, 2007a).

The projected increases in traffic will lead to more traffic congestion. To help measure the traffic-congestion problem and the quality of traffic flow, the MaineDOT modeled existing (i.e., 1998 and 2006) and future (i.e., 2035) design hour volumes (DHVs) of traffic for three roadways in the study area: Routes 1A, 9, and 46. The DHV is the 30th highest hour of travel during a year at a given location; therefore, it accurately reflects the heaviest summer travel congestion.

The MaineDOT used the DHVs to determine the volume-to-capacity (v/c) ratio, operating speeds, and overall level of service (LOS) for the following five roadway segments within the study area: (1) Route 1A east of the I-395 interchange and west of Route 46; (2) Route 1A east of Route 46; (3) Route 46 between Routes 1A and 9; (4) Route 9 east of Route 178 and west of Route 46; and (5) Route 9 east of Route 46.

The v/c ratio is a measure of traffic demand on a roadway (expressed as volume, “v”) compared to its traffic-carrying capacity (expressed as capacity, “c”). For example, a v/c ratio of 0.7 indicates that a roadway is operating at 70 percent of its capacity.

The average travel speed is an important measure of the quality of traffic flow because it reports traffic flow in terms that most people can understand and to which they can relate their own experiences.

Exhibit 1.7– *LOS Thresholds on Two-Lane Rural Highways*

Level of Service	Flow Conditions	Operating Speed (mph)	Technical Descriptors
A		55+	Highest quality of service. Free traffic flow; low volumes and densities. Little or no restriction on maneuverability or speed. **No Delays**
B		50	Stable traffic flow; speed becoming slightly restricted. Low restriction on maneuverability. **No Delays**
C		45	Stable traffic flow but less freedom to select speed, change lanes, or pass. Density increasing. **Minimal Delays**
D		40	Approaching unstable flow. Speeds tolerable but subject to sudden and considerable variation. Less maneuverability and driver comfort. **Minimal Delays**
E		35	Unstable traffic flow with rapidly fluctuating speeds and flow rates. Short headways, low maneuverability, and low driver comfort. **Significant Delays**
F		25-	Forced traffic flow. Speed and flow may drop to zero with high densities. **Considerable Delays**

LOS is a qualitative measure of the performance of a roadway describing operational conditions. Generally, the LOS is defined in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, and convenience (exhibit 1.7). Six LOS "levels" are defined for each type of roadway with different analyses and definitions for each type. Letters designate each "level" with LOS A representing the best operating conditions and LOS F representing the worst. Each LOS represents a range of operating conditions and relies heavily on the perceptions of drivers. In developed areas, LOS D is typically the "worst" traffic condition considered acceptable during normal peak hours.

In evaluating the performance of roadways, the v/c ratios and average operating speeds should be considered together with LOS, which is more of a qualitative assessment. The three performance measures do not necessarily indicate the same need to improve a roadway. For example, a roadway improvement may address an unfavorable LOS, but the roadway may already have ample capacity. Similarly, improvement in a road could reduce the v/c ratio but only have a minimal impact on average travel speed.

The MaineDOT estimated the v/c ratios, operating speeds, and overall LOS of these roadway segments using peak season 1998 and 2006 travel conditions and forecasted peak season 2035 travel conditions (exhibit 1.8). Route 1A east of the I-395 interchange and west of Route 46 is forecasted to decrease in service from LOS E in 1998 to LOS F by 2035 (MaineDOT, 2007a). LOS F represents heavily congested flow with traffic demand exceeding capacity (Transportation Research Board, 1998). Route 1A east of Route 46 is forecasted to decrease from LOS D in 1998 to LOS E by 2035 (MaineDOT, 2007a). LOS E is defined as traffic flow on two-lane highways having a time delay of greater than 75 percent. Passing under LOS E conditions is virtually impossible. LOS E is seldom attained over extended sections of level terrain on more than a transient condition; most often, small disturbances in traffic flow as LOS E is approached cause a rapid transition to LOS F (Transportation Research Board, 1998).

The intersection of Routes 1A and 46 is a signalized intersection. This intersection handles traffic traveling to and from the areas of Downeast Maine and traffic to and from the Ellsworth area and the coast. In 1998, the overall performance of this intersection was estimated using peak-volume conditions at LOS B (exhibit 1.9). By 2035, with increases in traffic volume and corresponding increases in delays, this intersection is forecasted to decline to an overall performance of LOS F. LOS F at a signalized intersection describes a control delay exceeding 80 seconds per vehicle. This LOS occurs when arrival flow rates exceed the capacity of the intersection (Transportation Research Board, 1998).

Exhibit 1.8 – *DHV, v/c Ratio, Average Travel Speed, and LOS for Roadways Segments*

Year	DHV	v/c Ratio	Average Travel Speed (mph)	LOS Rural Two-Lane Road
Route 1A east of I-395				
1998	1,840	0.63	34.6	E
2006	2,001	0.69	33.2	E
2035	3,269	1.12	varies	F
Route 1A east of Route 46				
1998	1,282	0.43	44.1	D
2006	1,268	0.43	44.2	D
2035	2,123	0.72	37.5	E
Route 46 between Routes 1A and 9				
1998	244	0.14	45.1	C
2006	197	0.12	45.6	C
2035	1,006	0.40	40.8	D
Route 9 east of Route 178				
1998	641	0.27	41.2	D
2006	629	0.26	41.3	D
2035	873	0.36	39.5	E
Route 9 east of Route 46				
1998	505	0.20	43.9	D
2006	573	0.23	43.5	D
2035	1,267	0.46	39.3	E

The intersection of Routes 46 and 9 is an unsignalized intersection. This intersection handles traffic traveling to and from Bangor (and the Interstate system) and Downeast Maine. Unsignalized intersections are not defined by an overall LOS for the intersection; individual approaches to the intersection are evaluated in terms of delay (measured in seconds) and expressed by a LOS. Threshold LOS values for individual approaches to unsignalized intersections are lower for unsignalized intersections (exhibit 1.10) than for signalized intersections because of the difference between idling at a stop sign, actively looking for a gap in traffic, and idling at a traffic signal, passively waiting for the green phase. The more onerous activity of searching for a gap and the uncertainty of when that gap will arrive makes delay at a stop sign more difficult than at a traffic signal.

In 1998, the delay on the northbound approach of Route 46 to the intersection of Routes 46 and 9 was estimated using peak-volume conditions to be 6.5 seconds (LOS A) (exhibit 1.11). By 2035, with increases in traffic volume, this delay is forecasted to increase to 119.4 seconds (LOS F). LOS F at an unsignalized intersection occurs when there are insufficient gaps of suitable size to allow side-street traffic to safely cross through a major-street traffic system (Transportation Research Board, 1998).

1.4 Other Actions

In support of east–west travel, the MaineDOT and the FHWA have made substantial improvements in Route 9 in the past 15 years. Since 1993, MaineDOT has improved over 62 miles of the 88-mile corridor between Clifton and Baileyville at a cost of more than $66 million. The last reconstruction project was

Exhibit 1.9 – *LOS Criteria for Signalized Intersections*

Level of Service	Control Delay Per Vehicle (Seconds)
A	< 10
B	> 10 and < 20
C	> 20 and < 35
D	> 35 and < 55
E	> 55 and < 80
F	> 80

Exhibit 1.10 – *LOS Criteria for Individual Approaches to Unsignalized Intersections*

Level of Service	Control Delay Per Vehicle (Seconds)
A	< 10
B	> 10 and < 15
C	> 15 and < 25
D	> 25 and < 35
E	> 35 and < 50
F	> 50

Exhibit 1.11 – *Delay on Route 46 at the Intersection of Routes 46 and 9*

Year	Delay (Seconds)
1998	6.5
2006	5.6
2010	7.5
2035	119.4

completed in 2003. In addition to the investments in the Route 9 corridor, a new Border crossing was built between Calais, Maine and St. Stephen, New Brunswick. Two other actions – the Calais–St. Stephen Border Crossing and the removal of the 80,000 pound weight restrictions on the Interstate–affect the effectiveness of east–west travel across the state and Northern New England.

1.4.1 Calais–St. Stephen Area International Border Crossing

A third international border crossing has been built between Calais, Maine, and St. Stephen, New Brunswick, and was opened to traffic in 2009. This new international border crossing plays an important role in the I-395/Route 9 transportation study. An improved international border crossing with new and efficient inspection facilities, in both the United States and Canada, will allow commercial and seasonal tourist traffic to flow more easily to and from the I-395/Route 9 study area using Route 9 (see exhibit 1.3). As a result of the improved border crossing and traffic operations, an increasing amount of traffic is forecasted to use Route 9 as an alternative to I-95 when traveling north or south to and from Canada and Downeast Maine.

1.4.2 Weight Restrictions on the Interstate System

On November 18, 2011 President Obama signed the 2012 Transportation funding bill that will allow trucks weighing up to 100,000 pounds to travel on Maine's federal interstates - including I-95 and 395 - for an additional 20 years. This will allow the heaviest trucks to stay on the Interstates and avoid using state and local roads through towns and communities. The increased weight limit further underscores the purpose of this study and the need for action.

1.5 Federal and State Decisions and Actions

The MaineDOT and the FHWA, with input from the public and the federal and state regulatory and resource agencies, will decide which action to take in accordance with the National Environmental Policy Act (NEPA). The NEPA process is intended to help public officials make decisions based on an understanding of the environmental consequences and to take actions that protect, restore, and enhance the environment (40 CFR Part 1500.1) (exhibit 1.12).

This document identifies reasonable alternatives and assesses their potential transportation, social, economic, and environmental impacts. NEPA requires federal agencies to consider the impacts of their actions on the natural, social, economic, and cultural

Exhibit 1.12 –
The NEPA Process

environment and to disclose those considerations in a public decision-making document referred to as an Environmental Impact Statement (EIS). The EIS is first circulated publicly as a Draft EIS (DEIS). Following publication of the DEIS, a public hearing is held to solicit additional public input for the federal decision-making process. Additional public input will be accepted during an open public-comment period following publication of the DEIS.

The purpose of this EIS is to provide the FHWA, the MaineDOT, other federal and state agencies, and the public with a full accounting of the anticipated environmental impacts of the alternatives developed for meeting the study's purpose and needs. The EIS serves as the primary document to facilitate review of the proposed action by federal, state, and local agencies and the public. The EIS will provide full discussion of potential environmental impacts and will inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment (40 CFR Part 1502.1). An EIS must briefly discuss the purpose and need for the proposed action, the range of alternatives considered, the resultant environmental impacts from the proposed action, and the agencies and people consulted during the planning of the proposed action.

Publication of the Final EIS (FEIS) would be followed by the FHWA issuing a Record of Decision (ROD) that selects and explains the rationale for selecting the preferred alternative and the funding, construction, operation, and monitoring of the preferred alternative. The ROD will accomplish the following:

- State the decision.
- Identify all alternatives considered by the lead agencies in reaching their decision, specifying the alternative or alternatives that were considered environmentally preferable. An agency may discuss preferences among alternatives based on relevant factors, including economic and technical considerations and agency statutory missions. An agency will identify and discuss all such factors, including any essential considerations of national policy that were balanced by the agency in making its decision, and state how those considerations entered into its decision.
- State whether all practicable means to avoid or minimize environmental harm from the

alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program will be adopted and summarized where applicable for any mitigation (40 CFR Part 1505.2).

This DEIS provides the MaineDOT with the decision-making tool required by the Sensible Transportation Policy Act (STPA), which mandates that the MaineDOT "evaluate the full range of reasonable transportation alternatives for significant highway construction or reconstruction projects." The MaineDOT actions that may proceed after completion of the NEPA process may include final design, property acquisition for use as transportation right-of-way, and construction.

This DEIS integrates the requirements of Section 404 of the CWA and provides information in support of the permit application submitted to the USACE. The USACE provides oversight and regulates activities in the nation's waters. A Section 404 individual permit would be required from the USACE for the discharge of dredged or fill material into the Waters of the United States, which include wetlands. Section 404(b)(1) of the CWA provides guidance to the USACE for the issuance of permits; compliance with Section 404(b)(1) is required. Section 404(b)(1) requires project sponsors to select the Least Environmentally Damaging Practicable Alternative (LEDPA).

A permit will not be issued if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. A LEDPA should be obtained prior to completing the FEIS/ROD because the ROD documents the Preferred Alternative.

The objective of this EIS is to identify a solution that furthers the study purpose, satisfies the needs of the study, and minimizes adverse environmental and social impacts at an affordable cost.

1.6 Scope of This Environmental Analysis

The I-395/Route 9 Transportation Study was initiated in 2000 as an Environmental Assessment (EA). In December 2000, scoping letters were mailed to federal, state, regional, and local agencies; special-interest groups; and others in accordance with the procedural provisions of NEPA and the MaineDOT's and the FHWA's requirements and policies for scoping and early coordination.

The MaineDOT and the FHWA developed the scoping process to comply with the spirit and intent of the NEPA. A public scoping and informational meeting was held on April 11, 2001. The purpose of the meeting was to review the planning and programming activities that led to the initiation of this phase of the study and to provide an opportunity for the public to provide comments at the beginning of the study. The meeting included a discussion of the history, purpose, and needs, as well as a broad review of the strategies and alternatives for satisfying the purpose and needs of the study. About 70 people attended the scoping meeting. Most of the meeting consisted of questions and answers related to construction of the preferred alternative.

The MaineDOT and the FHWA created a public advisory committee (PAC) with representatives from the communities in or adjacent to the study area. The PAC met monthly during the scoping process to discuss environmental issues, potential alternatives, and other scoping-related issues. In addition, the MaineDOT conducted a scoping meeting with federal and state agency representatives on November 14, 2000, and continued the scoping discussion on February 13, 2001.

These scoping and study processes resulted in confirmation of the needs for the study, the identification of local values and objectives, the identification of features and resources of concern, and the identification of a range of alternative actions to be analyzed. The PAC assisted the MaineDOT and the FHWA with identifying a broad range of alternatives to be developed and analyzed. The range of reasonable alternatives developed for satisfying the study's purpose and needs was screened, refined, and evaluated as part of the environmental analysis that continued through October 2005 (see Appendix C).

On October 11, 2005, the I-395/Route 9 transportation study was elevated to an EIS by the FHWA because of the potential impacts to wetlands and the potential difficulty in compensating for those impacts. In response to the need to prepare an EIS, the FHWA published a Notice of Intent (NOI) to prepare the EIS in the *Federal Register* on December 1, 2005.

The MaineDOT and the FHWA held a second agency scoping meeting in the study area on June 3, 2008. The attendees toured the study area and provided input to the methods of analysis to be used and potential opportunities to compensate for unavoidable adverse impacts. A public scoping meeting was held on June 4, 2008; approximately 30 people attended that meeting. Exhibit 1.13 lists the concerns that people raised during the public scoping process and where those issues are addressed in this EIS.

Exhibit 1.13 – *Issues Identification and Tracking*

Issue or Suggestion	Addressed in Section…	Remarks
Traffic counts and traffic projections for the future may be outdated with the passage of time and the increase in the price of gasoline.	1.3.3 Traffic Congestion	The MaineDOT took new traffic counts in the study area in 2006 and truck counts on Route 178 at Route 9 in August 2008. The MaineDOT reported the results of these traffic counts in the EIS and revised the traffic projections for the area for 2010 and 2035 using these more recent traffic counts and its statewide travel-demand traffic model.
If the 80,000-pound weight limit for trucks on the Interstate is increased to 100,000 pounds, will it affect this study?	1.4 Other actions that influence the scope of this study	On November 18, 2011 President Obama signed the 2012 Transportation funding bill that will allow trucks weighing up to 100,000 pounds to travel on Maine's federal interstates - including I-95 and 395 - for an additional 20 years. This will allow the heaviest trucks to stay on the Interstates and avoid using state and local roads through towns and communities. The increased weight limit further underscore the purpose of this study and the need for action.
Will the road be controlled-access?	2.2.2 Continued Screening	Yes. No access to local roads from the new highway would be permitted.
Consider coordinating with the fire departments that serve the area because they may want access to local roads midway between access points.	3.4.1.4 Community Facilities and Services	The MaineDOT has coordinated with the fire departments. Emergency responders would see similar or improved response times without the need for new access points to local roads.
This study started as an EA and was elevated to an EIS. How much of the original study remains valid and will be used in the EIS?	1.6 Scope of This Environmental Analysis	All materials produced during the EA phase would be used in the preparation of the EIS.
If one of the westernmost alternatives is selected, consider developing a short connection to Route 178.	See remarks	The MaineDOT and the FHWA considered the merits and feasibility of providing a connection between the westernmost alternatives and Route 178 to help remove truck traffic through downtown Brewer. This connection, although feasible, would remove only a small portion of the truck traffic through downtown Brewer destined for the Interstate and was estimated to cost between $15 million and $20 million dollars to construct, depending on the build alternative selected. A connection between the westernmost alternatives and Route 178 does not help to address the purpose and needs of this study. The MaineDOT and the FHWA concluded that they do not wish to further expand the scope of this study and consider a connection between the westernmost alternatives and Route 178.
Alternative 3A-3EIK-1 will displace all 86 families that live in the Pine Cone Mobile Home Park.	See remarks	Alternative 3A-3EIK-1 was designed to avoid the Pine Cone Mobile Home Park and was dismissed from further consideration.
How much property would be acquired?	3.4.1.1 Land Use	The MaineDOT and the FHWA would acquire the minimum amount of property necessary to construct the preferred alternative. Property would be acquired and used as right-of-way for the preferred alternative; the average width of the right-of-way is approximately 200 feet.

Issue or Suggestion	Addressed in Section…	Remarks
Would Route 9 be widened to four lanes?	2.2.2.2 Evaluation of Route 9	No. After careful consideration the MaineDOT determined that Route 9, with the exception of the sections approaching the intersection of Routes 9 and 46 where the posted speed limit is lower than other portions of Route 9, could reasonably accommodate future traffic volumes for the next 20 years without additional improvements beyond the existing right-of-way.
The MaineDOT's priorities should not include this study; the MaineDOT should focus on maintaining existing roads and not building new highways.	See remarks	The MaineDOT has a "maintenance first'" policy. As part of its long-range improvement program, the MaineDOT is studying several capacity-adding projects across the state that are forecasted to have increases in traffic volumes and decreases in traffic mobility in the foreseeable future.

1.7 Applicable Regulations, Guidance, and Required Permits and Approvals

The following statutes and orders apply to the proposed action and were considered during the performance of this study and preparation of this EIS:

- American Indian Religious Freedom Act (AIRFA)
- Archeological and Historical Preservation Act (AHPA)
- Archeological Resources Protection Act (ARPA)
- Clean Air Act (CAA), 40 CFR 50
- Coastal Zone Management Act of 1972 (CZMA), 15 CFR 930
- Community Environmental Response Facilitation Act
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 40 CFR 373 and 41 CFR 101-47
- Endangered Species Act, as promulgated at 50 CFR 17
- Environmental Impact and Related Procedures, 23 CFR 771, signed March 24, 2009
- Environmental Quality Improvement Act
- Executive Order 11514 Protection and Enhancement of Environmental Quality
- Executive Order 11593 Protection and Enhancement of the Cultural Environment
- Executive Order 11988, Floodplain Management, 42 FR 26951, signed May 24, 1977
- Executive Order 11990, Protection of Wetlands, 42 FR 26961, signed May 24, 1977
- Executive Order 12088 Federal Compliance with Pollution Control Standards
- Executive Order 12372, Intergovernmental Review of Federal Programs
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, signed February 11, 1994
- Executive Order 13007, Indian Sacred Sites
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, 65 FR 50121, signed August 11, 2000
- Farmlands Protection Policy Act, 7 CFR 658 and 7 CFR 657
- Federal Facility Compliance Act
- Federal Records Act, 36 CFR 1222, 1228, 1230, 1232, 1234, 1236, and 1238
- *Federal Register*, Environmental Impact and Related Procedures; Final Rule, 23 CFR Parts 635, 640, 650, 712, 771, and 790; and 40 CFR Part 622, August 28, 1987

- *Federal Register*, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508, November 29, 1978
- Fish and Wildlife Coordination of 1956, as amended, 16 USC 661-667e
- Historic Sites Act, 36 CFR 65
- Magnuson–Stevens Fishery Conservation and Management Act, 50 CFR Part 600
- Maine Department of Environmental Protection, Natural Resources Protection Act, 38 MRSA, Chapter 3 § 480 et seq.
- Maine Department of Environmental Protection/Maine Department of Transportation, Stormwater Memorandum of Understanding
- Maine Endangered Species Act, 12 MRSA § 7751
- Maine Hazardous Waste, Septage, and Solid Waste Management Act, 38 MRSA § 1301, 1979
- Maine Revised Statutes, Sensible Transportation Policy Act of 1991, 23 MRSA § 73
- Native American Graves Protection and Repatriation Act (NAGPRA), 43 CFR 10
- Public Law 91-190, National Environmental Policy Act of 1969, 42 USC § 4321 et seq., signed January 1, 1970
- Public Law 95-217, Clean Water Act of 1977, 33 USC § 1251-1376
- Resource Conservation and Recovery Act (RCRA), 40 CFR 260-281
- Safe Drinking Water Act, 40 CFR 141
- Section 106 of the National Historic Preservation Act of 1966, as amended, 16 USC 470
- Sections 401 and 404 of the Federal Water Pollution Control Act (CWA)
- Section 6(f) of the Land and Water Conservation Act of 1965, 16 USC 460
- Toxic Substances Control Act (TSCA), 40 CFR 761
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 USC 61
- 23 CFR 774 Policy on Lands, Wildlife and Waterfowl Refuges, and Historic Sites

The MaineDOT would be required to obtain the following permits and approvals prior to the start of construction:

- Section 404 (of the CWA) Individual Permit: The USACE provides oversight and regulates activities in the nation's waters. A Section 404 individual permit would be required from the USACE for the discharge of dredged or fill material into the waters of the United States, which include wetlands. Section 404(b)(1) of the CWA provides guidance to the USACE for the issuance of permits; compliance with Section 404(b)(1) is required. Section 404(b)(1) may only permit discharges of dredged or fill material into waters of the United States that represent the LEDPA, so long as the alternative does not have other significant adverse environmental consequences.

- Natural Resources Protection Act (NRPA) Permit: A NRPA Permit is required from the Maine Department of Environmental Protection (MDEP) for projects in, on, over, or adjacent to protected natural resources. Protected resources are coastal wetlands, great ponds, rivers, streams, significant wildlife habitat, and freshwater wetlands.
- Section 401 Water Quality Certification: Section 401 of the CWA regulates the discharge of dredged or fill materials into waters. A Section 401 Water Quality Certification is required from the MDEP to ensure that the project would comply with state water-quality standards. Typically, the Section 401 Water Quality Certification would be issued concurrently by the MDEP with the NRPA Permit.
- Coastal Zone Management Consistency Determination: The portion of the study area in the city of Brewer is within the state's statutory coastal zone and subject to the provisions of the Coastal Zone Management (CZM) Act of 1972 and the Maine CZM Program. The Maine State Planning Office (SPO) administers the Maine Coastal Program. For efficiency, consistency reviews and determinations are rendered by the SPO following the review and approval of state permit applications. This project would require a NRPA Permit issued by the MDEP and would require a CZM Consistency Determination issued with the NRPA Permit.

1.8 Remainder of This DEIS and Section 404 Permit Application Supporting Information

The following chapters document results of the analysis performed:

- Chapter 2 presents the alternatives analysis. It introduces the range of reasonable alternatives developed to meet the study's purpose and needs. It identifies those alternatives retained or dismissed from more detailed study and the reasons for their retention or dismissal.

- Chapter 3 is an inventory of the affected environment. It succinctly describes the physical, biological, social, and economic environments of the area to be affected by the alternatives retained for further consideration. Chapter 3 also provides a scientific and analytic discussion of the environmental consequences and potential mitigation measures resulting from the alternatives retained for detailed study. The discussion includes the environmental impacts of the alternatives; the adverse environmental effects that cannot be avoided if the preferred alternative is 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 commitment of resources that would be involved in the preferred alternative if it is implemented (40 CFR Part 1502.16).
- Chapter 4 summarizes the coordination and consultation activities performed for this project among the federal, state, and local agencies and the public.
- Chapter 5 lists the preparers and their qualifications.
- Chapter 6 lists the DEIS recipients.
- Chapter 7 is a list of references used in preparing this DEIS.

Chapter 2
Alternatives Analysis

Chapter 2 presents the alternatives analysis. It introduces the range of reasonable alternatives developed to meet the study purpose and needs and the USACE's basic project purpose. It identifies those alternatives retained or dismissed from more detailed study and the reasons for their retention or dismissal.

Details of the alternatives identification, development, analysis, and screening process are available in the MaineDOT's *Transportation Improvement Strategies and Alternatives Analysis Technical Memorandum and U.S. Army Corps of Engineers Highway Methodology Phase I Submission, October 2003*. This publication is available on study website on the "Resources" page (www.i395-rt9-study.com).

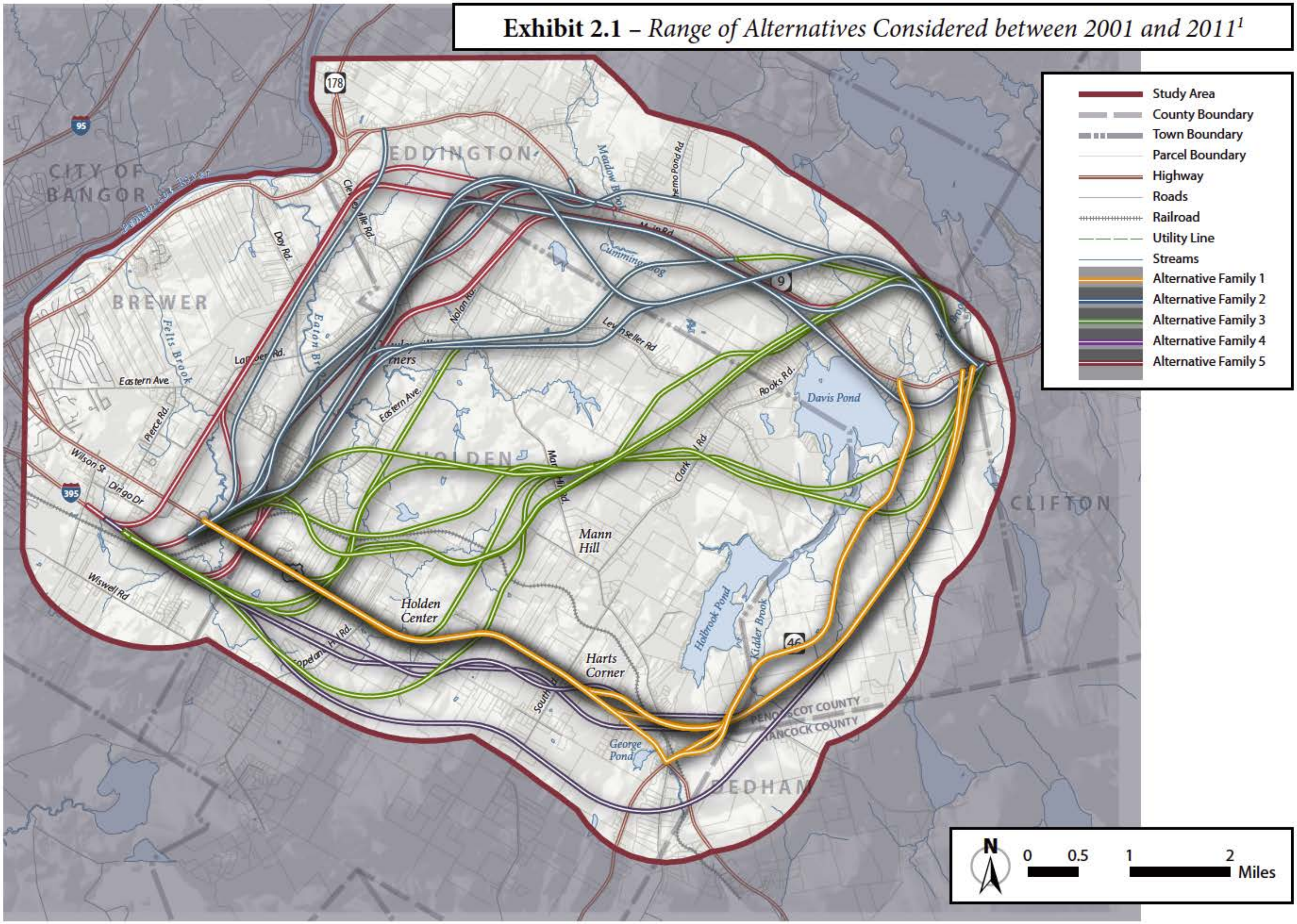
From 2001 to 2011, the MaineDOT and the FHWA conceptually designed and analyzed the No-Build Alternative and more than 70 build alternatives that could potentially satisfy the study purpose and needs and the USACE basic project purpose (exhibit 2.1). In conceptually designing and analyzing alternatives, the MaineDOT and the FHWA consulted with regulatory and resource agencies at the state and federal level, local officials, special-interest groups, and the public. At the end of the process of identifying, developing, analyzing, and screening alternatives, four alternatives, including the No-Build Alternative, were retained for further consideration and detailed study.

2.1 Maine Sensible Transportation Policy Act Analysis

The STPA applies to significant highway projects in Maine, which are defined as projects that increase capacity by constructing one or more through-travel lanes, a highway at a new location, and a bridge at a new location. The STPA recognizes that there are

Chapter Contents

Exhibit 2.1 – *Range of Alternatives Considered between 2001 and 2011*[1]



[1]**Note:** *Alternative alignments shown here have been grouped into families. For a detailed discussion of each family, please refer to Appendix C*

benefits and costs (i.e., financial, energy, and environmental) associated with transportation improvements and provides policies and management strategies for the analysis of those issues. This rule requires the MaineDOT to consider available and future modes of transportation and to minimize the effects of transportation on public health, air quality, water quality, land use, and other natural resources.

Modes other than highway improvements were considered but dismissed, given the study's purpose and needs. To improve the quality and quantity of traffic flow, improvements to the existing highways through Transportation Systems Management (TSM) and Travel Demand Management (TDM) were considered.

2.1.1 Transportation Systems Management

TSM consists of low-impact highway and intersection geometric improvements, as well as operational strategies, that improve traffic flow through an area. Whether implemented separately or in combination with TDM strategies, TSM improvements may reduce or delay the need for improvements and upgrades that would be necessary if no action were taken.

The TSM alternative consisted of increasing the size and capacity of the Route 9/46 intersection (exhibit 2.2). This intersection was conceptually designed to have additional through-travel and turn lanes. The improvements to this intersection could be accomplished within the existing rights-of-way of Route 9 and Route 46 with no impact to the natural and social features adjacent to the intersection. The MaineDOT is committed to improving the intersection of Route 9 and Route 46; given the future need and the limited scope of the improvements to the intersection, the improvements will be added to future work plans for MaineDOT.

Exhibit 2.2 – *Route 9 and 46 Intersection Traffic*

Intersection Route 9 & Route 46	1998 PM DHV No Build			2010 PM DHV No Build			2035 PM DHV No Build		
	Volume	Movement Delay Per Vehicle Delay (sec.)	Movement Level of Service (LOS)	Volume	Movement Delay Per Vehicle Delay (sec.)	Movement Level of Service (LOS)	Volume	Movement Delay Per Vehicle Delay (sec.)	Movement Level of Service (LOS)
Rte 9 EB Thru	199	5.5	A	241	6.3	A	266	7.7	A
Rte 9 EB Right	22	4.5	A	23	5.7	A	56	7.0	A
Rte 9 WB Left	63	8.8	A	107	10.0	B	385	17.5	C
Rte 9 WB Thru	167	5.6	A	221	7.7	A	210	16.4	C
Rte 46 NB Left	25	9.1	A	23	12.2	B	59	126.3	F
Rte 46 NB Right	76	5.6	A	112	6.5	A	406	118.7	F

The TSM alternative was dismissed from further consideration because it would not satisfy the study's purpose and would not meet the system-linkage and traffic-congestion needs because it would not improve the traffic congestion and quality of traffic flow on

Route 1A. It is not practicable as it does not meet the overall project purpose. To improve the traffic congestion and quality of traffic flow on Route 1A to generally acceptable levels, physical improvements beyond the scope of TSM would be required.

2.1.2 Travel Demand Management

TDM consists of strategies to reduce demand for travel during periods of peak traffic flow through an area. TDM strategies normally attempt to accomplish one of two goals:

- remove vehicle trips from the highway network or
- shift trips from periods of high traffic demand to periods of low traffic demand

TDM strategies for removing vehicle trips from highways include ride-sharing programs and improvements to transit networks. Strategies to shift traffic from periods of high demand to periods of low demand include programs such as encouraging employers to offer their employees flexible work hours.

The TDM alternative consisted of briefly considering the major employers in the region and further opportunities to institute and expand ride-sharing programs. The TDM alternative was focused on the Route 1A corridor. The TDM alternative did not consider the Route 9 corridor in detail because it does not have a concentration of major employers or a high concentration of commuter traffic during peak periods.

TDM strategies work best in areas with a high concentration of commuter traffic during defined peak periods. Most traffic congestion in the study area is caused by increased heavy truck and automobile traffic—often with an origin or destination outside the study area and region—and a lack of system linkage.

The TDM alternative was dismissed from further consideration because TDM strategies are unavailable and they would not satisfy the study's purpose and would not meet the system-linkage and traffic-congestion needs because it would not improve the traffic congestion and quality of traffic flow on Route 1A. It is not practicable in that it does not meet the overall project purpose. To improve the traffic congestion and quality of traffic flow on Route 1A to generally acceptable levels, physical improvements beyond the scope of TDM would be required.

2.2 Alternatives Identification, Development, and Analysis Process

Alternatives were identified, developed, and analyzed in accordance with requirements of the NEPA and Section 404 of the CWA. The NEPA requires the MaineDOT and the FHWA to consider the impacts of an action on the environment and to disclose those impacts in a public decision-making process.

Alternatives generally should be discussed at a comparable level of detail. Although the No-Build Alternative (generally consisting of maintenance and short-term minor improvements) might not seem reasonable for satisfying the study purpose and needs, it must always be included in the analysis with its consequences fully developed. The No-Build Alternative serves two purposes: (1) it may be a reasonable alternative, especially for situations in which the impacts are great and the need is relatively minor; and (2) it is a baseline against which other alternatives can be compared.

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit from the USACE before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from regulation (e.g., certain farming and forestry activities).

Under Section 404, no discharge of dredged or fill material into waters of the United States may be permitted if (1) a practicable alternative exists that is less damaging to the aquatic environment, or (2) the nation's waters would be significantly degraded. To be granted a permit, the project must show that it has, to the extent practicable:

Practicable may be defined as "available and capable of being done after considering cost, existing technology, and logistics in light of the overall project purpose."

The regulations implementing the NEPA (40 CFR 1502.14) require that the lead agencies:

a. Rigorously explore and objectively evaluate all reasonable alternatives and, for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination.
b. Devote substantial treatment to each alternative considered in detail, including the proposed action, so that reviewers may evaluate their comparative merits.
c. Include reasonable alternatives not within the jurisdiction of the lead agency
d. Include the alternative of no action.
e. Identify the agency's preferred alternative or alternatives, if one or more exists, in the DEIS and identify such alternative in the FEIS, unless another law prohibits the expression of such a preference.
f. Include appropriate mitigation measures not already included in the proposed action or alternatives.

Wetlands subject to Section 404 can be defined as "areas that are inundated or saturated by surface 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."

- taken steps to avoid waters and wetlands impacts
- minimized potential impacts on waters and wetlands
- provided compensation for remaining unavoidable impacts

2.2.1 Initial Screening

The first step in the alternatives development process was to establish the study purpose and needs (i.e., the transportation problems warranting identification of reasonable alternatives). Concurrently, the MaineDOT and the FHWA compiled an inventory of the natural, socioeconomic, and cultural resources of the study area (MaineDOT, 2003). Using this information, the MaineDOT and the FHWA, with assistance from the PAC and the public, identified a wide range of potential 1,000-foot-wide corridors for alternatives that appeared to satisfy the purpose and needs of the study and were practicable, while avoiding and minimizing impacts to people and resources. The logical termini of the build alternatives were identified and defined to consist of (1) I-395 near Route 1A and (2) the portion of Route 9 in the study area.

In May 2001, the MaineDOT and the FHWA, with public and PAC assistance, identified potential corridors for alternatives using low-level, high-resolution aerial photography and mapping of the land use, social features, and natural resources of the study area. The MaineDOT and the FHWA compiled and refined the suggested corridors into 45 alternatives. These initial 45 alternatives fit into the following four broad "families":

- **Family 1: The Upgrade Alternatives.** Widening and other improvements to Route 1A (from I-395 to Route 46) and Route 46 (from Route 1A to Route 9) approximately 10 miles long. Although one upgrade alternative was initially considered, six upgrade and five partial-upgrade alternatives ultimately were considered.
- **Family 2: The Northern Alternatives.** Alternatives that began at the I-395/Route 1A interchange and generally proceeded in a northerly direction to connect with Route 9. These alternatives were five to 10 miles in length, depending on the distance on Route 9 used as part of the alternative. Twelve alternatives in this family were ultimately studied.
- **Family 3: The Central Alternatives.** Alternatives that began at or near the I-395/Route 1A interchange and generally proceeded north and east through the study area to Route 9 east of Route 46. These alternatives were seven to 11 miles in length, depending on the distance on Route 9 used as part of the alternative. Due to natural resources and an attempt to minimize

the impact to them, these "central" alternatives merged in a common area in the center of the study area north of Mann Hill Road. The MaineDOT created a "match line" at that point, with the central alternatives branching to the east and west of it, creating components 3A through 3K; the components were then combined to form alternatives. The six components on the western side of the match line (i.e., 3A though 3F) matched the four components on the east side (i.e., 3G through 3J), which in turn connected to Route 9. One component, 3K, extended the central alternatives bypassing East Eddington to the north and connected to Route 9 east of Route 46. Using all possible combinations of the six western components, the four eastern components, and component 3K, 36 possible central alternatives were initially created. Five other alternatives (for a total of 41) in this family were ultimately developed by modifying some of the initial 36 alternatives.

- **Family 4: The Southern Alternatives.** Alternatives that began near the I-395/Route 1A interchange and that were south of Route 1A and east of Route 46. These alternatives paralleled Routes 1A and 46 and intersected Route 9 in East Eddington. These alternatives were approximately 11 miles in length. Four alternatives

The preliminary alternatives analysis and screening was performed in accordance with the USACE—New England Division's "*The Highway Methodology Workbook*" to identify and document potential impacts generated by construction of those alternatives (USACE, 1995). Potential impacts were based on the limits of cut and fill necessary to construct, operate, and maintain a four-lane highway with two travel lanes in each direction and a divided median within an approximate 250-foot-wide right-of-way. The preliminary alternatives analysis quantified impacts to the following:

- Wetlands
- Hydric soils (for the purposes of this analysis, hydric soils were assumed to be wetlands)
- Surface waters and water crossings with the potential to support anadromous fish (i.e., saltwater fish that return to freshwater streams and rivers to spawn)
- Wildlife habitat
- Notable wildlife habitat (i.e., threatened and endangered species habitat, deer-wintering areas, Maine Natural Areas Program Data, inland waterfowl and wading bird habitat)
- Surface impacts over significant groundwater aquifers
- Surface impacts over high-yield aquifers
- Floodplains
- Community wells
- Active farmland, prime farmland soils, and soils of statewide importance
- Areas of potential hazardous waste
- Commercial and residential areas
- Other land (e.g., transportation, recreation, education)
- Residential and commercial displacements
- Residences within 500 and 1,000 feet
- Archeological areas
- Historic resources listed on or potentially eligible for listing on the National Register of Historic Places

The engineering feasibility of each alternative was considered as part of the preliminary alternatives analysis. In addition to the ability to satisfy the design criteria, the following were quantified for each alternative:

- Length
- Bridges (the number and total length of bridges)
- Amount of cut, fill, and total earthwork required (in millions of cubic yards)
- Deepest cut (in feet)
- Deepest fill (in feet)
- Number of roadway and railway crossings
- Average grade (in percent)
- Average curvature (in degrees)

were identified and considered: 4A, 4B, 4C, and 4D.

The MaineDOT conceptually designed and refined alternatives within the 1,000-foot-wide corridors.

To reduce the number of alternatives identified and conceptually designed to a reasonable range, the MaineDOT and the FHWA sought to identify one alternative from each family to be studied in detail. The decision of whether to dismiss or retain alternatives for further analysis was based on their ability to satisfy the study purpose and needs, results of the preliminary impacts analysis, and consideration of overall engineering feasibility. If more than one alternative in each family fully satisfied the study purpose and needs and was practicable, the alternative was selected based on potential impacts to the features and resources. Alternatives that were more environmentally damaging than others were dismissed from further consideration and alternatives that were the least environmentally damaging were retained for further consideration.

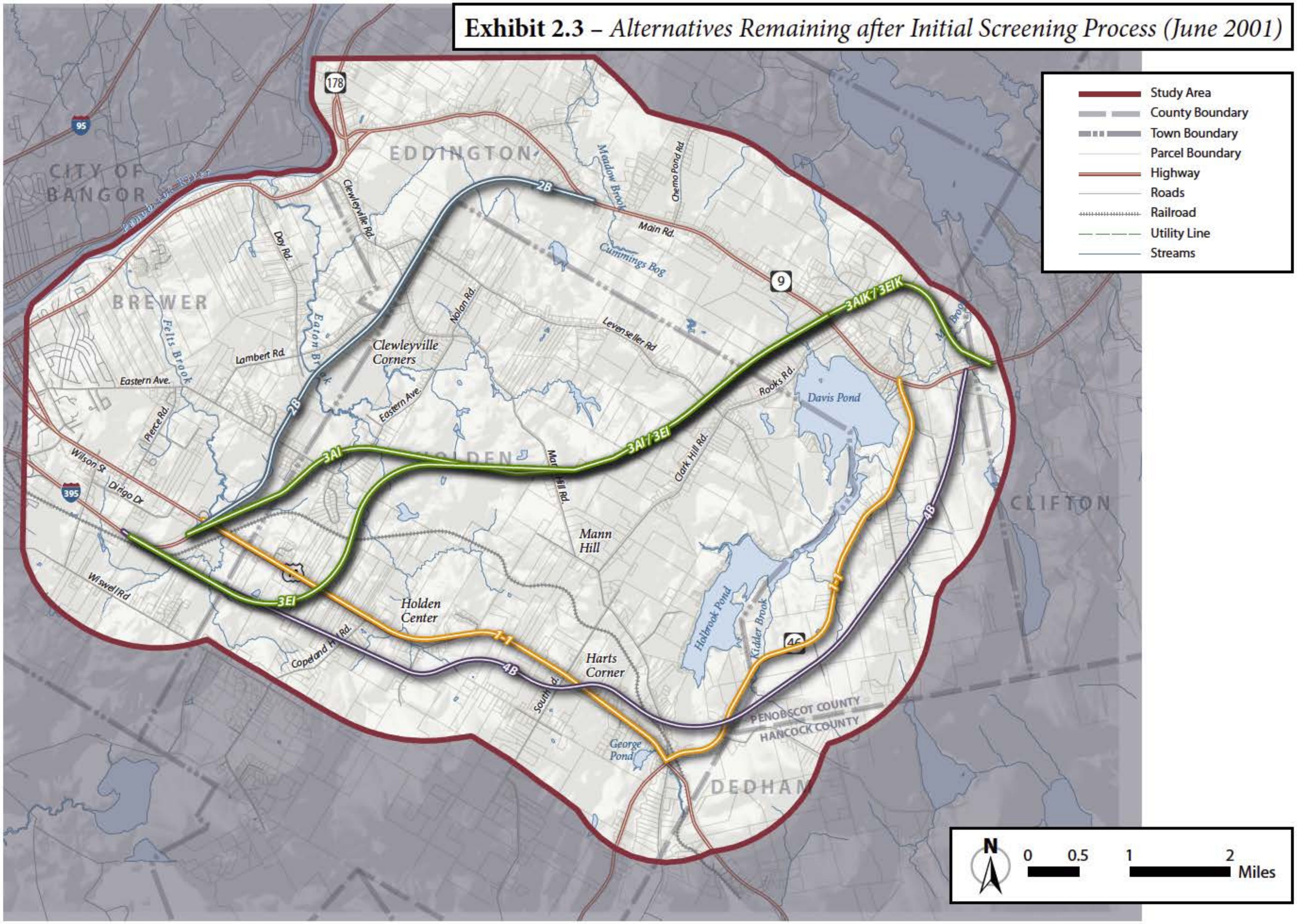
In June 2001, the MaineDOT and the FHWA, using results of the preliminary impacts analysis, dismissed from further consideration 37 of the initial 45 alternatives. The MaineDOT and the FHWA retained the alternative from each family that was the least environmentally damaging to features and resources. In Family 3, the Central Alternatives, no single alternative clearly emerged as having the least impacts; therefore, the MaineDOT and the FHWA chose four that were least environmentally damaging relative to the other Central Alternatives.

The MaineDOT and the FHWA presented the results of the initial alternatives development and screening to attendees at their interagency coordination meetings on eight occasions (chapter 4.2).

The following eight alternatives were retained after the initial screening (the alternatives in Family 5 had not been identified at this time) (exhibit 2.3):

- No-Build Alternative
- Alternative 1-1
- Alternative 2B
- Alternative 3AI
- Alternative 3AIK
- Alternative 3EI
- Alternative 3EIK
- Alternative 4B

Exhibit 2.3 – *Alternatives Remaining after Initial Screening Process (June 2001)*



2.2.2 Continued Development and Screening

Following the initial screening from June 2001 through September 2003, members of the PAC, the City of Brewer, the towns of Holden and Eddington, and the public suggested potential additional alternatives and modifications of other alternatives. The MaineDOT and the FHWA, with input from the cooperating agencies, continued to develop and screen the suggested alternatives along with the eight alternatives retained for further consideration. They presented screening results to the PAC and the public at 13 PAC meetings, one public meeting, and meetings with representatives of the city of Brewer and the towns of Holden and Eddington (chapter 4.3.1).

Family 4 was dismissed from further consideration because other alternatives were less environmentally damaging (e.g., extensive earthwork, impacts to wetlands, and substantial impacts to Camp Roosevelt Boy Scout Reservation).

In June 2004, alternatives were identified and developed parallel to the utility easements with the Bangor Hydro-Electric Company transmission lines. This family of alternatives, which start with the number 5, began at or near the I-395/Route 1A interchange and largely paralleled the electric transmission lines in the City of Brewer and the towns of Holden and Eddington. This family of alternatives consisted of four alternatives approximately 11 miles long. These alternatives were believed to have fewer impacts to wetlands than Family 3 alternatives because the land use had already been disturbed through the construction of power lines.

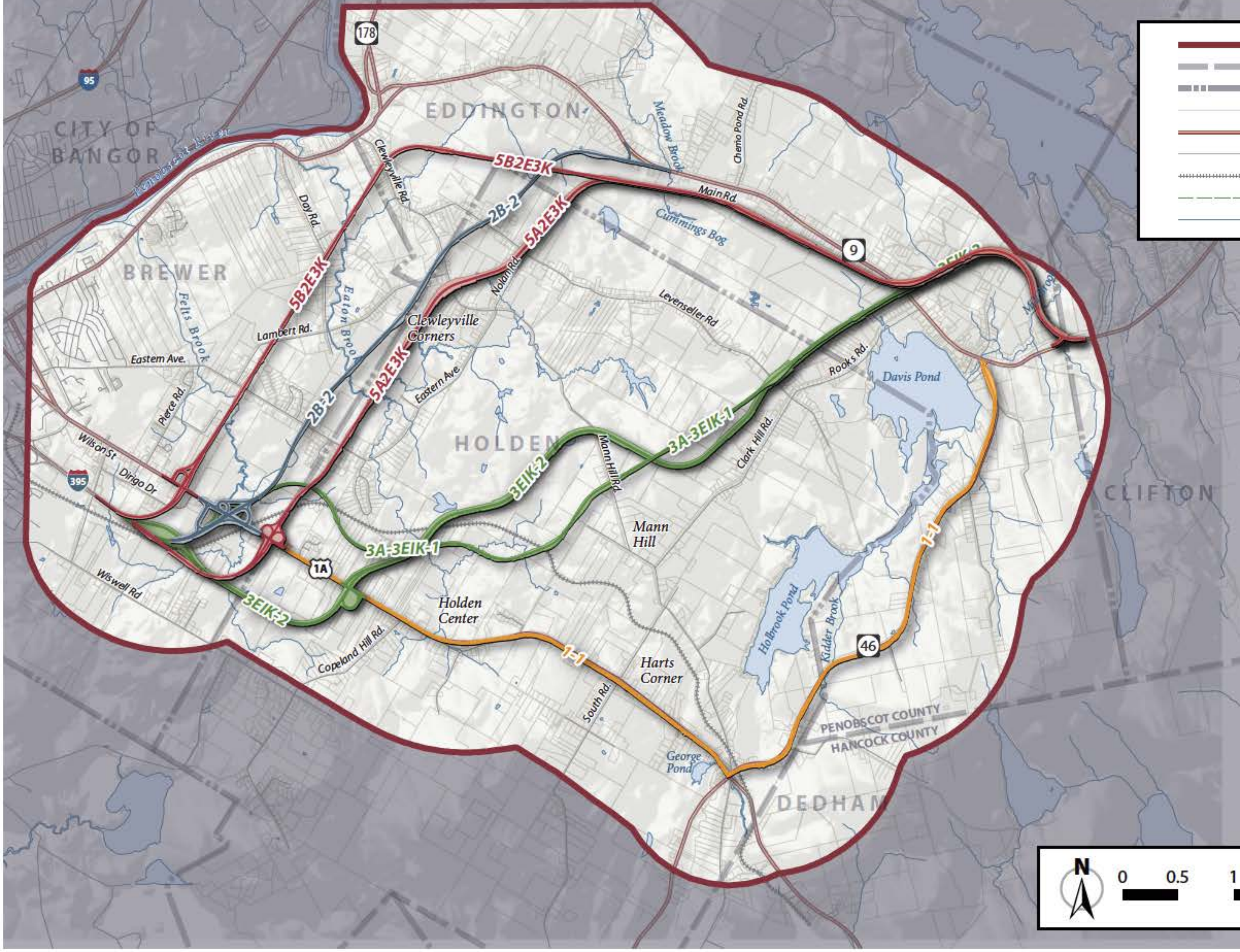
The process of identifying, developing, and screening alternatives or modifying alternatives continued. In January 2008, the following seven alternatives were preliminarily identified for further consideration and development and detailed study (exhibit 2.4):

- No-Build Alternative
- Alternative 1-1
- Alternative 2B-2
- Alternative 3A-3EIK-1
- Alternative 3EIK-2
- Alternative 5A2E3K
- Alternative 5B2E3K

In 2008, the MaineDOT and the FHWA updated the inventory of natural, socioeconomic, and cultural resources in the study area (MaineDOT, 2008d); revised the conceptual designs of the build alternatives; and performed additional scoping with the public and with federal and state regulatory and resource agencies (Chapter 4).

In a continuing effort to avoid and minimize adverse impacts, the conceptual design of the build alternatives

Exhibit 2.4 – *Alternatives Remaining after Continued Screening Process (June 2004)*



retained at the conclusion of the preliminary development and screening process was reconsidered in light of the updated inventory of natural, socioeconomic, and cultural resources in the study area. Refinements to the locations and conceptual design of the build alternatives were made using information from the updated inventory of features.

Additional scoping with the public and with federal and state regulatory and resource agencies was performed in June 2008. Six "connectors" (i.e., a highway connecting to another highway) were identified, developed, and analyzed between the three westernmost build alternatives retained at the end of the preliminary development and screening process.

2.2.2.1 Analysis of Connectors

In a continued effort to avoid and minimize adverse impacts in December 2008, six connectors between the three western most build alternatives were identified, conceptually designed, and analyzed at the beginning of the phase of considering alternatives in detail (exhibit 2.5). One connector for Alternative 5B2E3K was identified, conceptually designed, and analyzed. Five connectors between Alternatives 2B-2 and 5A2E3K were identified, conceptually designed, and analyzed, resulting in 12 additional alternatives that were considered. The connectors and the resultant alternatives were conceptually designed and analyzed to the same level of detail as the other build alternatives (exhibit 2.6).

For Alternative 5B2E3K, one connector was considered. It used the existing I-395 interchange with Route 1A and replaced the section of Alternative 5B2E3K between I-395 and Eastern Avenue. This connector would reduce impacts to wetlands and result in fewer displacements of commercial businesses and residences. After considering this connector, Alternative 5B2E3K was modified to create Alternative 5B2E3K-1. Alternative 5B2E3K was dismissed from further consideration because it was substantially more environmentally damaging to wetlands and more displacements of commercial businesses and residences than Alternative 5B2E3K-1.

Five connectors between Alternatives 2B-2 and 5A2E3K were identified and developed resulting in 12 additional alternatives for consideration. Six of these alternatives resulted from connecting Alternative 2B-2 to Alternative 5A2E3K near I-395; the six others resulted from connecting Alternative 5A2E3K to Alternative 2B-2 near Route 9. The alternatives that resulted from connecting Alternative 2B-2 to Alternative 5A2E3K were more environmentally damaging to wetlands and more residential displacements than Alternatives 2B-2 and 5A2E3K and were dismissed from further consideration.

Exhibit 2.5 – *Alternatives and Connectors between the Three Westernmost Alternatives (December 2008)*

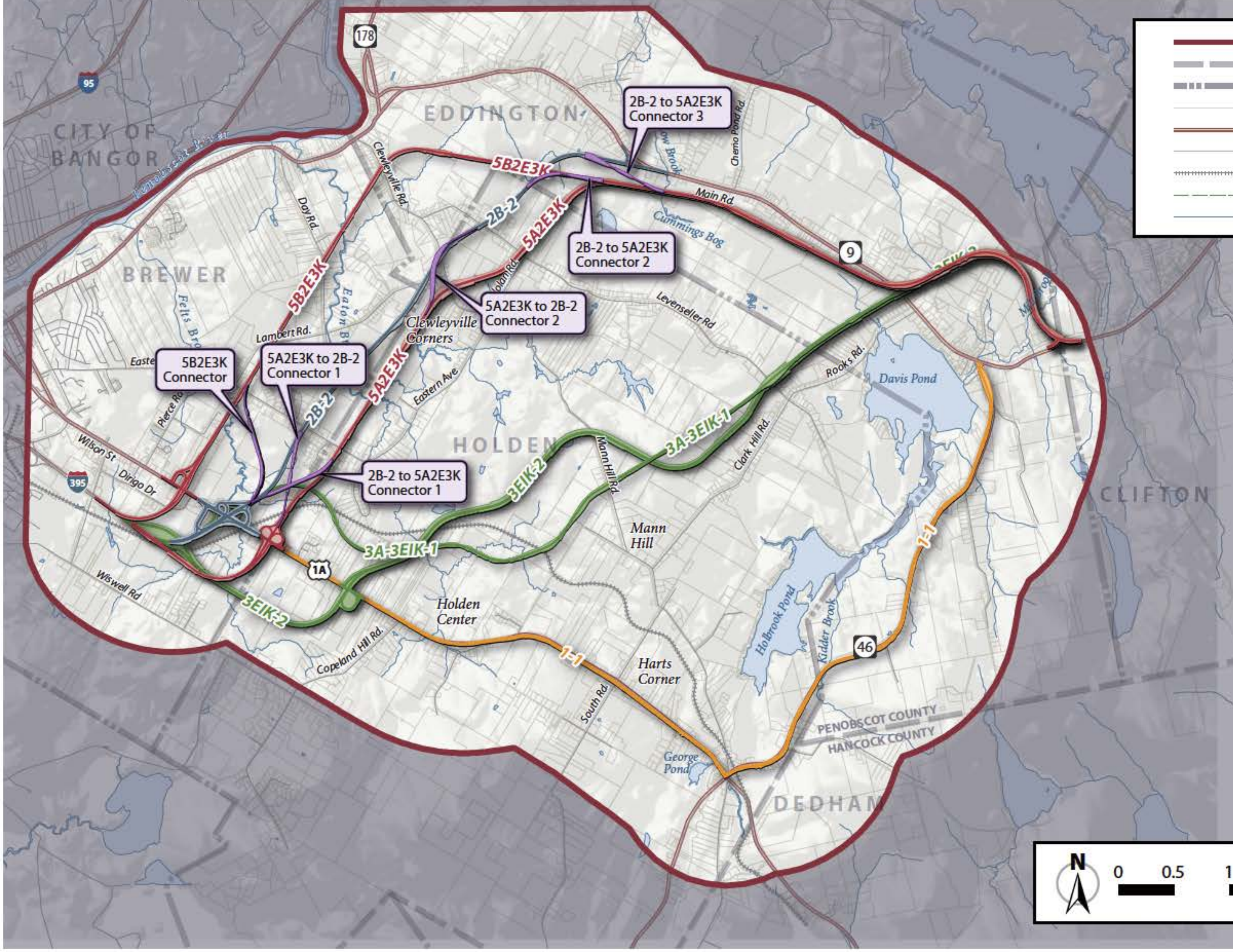


Exhibit 2.6 – *Connectors Analyzed and Impacts to Select Features*

	Design Features	Wetlands (acres)	Streams (feet)	Floodplains (acres)	Displacements	Conclusion
Alternative 5B2E3K	Requires a new interchange with the existing I-395 interchange or construction of a new interchange with Rt. 1A	56	2,350	9	11 residences, Showcase Homes, Wilson Street Holdings Property, and Weathervane Restaurant	Dismissed: More Environmentally Damaging
Alternative 5B2E3K Connector	Three bridges 300 feet long would be required to span Felts Brook	49	2,275	9	9 residences	Dismissed: More Environmentally Damaging
5A2E3K	Two bridges crossing the rail corridor; requires a new interchange with Rt. 1A or interchange with I-395	60	2,065	5	12 residences, Mitchell's, Maine's Military Supply, Brookfield Estates Phase I 8 lots, Phase II	Dismissed: More Environmentally Damaging
5A2E3K to 2B-2 Connector 1	Two bridges crossing the rail corridor; requires a new interchange with Rt. 1A or interchange with I-395	30	1,540	6	15 residences, Brewer Fence Company, Eden Pure Heaters, Mitchell's Landscaping & Garden Center, and Town 'N Country Apartments	Retained: Among Least Environmentally Damaging
5A2E3K to 2B-2 Connector 2	Two bridges crossing the rail corridor; requires a new interchange with Rt. 1A or interchange with I-395; parallels utility corridor	26	1,740	8	5 residences, Mitchell's, Maine's Military Supply, Brookfield Estates Phase I 8 lots and Phase II	Dismissed: More Environmentally Damaging
5A2E3K to 2B-2 via Connector 1 to 2B-2 to 5A2E3K via Connector 2	Two bridges crossing the rail corridor; requires a new interchange with Rt. 1A or interchange with I-395; connects to 5A2E3K paralleling Rt. 9 by 4.5 miles	50	2,120	8	11 residences, Mitchell's, Maine's Military Supply, Beech Ridge development	Dismissed: More Environmentally Damaging
5A2E3K to 2B-2 via Connector 1 to 2B-2 to 5A2E3K via Connector 3	Two bridges crossing the rail corridor; requires a new interchange with Rt. 1A or interchange with I-395; connects to 5A2E3K paralleling Rt. by 9 4.5 miles	48	2,300	6	11 residences, Mitchell's, Maine's Military Supply, Beech Ridge development	Dismissed: More Environmentally Damaging
5A2E3K to 2B-2 via Connector 2 to 2B-2 to 5A2E3K via Connector 2	Connects to 5A2E3K paralleling Rt. 9 lengthening 2B-2 by 4.5 miles; alignment along utility corridor	48	2,330	6	12 residences, Mitchell's, Maine's Military Supply, Brookfield Estates Phase I – 8 lots and Phase II	Dismissed: More Environmentally Damaging

Note: *Direct impacts are based on the conceptual design of a two-lane highway.*

Exhibit 2.6 – *Connectors Analyzed and Impacts to Select Features (continued)*

	Design Features	Wetlands (acres)	Streams (feet)	Floodplains (acres)	Displacements	Conclusion
5A2E3K to 2B-2 via Connector 2 to 2B-2 to 5A2E3K via Connector 3	Connects to 5A2E3K paralleling Rt. 9 lengthening 2B-2 by 4.5 miles; alignment along utility corridor	45	2,500	8	12 residences, Mitchell's, Maine's Military Supply, Brookfield Estates Phase I – 8 lots and Phase II	Dismissed: More Environmentally Damaging
2B-2	Uses existing interchange with Rt. 1A in a modified form	28	1,460	10	8 residences	Retained: Among Least Environmentally Damaging
2B-2 to 5A2E3K Connector 1	Connects to 5A2E3K paralleling Rt. 9 by 4.3 miles	54	2,600	17	11 residences; Brookfield Estates Phase I – 8 lots and Phase II	Dismissed: More Environmentally Damaging
2B-2 to 5A2E3K Connector 2	Allows use of existing interchange with Rt. 1A with modifications; no crossing state-owned rail corridor; connects to alignment along exising utility corridor	60	2,010	16	10 residences; Beech Ridge development	Dismissed: More Environmentally Damaging
2B-2 to 5A2E3K Connector 3	Connects to 5A2E3K paralleling Rt. 9 by 4.3 miles	57	2,420	15	11 residences; Beech Ridge development	Dismissed: More Environmentally Damaging
2B-2 to 5A2E3K via Connector 1 to 5A2E3K to 2B-2 via Connector 2	Uses existing interchange with Rt. 1A with modifications; connects to alignment along utility corridor	29	1,690	18	6 residences; Brookfield Estates Phase I – 8 lots and Phase II	Dismissed: More Environmentally Damaging
2B-2 to 5A2E3K via Connector 1 to 5A2E3K to 2B-2 via Connector 2 to 2B-2 to 5A2E3K via Connector 2	Uses existing interchange with Rt. 1A with modifications; connects to alignment along utility corridor	50	2,270	15	12 residences; Brookfield Estates Phase I development – 8 lots and Phase II	Dismissed: More Environmentally Damaging
2B-2 to 5A2E3K via Connector 1 to 5A2E3K to 2B-2 via Connector 2 to 2B-2 to 5A2E3K via Connector 3	Uses existing interchange with Rt. 1A with modifications; connects to alignment along utility corridor	48	2,465	19	12 residences; Brookfield Estates Phase I development – 8 lots and Phase II	Dismissed: More Environmentally Damaging

Note: *Direct impacts are based on the conceptual design of a two-lane highway.*

Of the six alternatives that resulted from connecting Alternative 5A2E3K to Alternative 2B-2, two were retained for further consideration because they resulted in comparable or less impact to wetlands and fewer residential displacements than Alternatives 2B-2 and 5A2E3K. These alternatives were named Alternative 5A2B-2 and Alternative 5A2E3K-2.

In May 2009, a meeting took place with the federal and state regulatory and resource agencies to review the range of alternatives being considered. It was agreed that Alternatives 1-1 and 3A-3EIK-1 should be dismissed from further consideration. Alternative 1-1 was dismissed from further consideration because it would not further the study's purpose related to the NHS or satisfy the system-linkage need because it would not provide a high-speed, controlled-access connection between I-395 and Route 9. Alternative 1-1 would satisfy the USACE's basic purpose statement. Alternative 3A-3EIK-1 was dismissed from further consideration because it was more environmentally damaging than Alternative 3EIK-2.

A controlled-access highway provides limited points of vehicle access; access is permitted only at interchanges and intersections.

2.2.2.2 Evaluation of Route 9

In December 2009, the system-linkage need and Route 9 were reexamined in greater detail. Specifically, Route 9 was reexamined to understand more fully if it could reasonably accommodate the future traffic volumes that were foreseeable within the next 20 years. The following factors were considered in examining Route 9 in greater detail:

- study purpose and the need for improved regional system linkage
- the geometry and capacity of Route 9
- existing and future traffic congestion (measured in terms of operating speeds and the volume of existing and future traffic compared to the capacity of the highway) and safety
- expectations and concerns of community leaders and the public
- origins and destinations of motorists
- areas of congestion
- system continuity
- land use and community features
- growth trends
- natural resources

After careful consideration of those factors, the MaineDOT determined that Route 9, with the exception of the sections approaching the intersection of Routes 9 and 46 where the posted speed limit is lower than other segments of Route 9, could reasonably accommodate future traffic volumes for the next 20 years without additional improvements beyond the existing right-of-way (exhibit 2.7).

Exhibit 2.7 – *DHV, v/c Ratio, Average Travel Speed and LOS for Route 9*

Analysis Year	DHV	v/c Ratio	Average Travel Speed (mph)	LOS Rural Two-Lane Road
Route 9 East of Route 178				
1998 No Build	641	0.27	41.2	D
2006 No Build	629	0.26	41.3	D
2035 No Build	873	0.36	39.5	E
Route 9 East of Route 46				
1998 No Build	505	0.20	43.9	D
2006 No Build	573	0.23	43.5	D
2035 No Build	1,267	0.46	39.3	E

Two alternatives – 2B-2 and 5A2B-2 – connect with Route 9 near the Eddington School approximately 4.2 miles to the west of Route 46. When these two alternatives were considered with a bypass of the intersection of Routes 9 and 46 similar to the other build alternatives, two additional build alternatives were created: 2B-2-K and 5A2B-2-K.

2.2.2.3 Continued Coordination with the Federal Cooperating Agencies

In September and December 2010, meetings with the federal cooperating agencies took place, the purpose of which was to solidify the range of alternatives to be considered in detail.

The MaineDOT continued its analysis of the Routes 9/46 intersection and concluded that the build alternatives, including those that use portions of Route 9, would improve the quality of traffic flow at the intersection of Routes 9 and 46 and other physically less intrusive improvements (e.g. as adding turn lanes), could be made to the intersection that would further improve the quality of traffic flow at the intersection. For these reasons, the MaineDOT and the FHWA dismissed alternatives that bypassed the intersection of Routes 9 and 46 to the north in favor of further consideration of alternatives that use Route 9.

The MaineDOT, the FHWA, and the federal cooperating agencies further considered the remaining build alternatives and concluded, although available and practicable, Alternatives 3EIK-2, 5A2E3K, 5A2E3K-2, and 5B2E3k-1 were more environmentally damaging than other build alternatives and were dismissed from further consideration (see Appendix C). Alternative 5B2B-2 was created.

2.2.2.4 Alternatives Retained for Further Consideration and Detailed Study

The following four alternatives were retained for further consideration and detailed study:

- No-Build Alternative
- Alternative 2B-2
- Alternative 5A2B-2
- Alternative 5B2B-2

The cooperating agencies concurred with this range of alternatives to be retained for detailed analysis (see Appendix C). Drawings of the build alternatives are shown in Appendix D.

2.3 Range of Reasonable Alternatives Retained for Further Consideration

Four alternatives, including the No-Build Alternative, were retained for further consideration and analyzed in detail (exhibit 2.8).

The build alternatives would be controlled-access highways and were conceptually designed using the MaineDOT design criteria for freeways (exhibit 2.9). Two lanes would be constructed and used for two-way travel within an appropriate 200-foot-wide right-of-way (exhibit 2.10).

After careful consideration of the range of alternatives developed in response to the study's purpose and needs and in coordination with its cooperating and participating agencies, the MaineDOT and the FHWA identified Alternative 2B-2 as their preferred alternative because the MaineDOT and the FHWA believe it best satisfies the study purpose and needs, would fulfill their statutory mission and responsibilities, and has the least adverse environmental impact.

As part of the review of this EIS, the MaineDOT and the FHWA invite comments on their decision identifying Alternative 2B-2 as its preferred alternative.

The final selection of an alternative will not be made until comments on this draft EIS and from the public hearing have been received and analyzed by the MaineDOT and FHWA, and comments have been received in response to the USACE's public notice; all reasonable alternatives are under consideration and a decision will be made after the alternatives' impacts and comments on the draft EIS and from the public hearing have been fully evaluated.

2.3.1 No-Build Alternative

The No-Build Alternative proposes that there be no new construction or major reconstruction of the transportation system in the study area; regular maintenance to I-395 and Routes 1A, 46, and 9 would be

Exhibit 2.8 – *Alternatives Retained for Further Consideration*

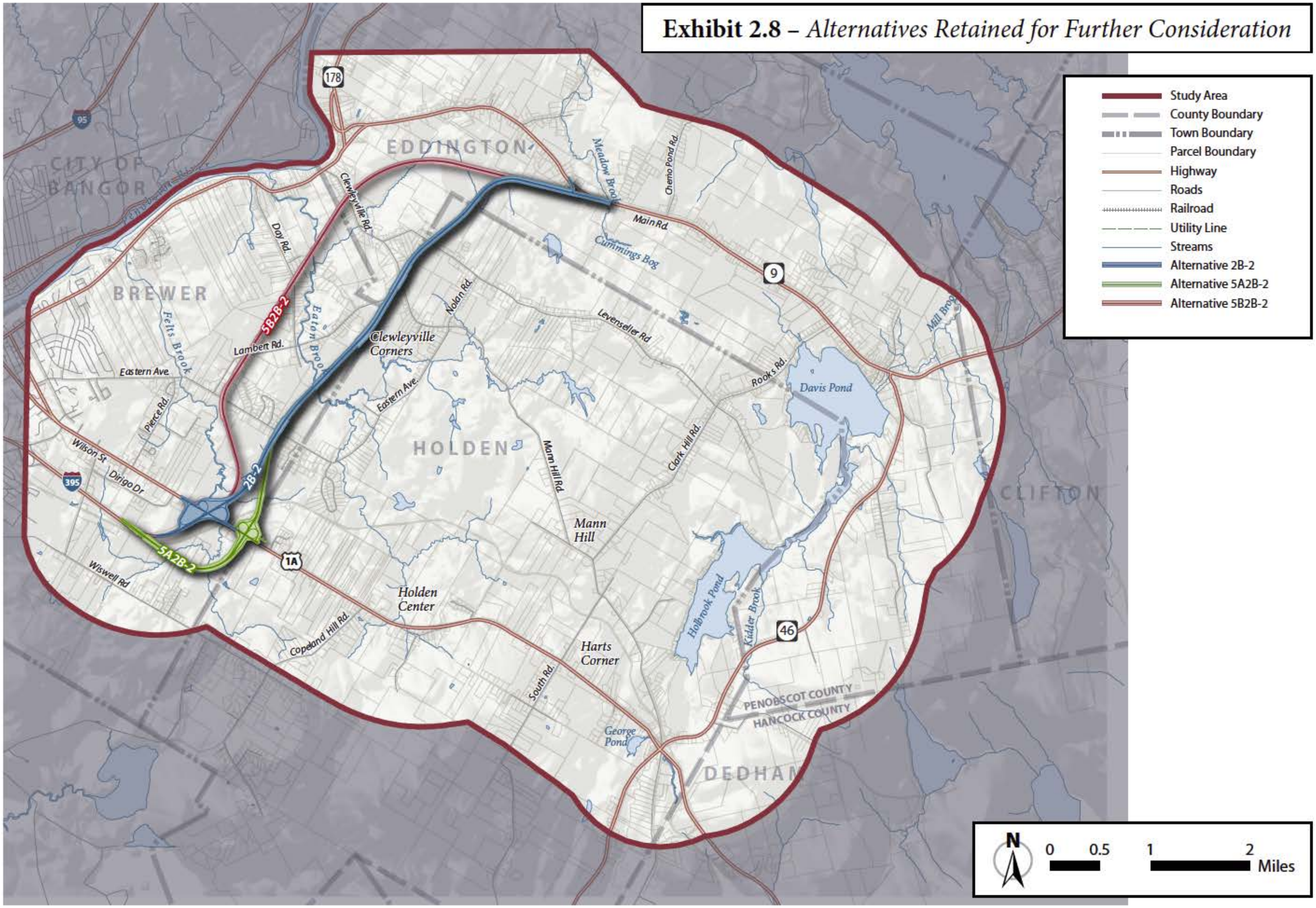


Exhibit 2.9 – *Design Criteria*

Element	Build Alternatives
Type of Roadway	Freeways
Design Speed	70 mph
Posted Speed	55 mph
Terrain	Level
Lane Width	12 feet
Shoulder Width	8 feet
Cross Slopes	6.0% Maximum Superelevation 2.1% Normal 4.2% Shoulder – Normal
Clear Zone	Variable. Dependent on design speed, traffic volume, and side slopes
Side Slopes Cut	Front slope at 6:1 Back slope at 2:1
Fill	6:1 / 4:1 (hinged); 2:1 and guardrail when the embankment height is greater than 20 feet
Minimum Stopping Sight Distance	850 feet
Maximum Degree of Curvature	2°45′
Vertical Grades	3% Maximum 0.25% Minimum Desirable 0% Minimum
Minimum Vertical Clearance	16 feet 6 inches over roads 23 feet 6 inches over railroads
Superelevation Transition Length	250 feet

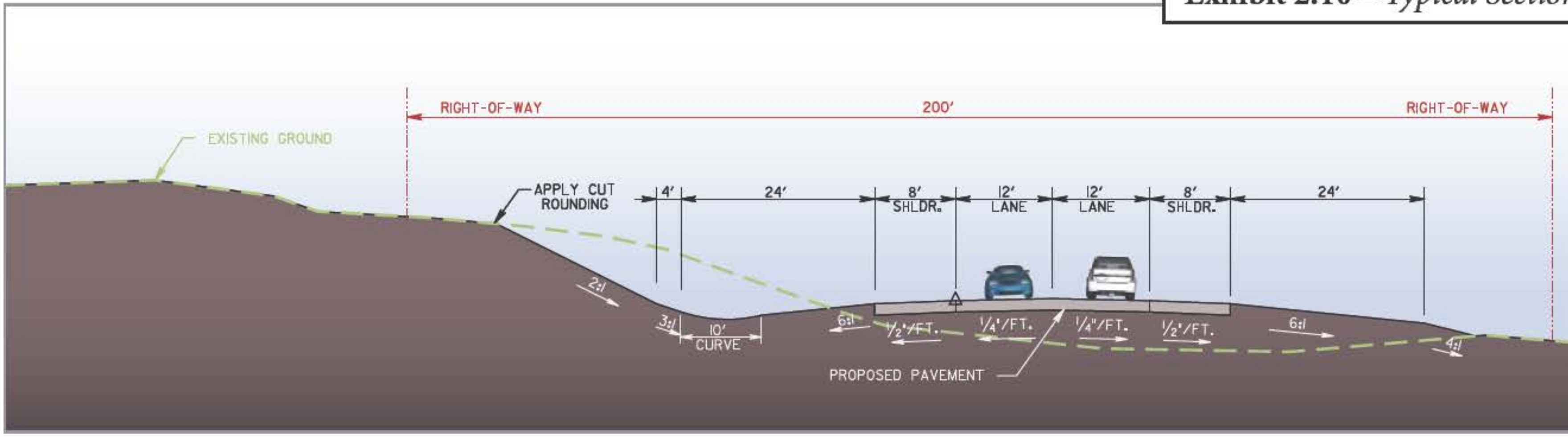
Sources: *American Association of State and Highway Transportation Officials, "A Policy on Geometric Design of Highways and Streets", 5th edition, November 2004; and the MaineDOT Highway Design Guide, 1994.*

continued at its present level; and the intersection of Routes 46 and 9 would be improved.

Improvements to this intersection were conceptually designed to have additional through-travel and turn lanes. 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. The MaineDOT is committed to improving the intersection of Route 9 and Route 46; given the future need (exhibit 2.2) and the limited scope of the improvements to the intersection, the improvements will be added to future work plans for MaineDOT.

Although the No-Build Alternative does not satisfy the study's purpose and needs or the USACE's basic purpose, it is retained for detailed analysis to allow equal comparison to the build alternatives and to help decision makers understand the ramifications of taking no action. The impacts of the No-Build Alternative were fully developed for design year 2035 to demonstrate the full impact of taking no action. Comparing the build alternatives with the current and future No-Build Alternative is essential for measuring the true benefits and adverse impacts of the build alternatives considered in detail.

Exhibit 2.10 – *Typical Section*



2.3.2 Alternative 2B-2

Alternative 2B-2 would continue north from the I-395 interchange with Route 1A, roughly paralleling the Brewer/Holden town line, and connect with Route 9 west of Chemo Pond Road (exhibit 2.11). Route 9 would not be widened to four lanes. The existing I-395/Route 1A interchange would be used (to the extent possible) and expanded to become a semidirectional interchange (exhibit 2.12). A semidirectional interchange reduces left turns and cross traffic; the only traffic movement that would require a left turn would be Route 1A south to Alternative 2B-2 north. The land required for the northern portion of the interchange is owned by the State of Maine.

Alternative 2B-2 would bridge over Felts Brook in two locations at the I-395 interchange. It would pass underneath Eastern Avenue between Woodridge Road and Brian Drive. Alternative 2B-2 would bridge over Eaton Brook, bridge over Lambert Road, pass underneath Mann Hill Road, and bridge over Levenseller Road connecting to Route 9 at a "T" intersection (exhibit 2.13). Route 9 eastbound would be controlled with a stop sign.

Alternative 2B-2 would further the study's purpose and satisfy the system-linkage need in the near term (before 2035). Alternative 2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way.

Route 9 would not be improved, and it would not provide a high-speed, controlled-access connection to the east of East Eddington village. It would satisfy the

Exhibit 2.11 – *Alternative 2B-2*

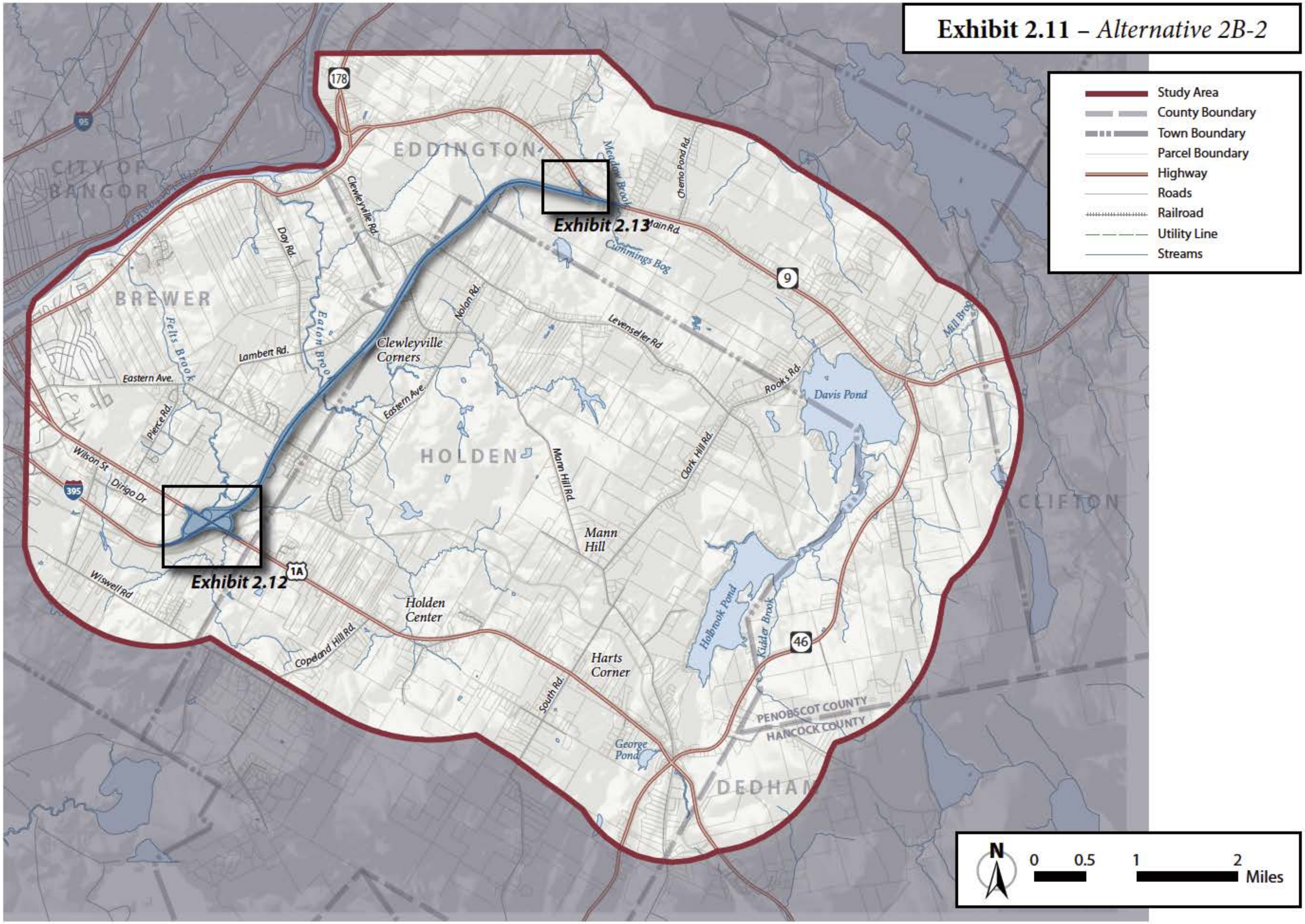


Exhibit 2.12 – *Interchange of Alternatives 2B-2 and 5B2B-2 and Route 1A*

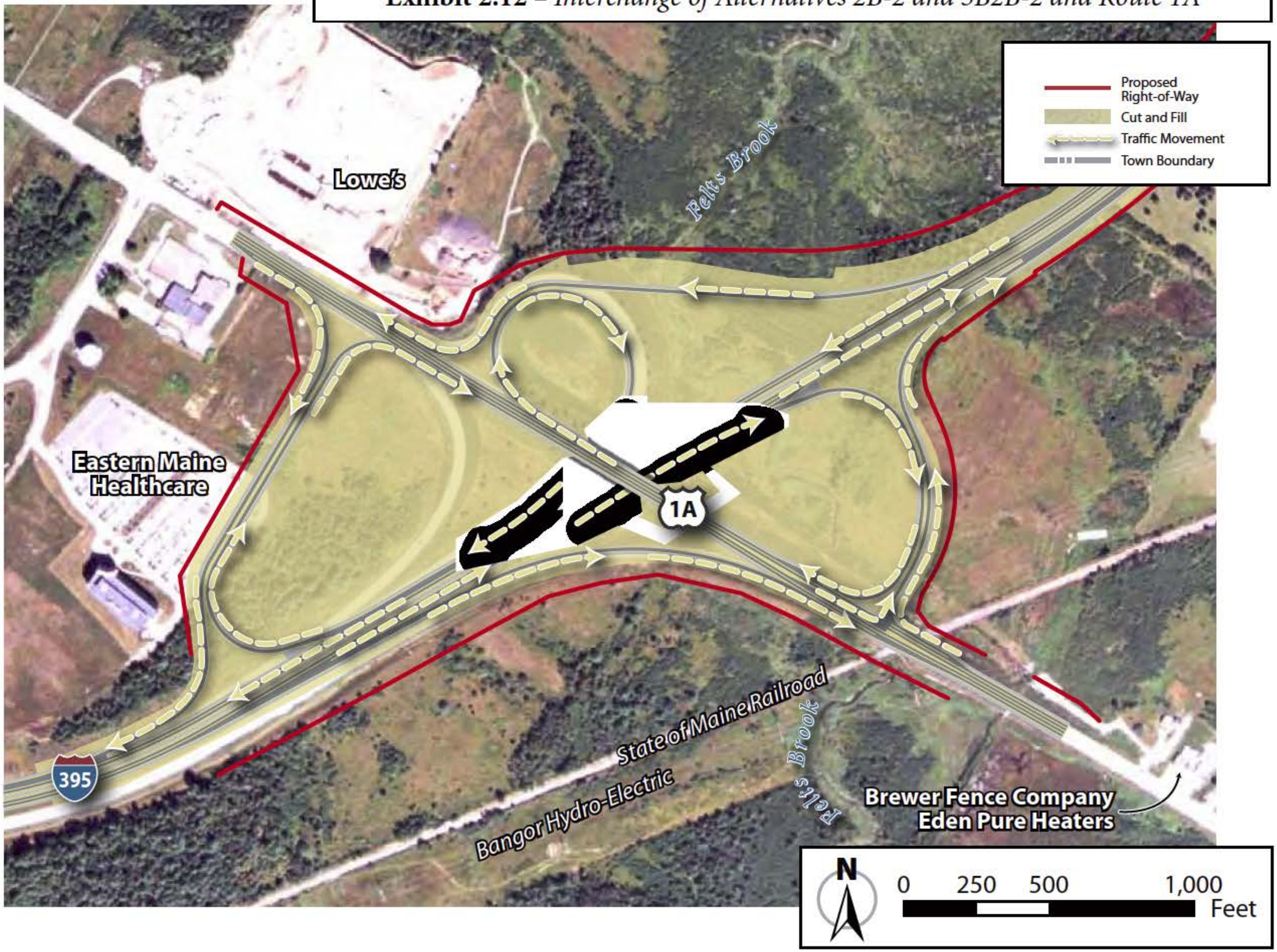
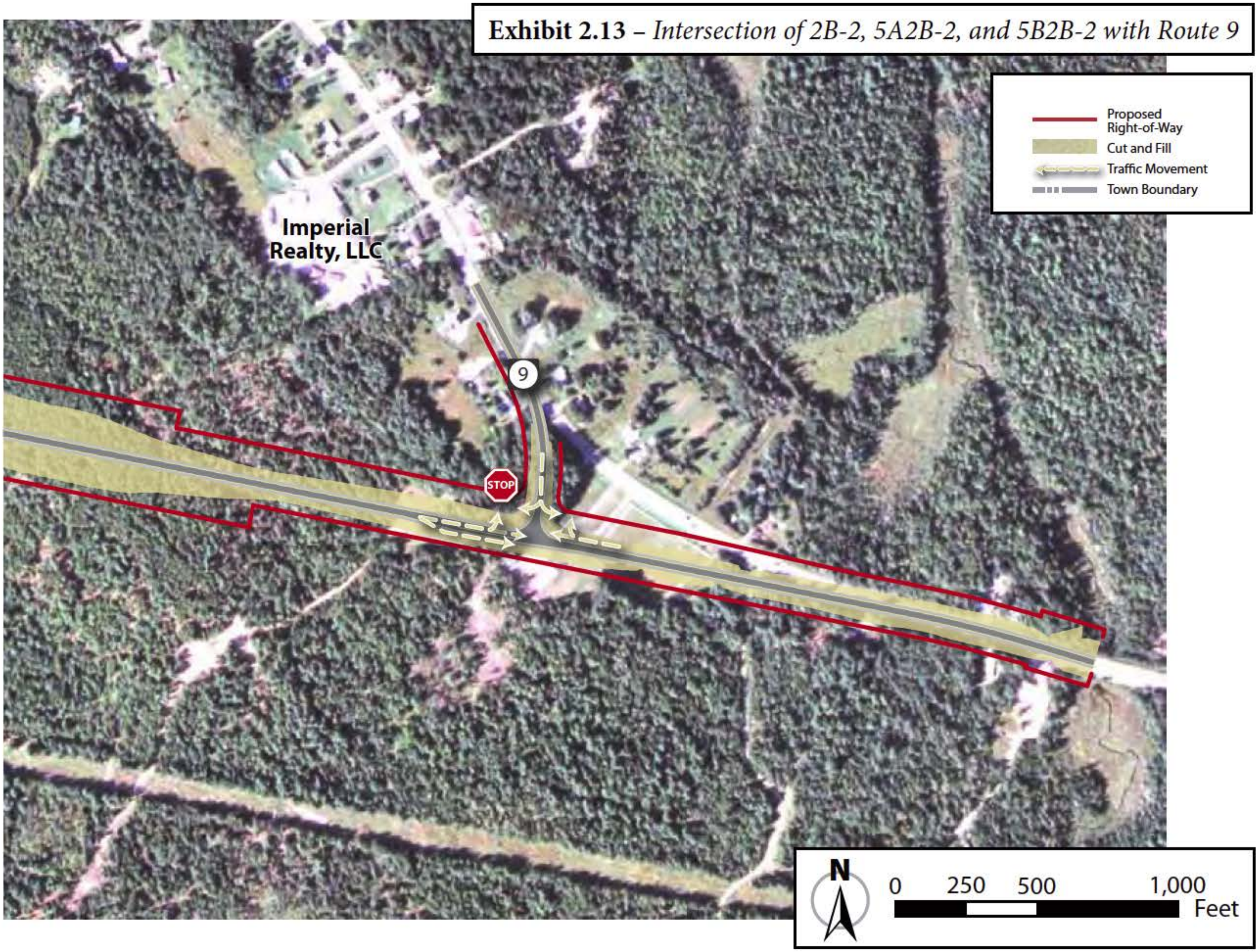


Exhibit 2.13 – *Intersection of 2B-2, 5A2B-2, and 5B2B-2 with Route 9*



study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

2.3.3 Alternative 5A2B-2

Alternative 5A2B-2 would start from I-395 for approximately one mile along the southern side of Route 1A in the town of Holden before turning northward, crossing over Route 1A, and paralleling the Bangor Hydro-Electric Company utility easement and connect with Route 9 west of Chemo Pond Road (exhibit 2.14). Route 9 would not be widened to four lanes. Alternative 5A2B-2 would connect to Route 1A with a modified-diamond interchange (exhibit 2.15), which would provide all traffic movements and require two left turns across traffic. A left-turn lane would be provided on Route 1A to 5A2B-2 north. The modified diamond-interchange design would reduce the amount of property that must be acquired. It would connect to Route 9 at a "T" intersection (exhibit 2.13). Route 9 eastbound would be controlled with a stop sign.

Alternative 5A2B-2 would further the study's purpose and satisfy the system-linkage need, in the near term. Alternative 5A2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way.

Route 9 would not be improved, and it would not provide a high-speed, controlled-access connection to the east of East Eddington village. It would satisfy the study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

Alternative 5A2B-2 would require the construction of a new interchange at I-395 and Route 1A in a location with poor soils and the existing interchange would need to be removed. The railroad crossings would be grade separated.

2.3.4 Alternative 5B2B-2

Alternative 5B2B-2 would continue north from the I-395 interchange with Route 1A before turning east and connecting with Route 9 west of Chemo Pond Road (exhibit 2.16). Route 9 would not be widened to four lanes. The existing I-395/Route 1A interchange would be used (to the extent possible) and expanded to become a semidirectional interchange (exhibit 2.12). The only traffic movement that would require a left turn would be Route 1A south to Alternative 5B2B-2 north. This interchange would require more land than a diamond interchange. The land required for the northern portion of the interchange is owned by the State of Maine.

Alternative 5B2B-2 would bridge over Felts Brook in two locations at the I-395 interchange. It would bridge over Eastern Avenue to the immediate east

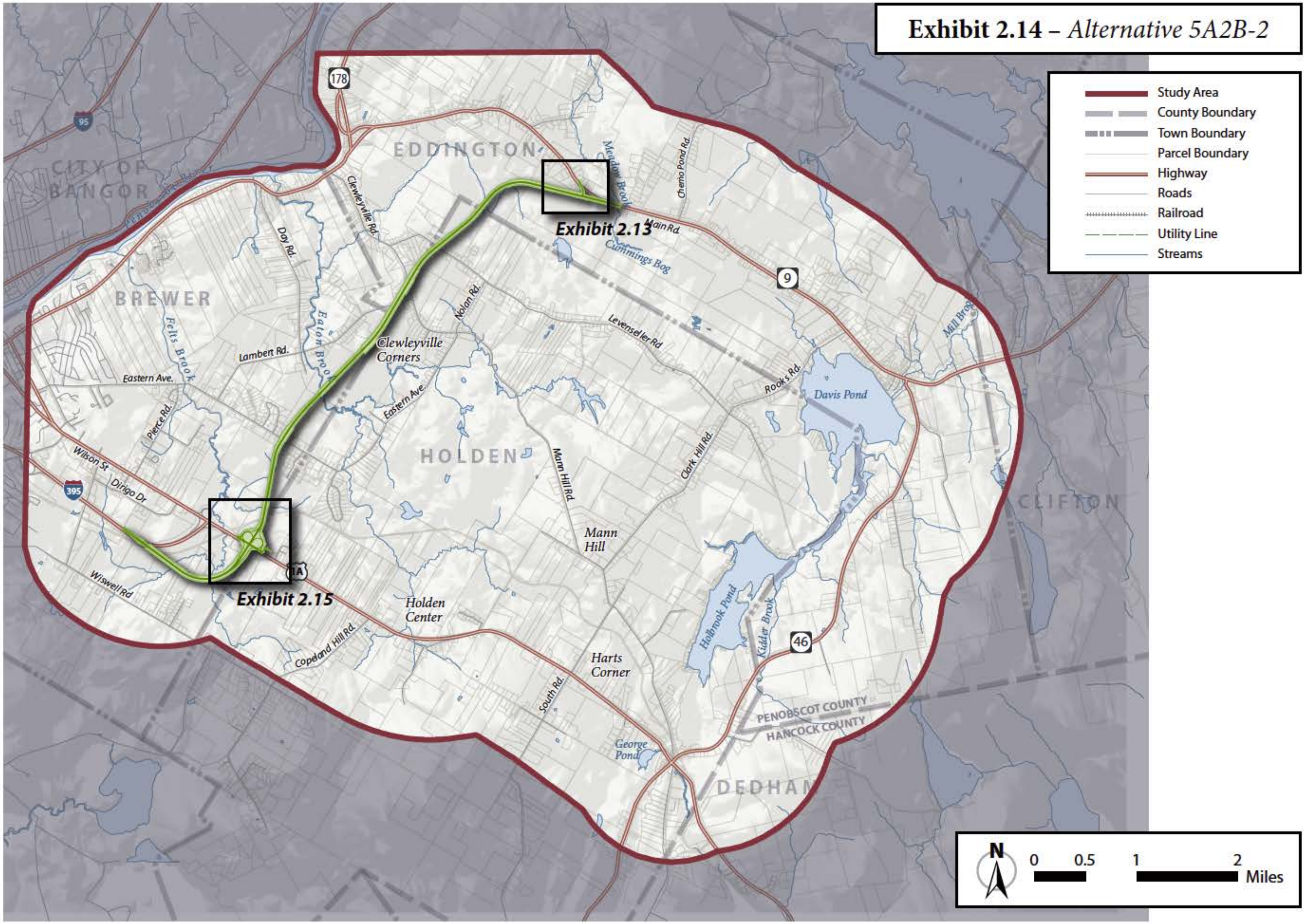


Exhibit 2.14 – Alternative 5A2B-2
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
EDDINGTON
CITY OF BANGOR
BREWER
HOLDEN
CLIFTON
DEDHAM
Exhibit 2.13
Exhibit 2.15
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
PENOBSCOT COUNTY
HANCOCK COUNTY
Lambert Rd.
Eastern Ave.
Pierce Rd.
Wilson St
Dirigo Dr
Wiswell Rd
Copeland Hill Rd.
Dow Rd.
Clewleyville Rd.
Nolan Rd.
Levenseller Rd
Mann Hill Rd.
Clark Hill Rd.
Rooks Rd.
Chemo Pond Rd.
Main Rd.
South Rd.
Felts Brook
Eaton Brook
Meadow Brook
Kidder Brook
Mill Brook
178
95
395
9
1A
46
N
0
0.5
1
2
Miles

Exhibit 2.15 – *Interchange of Alternative 5A2B-2 with Route 1A*

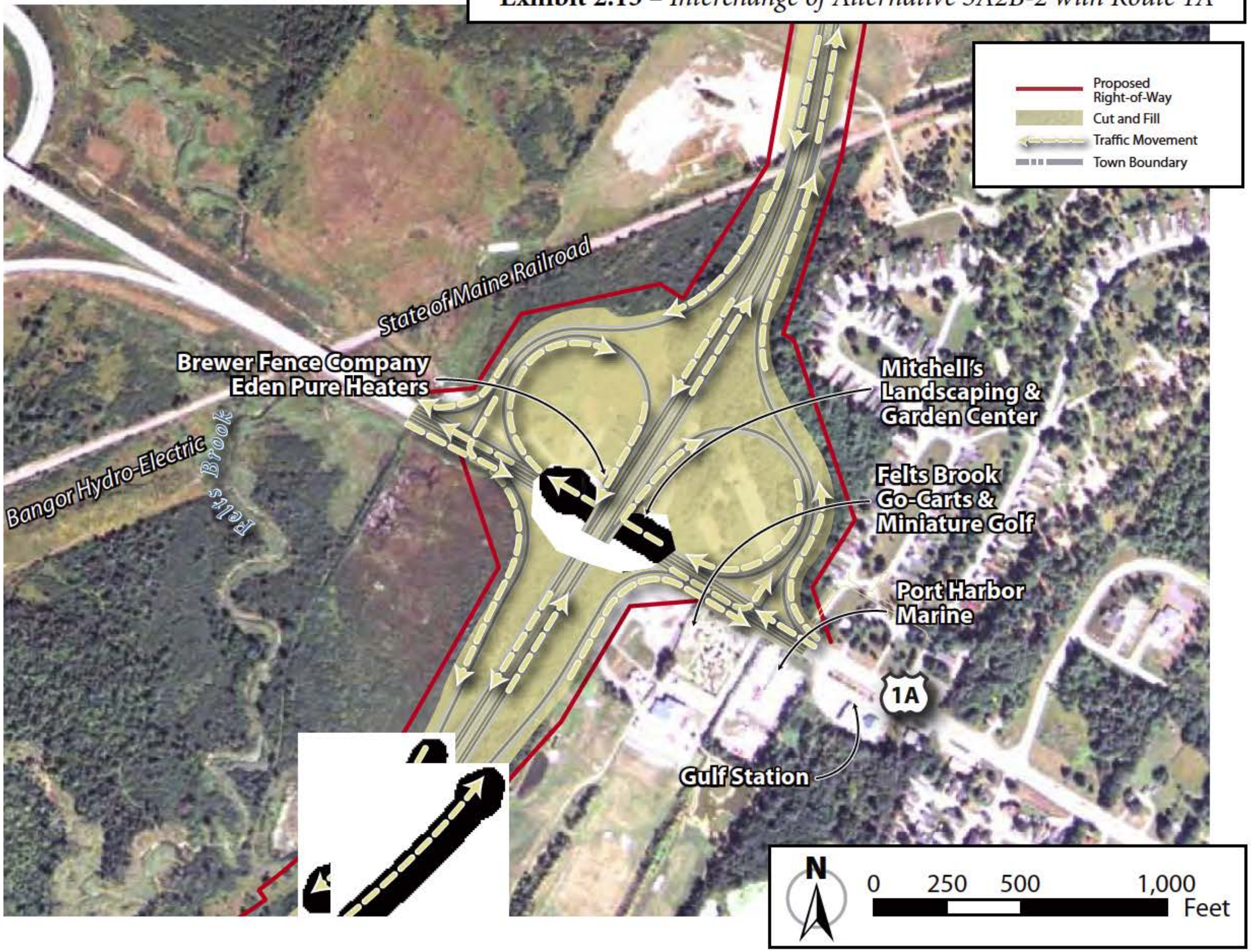
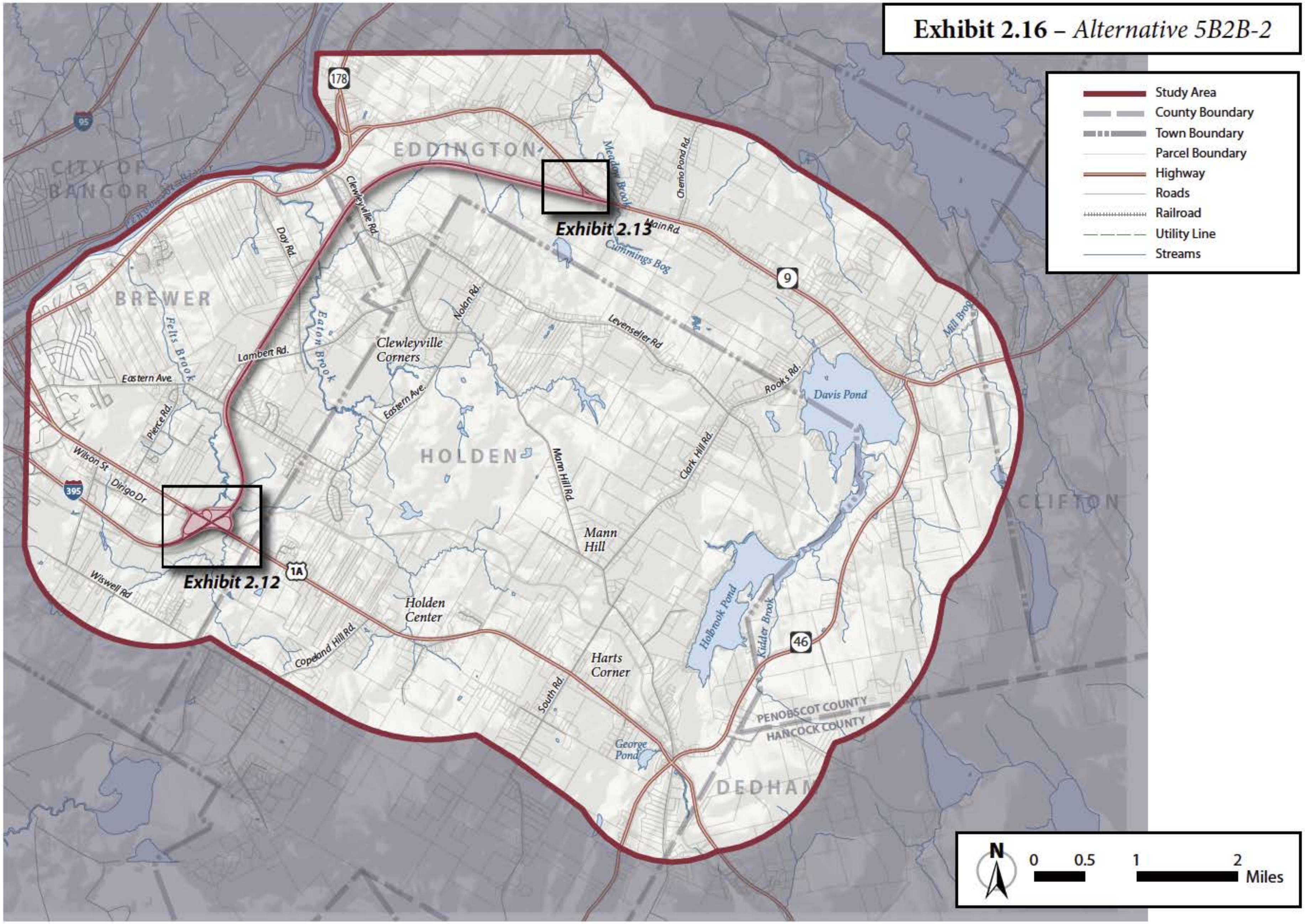


Exhibit 2.16 – *Alternative 5B2B-2*



of Lambert Road and bridge over Lambert Road. It would pass under Day Road and Chewleyville Road before turning east and connecting to Route 9 at a "T" intersection (exhibit 2.13). Route 9 eastbound would be controlled with a stop sign.

Alternative 5B2B-2 would further the study's purpose and satisfy the system-linkage need in the near term (before 2035). Alternative 5B2B-2 would be a controlled-access highway and conceptually designed using the MaineDOT design criteria for freeways. Two lanes would be constructed and used for two-way travel within an approximate 200-foot-wide right-of-way.

Route 9 would not be improved, and it would not provide a high-speed, controlled-access connection to the east of East Eddington village. It would satisfy the study need related to traffic congestion and safety. It would satisfy the USACE's basic purpose statement.

2.4 Other Activities Necessary to Construct the Preferred Alternative and Estimated Construction Cost

Each build alternative would require preliminary and final engineering design, acquisition of property, and relocation of utilities prior to construction.

2.4.1 Property to Be Acquired for Each Build Alternative

The conceptual design of the build alternatives included an estimation of land that would need to be acquired and used as a right-of-way for the two-lane highway. The proposed right-of-way width for the build alternatives would be the minimum necessary to accommodate a two-lane highway and averages approximately 200 feet. The limits of the proposed right-of-way are irregular because they are a function of topography, earth-moving activities (i.e., cutting and filling), slopes, existing property boundaries, viability of remaining portions of properties acquired, and continued access to individual properties. The amount of land to be acquired for the construction and operation of the build alternatives was minimized wherever possible.

A preliminary assessment was performed to provide a general understanding of existing properties and ownership and the extent of potential land to be acquired and used for right-of-ways to construct and maintain the build alternatives. Information was collected from aerial photography and property records from the city of Brewer and the towns of Holden, Eddington, and Clifton. Through analysis of property data, discussions with local officials, and observations, potentially impacted properties within the proposed right-of-ways for each build alternative were identified and quantified. The build alternatives would directly impact from 44 to 70 properties. The area to be acquired and used for right-of-way for the build alternatives ranges from 169 to 211 acres (exhibit 2.17).

2.4.2 Utilities to Be Relocated

The build alternatives were designed to avoid and minimize the impact and relocation of utilities. Construction of the build alternatives would impact electric, telephone, cable television, water, and sewer utilities.

A preliminary assessment of potential impacts of the build alternatives to utilities and their required relocations was performed. Information on utilities was collected from field inspection, interviews with utility owners and representatives, review of utility records and designs, property maps, and aerial photography.

Individual utility companies would be responsible for the cost of relocating utilities inside the rights-of-way of state roads. The MaineDOT would be responsible for the cost of relocating utilities located outside the right-of-ways of state roads.

2.4.3 Estimated Construction Costs

As part of the conceptual design of the build alternatives, a preliminary estimate of the cost to construct them was prepared (in 2011 dollars). The cost to construct the build alternatives ranges from $61 million to $81 million.

The MaineDOT and the FHWA preliminarily considered tolling as one method of partially financing

Exhibit 2.17 – *Summary of Property to Be Acquired*

Alternative	Displacements			Number of Affected Properties	Area to be Acquired (acres)
	Residential	Commercial	Utility		
No-Build	-	-	-	-	-
2B-2/the Preferred Alternative	8	-	-	54	174
5A2B-2	15	4	-	70	211
5B2B-2	6	-	2	44	169

Note: [1]in 2011 dollars

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit from the USACE before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from regulation (e.g., certain farming and forestry activities). The Section 404(b)(1) guidelines provide guidance to the Corps for issuing permits; compliance with the 404(b)(1) guidelines is required for the issuance of a permit. The Section 404(b)(1) guidelines require the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA). Critical to the selection of the LEDPA is the recognition of the full range of alternatives and impacts in determining first, which alternatives are (1) practicable, and (2) environmentally less damaging.

the operation and maintenance costs of a build alternative. The MaineDOT and the Maine Turnpike Authority considered the feasibility of tolling the build alternatives to determine if tolling could generate sufficient revenue to (1) cover the construction, operations, and maintenance costs of a toll facility; and (2) provide funding to supplement the operations and maintenance costs of the build alternatives, if one is selected and advanced to construction. Tolling would not be used to supplement the funding for construction of one of the build alternatives due to the low traffic volumes (HNTB, 2010).

The analysis considered two basic types of tolling facilities: a traditional barrier tolling facility (e.g., the York toll plaza in York, Maine) and an open-road tolling facility (e.g., the Hampton toll plaza in Hampton, New Hampshire). The analysis included the following toll schedule:

- Passenger-car cash toll rate would be $1.00 in the opening year
- Heavy-truck cash toll rate would be four times the passenger-car cash toll rate
- E-ZPass rates would be discounted 10 percent off the cash rate
- Commuter rates would be discounted 50 percent off the cash rate
- Toll increases would occur every five years at an annual inflation rate of 2.7 percent
- Toll rates for cash-paying vehicles would be rounded to the nearest $0.05

The analysis concluded that a traditional barrier tolling facility could generate revenue to cover the costs associated with the construction, operations, and maintenance costs of a toll facility and generate approximately $155,000 annually (in 2011 dollars) to supplement the operations and maintenance costs of one of the build alternatives. The analysis further concluded that an open-road toll facility would not generate enough revenue to cover the construction, operations, and maintenance costs of a toll facility (HNTB, 2010).

Due to the small amount of revenue generated from a toll facility in comparison to the estimated cost of construction, the MaineDOT and the FHWA are not considering tolling as a method of partially financing the operation and maintenance costs of a build alternative, if one is selected and advanced to construction.

2.5 Next Steps If a Build Alternative Is to Be Constructed

The MaineDOT and the FHWA have prepared a permit application in accordance with Section 404 of the CWA for the range of alternatives retained for further consideration and it has been submitted to the USACE. A copy of this Section 404 permit application is contained in Appendix E, and is supported by information throughout this EIS.

If the No-Build Alternative is selected, the MaineDOT and the FHWA would continue to work with local and regional authorities to maintain (to the extent possible) the safety and efficiency of I-395 and the state roads in the study area.

The USACE identifies the LEDPA following its review of the permit application and completion of its public-interest finding.

If a build alternative is selected for construction — through completion of a FEIS, filing of a ROD by the FHWA, and the USACE determination of the LEDPA and issuance of a Section 404 permit — the MaineDOT would work with the affected municipalities to develop a plan to protect the corridor of the preferred alternative from further development. Methods to protect the corridor include development of zoning and local ordinances and selective acquisition of properties as they become available for sale or at risk for further development. The MaineDOT may fund these property acquisitions through its customary programming of state and federal highway-funding mechanisms. Property acquisitions and residential and business relocations would be in accordance with appropriate state and federal laws relevant to acquisition of property for highway purposes.

Once the MaineDOT has a corridor-protection system in place, it would work to develop support for a funding plan. In recent years, many states have found that state highway funds, bonding, and federal core apportionments are needed to maintain the transportation system as it exists, with little in additional funds for new capacity projects. Therefore, the MaineDOT would work with the Governor, region, and state and federal legislators to devise funding strategies for the full property acquisition and ultimate construction of the selected build alternative.

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, eliminating existing and future curb cuts, and working with individual landowners to acquire property or development rights.

The acquisition of property for a right-of-way for corridor preservation could begin shortly after the NEPA/Section 404 process is completed. It would take several years to finalize the engineering design before construction can begin. Construction is not anticipated to begin until 2014.

During final design, the MaineDOT would continue to refine the alignment and its right-of-way within the preferred corridor to further avoid and minimize impacts to the natural, social, and economic environments and to coordinate with those that are affected.

In addition to construction and operation of the preferred alternative, the MaineDOT is committed to improving the most heavily congested section of Route 1A from I-395 to Route 46 and the intersection of Routes 46 and 9.

2.6 Most Essential Differences among the Alternatives to Be Considered in Decision Making

Distinct differences exist in the potential direct and indirect impacts from the build alternatives (exhibit 2.18). They help to define the alternatives and assist the MaineDOT and the FHWA in choosing the preferred alternative. A full accounting of the direct, indirect, and cumulative impacts from the No-Build Alternative and the build alternatives to the natural, social, cultural, and economic environments is in Chapter 3.

Exhibit 2.18 – *Direct Impacts of Alternatives*

Alternatives	Physical and Biological															Land Use				
				Streams																
	Wetlands (acres)	Roadway contaminants within 100 feet[1] (acres)	Roadway contaminants within 160 feet[2] (acres)	Bridges and culverts/feet	Roadway contaminants within 100 feet[1] (acres)	Roadway contaminants within 160 feet[2] (acres)	Sediments within 3,300 feet[2] acres)	Floodplains (acres)	Vernal pools[3]/ dispersal habitat (acres)	Waterfowl and wading bird habitat[4] (acres)	Deer-wintering areas (acres)	Endangered Species	Vegetation (acres)	Undeveloped habitat	Area to be acquired (acres)	Historic Properties	4(f) Properties	Residential displacements[5]	Business displacements[6]	Business impacts[7]
No-Build	-	17	64	-	0.3 ac. (17,000 sq. ft.)	0.7 ac. (29,000 sq. ft.)	12 ac.	-	-	-	-	-	-	-	-	-	-	-	-	-
2B-2/the Preferred Alternative	26	31	66	5 bridges 3 culverts/ 554 feet	0.9 ac. (39,100 sq. ft.)	1.8 ac. (78,300 sq. ft.)	13 ac.	10	1/15	9 acres along Eaton Brook and its tributaries	-	Yes	102	Eliminates two blocks; fragments three blocks	163	No	No	8	-	Eastern Maine Healthcare parking lot – 130 parking spaces (20 percent)
5A2B-2	31	34	71	5 bridges 3 culverts/ 567 feet	0.6 ac. (24,300 sq. ft.)	1.5 ac. (63,000 sq. ft.)	18 ac.	2	1/23	20 acres along Felts Brook and 9 acres along Eaton Brook	-	Yes	136	Eliminates two blocks; fragments four blocks	215	No	No	15	Brewer Fence Company, Eden Pure Heaters, Mitchell's Landscaping and Garden Center, Town 'N Country Apartments	-
5B2B-2	32	30	80	6 bridges 1 culvert/ 222 feet	1.0 ac. (43,700 sq. ft.)	2 ac. (90,000 sq. ft)	17 ac.	11	1/6	3 acres along a tributary to Eaton Brook	3 acres along a tributary to Eaton Brook	Yes	102	Fragments four blocks	186	No	No	6	Bangor Hydro-Electric Co. Building, Maritimes and Northeast Pipeline Compressor Station	Eastern Maine Healthcare parking lot – 130 parking spaces (20 percent)

Notes:
Primary road contaminants are salt and lead.
No-Build Alternative consisted of Route 1A from I-395 to Route 46, and Route 46 from Route 1A to Route 9.
[1]***Source:*** *USACE New England District, "Compensatory Mitigation Guidance", 2010.*
[2]***Source:*** *Maine Audubon Society, "Conserving Wildlife On and Around Maine's Roads", 2007.*
[3]*All vernal pools are insignificant.*
[4] *Upland habitat within 250 ft.*
[5] *The taking of a residence*
[6] *The taking of a business*
[7] *An impact to the business without the taking of the business*

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).

A study area of approximately 34,416 acres (approximately 54 square miles), encompassing the range of reasonable alternatives, was identified and a detailed analysis of its natural, social, and economic features was performed.

This chapter identifies the affected environment, potential environmental consequences, mitigation measures, and commitments associated with construction and operation of the No-Build Alternative and build alternatives retained for further consideration and detailed analysis. Potential impacts – both beneficial and adverse – were identified and, where possible, quantified through studies of the natural, social, and economic environments. Potential impacts include the direct impacts, indirect or secondary impacts, and cumulative impacts of the No-Build Alternative and build alternatives.

3.1 Physical and Biological Environment

The physical geography, or physiography, of an area is a description of physical features of the natural

Chapter Contents

landscape. The following subsections describe the physical geography, climate, soils, and geology of the study area that may influence the alternatives development and selection process.

Direct Impacts — the immediate effects on the social, economic, and physical environment caused by the construction and operation of a highway. These impacts are usually experienced within the right-of-way or in the immediate vicinity of the highway or another element of the proposed action (40 CFR 1508.8(a)).

Indirect (or Secondary) Impacts — the impacts that are caused by the project and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8(b)).

Cumulative Impacts — the impacts on the environment that result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7).

3.1.1 Physical Geography

The study area is in the Central Maine Embayment biophysical subregion.[1] the study area has a rolling to hilly topography, with steep inclines and expansive wetlands in lower-lying areas. Elevations in the study area generally range between zero and 1,000 feet above sea level (USGS, 2003).

The No-Build Alternative would not impact the physical geography of the study area.

The build alternatives would not substantially alter the physical geography of the study area. The build alternatives were designed to follow the existing terrain while adhering to the MaineDOT's design criteria for grades and slopes for freeways. The earthwork necessary to construct the build alternatives is balanced (i.e., no substantial borrowing or wasting of earth material from/at other sites is necessary).

3.1.1.1 Climate

The state of Maine is divided into three major climatological divisions: Coastal Division, Southern Interior Division, and Northern Interior Division. The study area is located in the Southern Interior Division, which encompasses approximately 30 percent of

[1]A type of classification system based on patterns in the landscape and vegetation to categorize Maine's landscape set forth by Janet McMahon in her MS thesis in 1990 that was adopted by the Maine Forest Service.

Maine. Peak summer temperatures average 70 degrees Fahrenheit (F) statewide, but temperatures can reach 90 degrees F. Winters in the Southern Interior Division can reach temperatures below zero degrees F. Average annual rainfall in the Southern Interior Division is 42 inches. Heavy fog can occur in low-lying areas. Average annual snowfall in this division is 60 to 90 inches (Maine Tourism Association, 2008).

The No-Build Alternative and build alternatives would not impact the climate of the study area.

3.1.1.2 Soils

The predominant glacial sediment in the study area is till, which is commonly a blanket deposition that conforms to the bedrock surface (Loiselle, 2003). Till is generally an unstratified, heterogeneous mixture of sand, silt, clay, and gravel. Glacial marine deposits, composed of dark blue to gray silt, clay, and very fine sand, are present in the study area. Small areas of ice contact deposits are present along the Penobscot River and near East Holden. They consist of well to poorly stratified deposits of sand, gravel, cobbles, boulders, and some silt and clay. Swamp deposits, found in the central and eastern portions of the study area, consist of peat, silt, clay, and sand and are poorly drained (Prescott, 1966). Thickness of the glacial deposits can be highly variable but is expected to range between zero and 50 feet in the study area (Caswell and Lanctot, 1978).

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 (exhibit 3.1). Hydric soils 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. Hydric soils are developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. The prevalence of hydrophytes and presence of hydric soil reflect the long-term hydrology and are generally useful indicators of wetlands. Hydric soils are evenly distributed throughout the study area, but most are prevalent near Davis Pond and Holbrook Pond. According to the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), hydric soils comprise approximately 8,440 acres (24.5 percent) of the study area.

Prime farmland soil has the best combination of physical and chemical characteristics for producing forage and crops. Potential prime farmland refers to soils that must be drained, irrigated, or both to be classified as prime farmland. The U.S. Farmland Protection Policy Act (FPPA) (7 USC §§ 4201-09) was enacted to prevent the unnecessary or irreversible

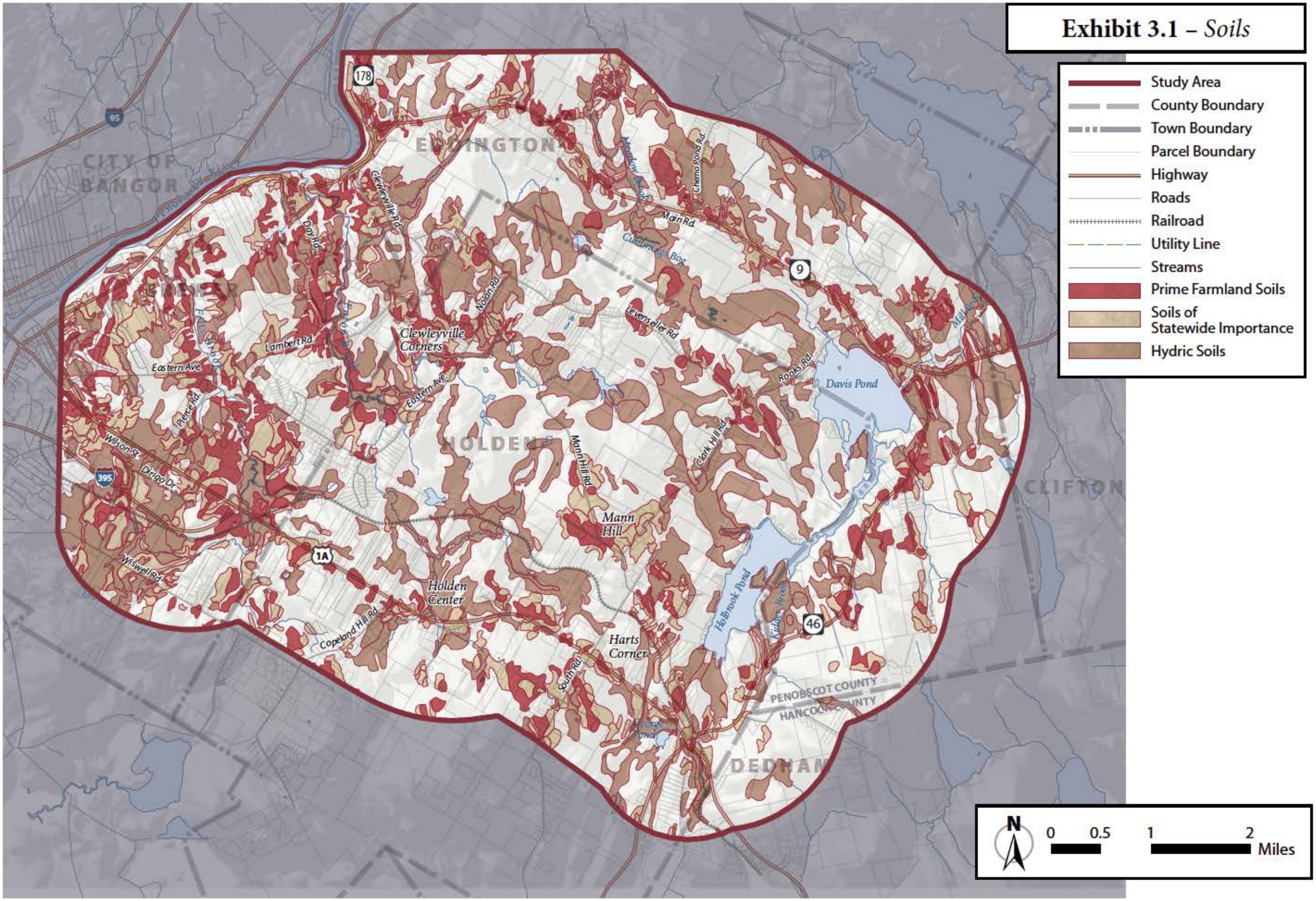


Exhibit 3.1 – *Soils*

conversion of these soil types to nonagricultural uses, even if the soils are not necessarily in agricultural use. Prime farmland soils in the study area are primarily in Brewer and along I-395 and Routes 1A and 9. Some of the active farmland in the study area contains prime farmland soils. Approximately 2,473 acres (seven percent) of the study area consists of prime and potential prime farmland soils.

Unique farmland is defined by the FPPA as land that is particularly suited to growing specific crops or other agricultural products. An example is a cranberry bog, which is uniquely suited to growing cranberries but may not be suitable for general agricultural uses. No unique farmland was identified in the study area.

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. Additional soils of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable" (Council on Environmental Quality, 1980).

Approximately 4,087 acres (11.9 percent) of the study area consists of soils of statewide importance. However, many areas of the soils exist in residential development and are not considered either prime and unique farmland or soils of statewide importance under the FPPA.

The No-Build Alternative would not impact hydric soils, prime farmland soils, soils of statewide importance, or farm operations.

The build alternatives would impact hydric soils, prime farmland soils, and soils of statewide importance (exhibit 3.2).

The build alternatives would impact agricultural land through the acquisition of property and conversion to transportation use.

The No-Build Alternative and build alternatives would not result in a substantial impact to farmland and farming operations. The MaineDOT, the FHWA, and the NRCS performed an analysis of the potential impacts of the build alternatives to farmland and farming operations in accordance with the 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

Exhibit 3.2 – *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%)

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, 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).

3.1.1.3 Geology

Most of the study area is underlain by Devonian and Silurian Age metasediments that have undergone several episodes of tectonic folding and faulting (Kaszuba, 1992). Bedding (i.e., layers of rock) in the area is generally vertical to near vertical and strikes northeast-southwest. Cleavage (i.e., the tendency of rocks to break or fracture in a plane or direction) also strikes northeast-southwest and is high angle to vertical. The Norumbega fault zone strikes northeast-southwest through the center of the study area. Blanketing the bedrock is a highly variable layer of glacial sediments (Prescott, 1966).

The northwestern half of the study area, located between the Penobscot River and the Norumbega fault zone, is underlain by the Sangerville formation; the Vassalboro and Fall Brook formations; and the "Kenduskeag Unit" a subgroup of the Vassalboro formation. The Sangerville formation is a graded calcareous quartzite interbedded with dark gray to black phyllitic slate. The Vassalboro and Fall Brook formations are composed of thick, fine- to medium-grained, feldspathic wacke with 3- to 6-inch-thick interbeds of phyllite and coarse sand to granule conglomerate. The Kenduskeag Unit is a sequence of massive quartzite alternating with sequences of thin interbeds of phyllite and metasiltstone. Portions of the unit consist of sedimentary breccia and chaotic zones of slump origin (Griffin, 1976).

The Bucksport formation underlies most of the study area southeast of the Norumbega fault zone (Osberg et al., 1985). The formation is composed of interlaminated pelite and calcareous siltstone. The Copeland formation is present along the southern edge of the study area near Holden and is composed of interlayered beds of bluish-gray pelitic schist and quartzite (Wones, 1991; Kaszuba, 1992).

The No-Build Alternative and build alternatives would not impact geological resources that would require extraordinary engineering solutions.

3.1.2 Aquatic Resources

Aquatic resources consist of surface water and groundwater used as a source of drinking water, surface water used as habitat, and transitional lands affected by surface water and groundwater (e.g., wetlands and floodplains).

Water resources in the study area consist of groundwater and surface water such as rivers, streams, and ponds. Some of these water resources serve as a source of primary drinking-water supply for area residents. Water resources may be affected directly or indirectly by construction. Federal and state environmental laws and regulations provide protection of water resources because they are important in supporting aquatic habitat and provide critical functions, such as flood control and water supply.

3.1.2.1 Water Resources

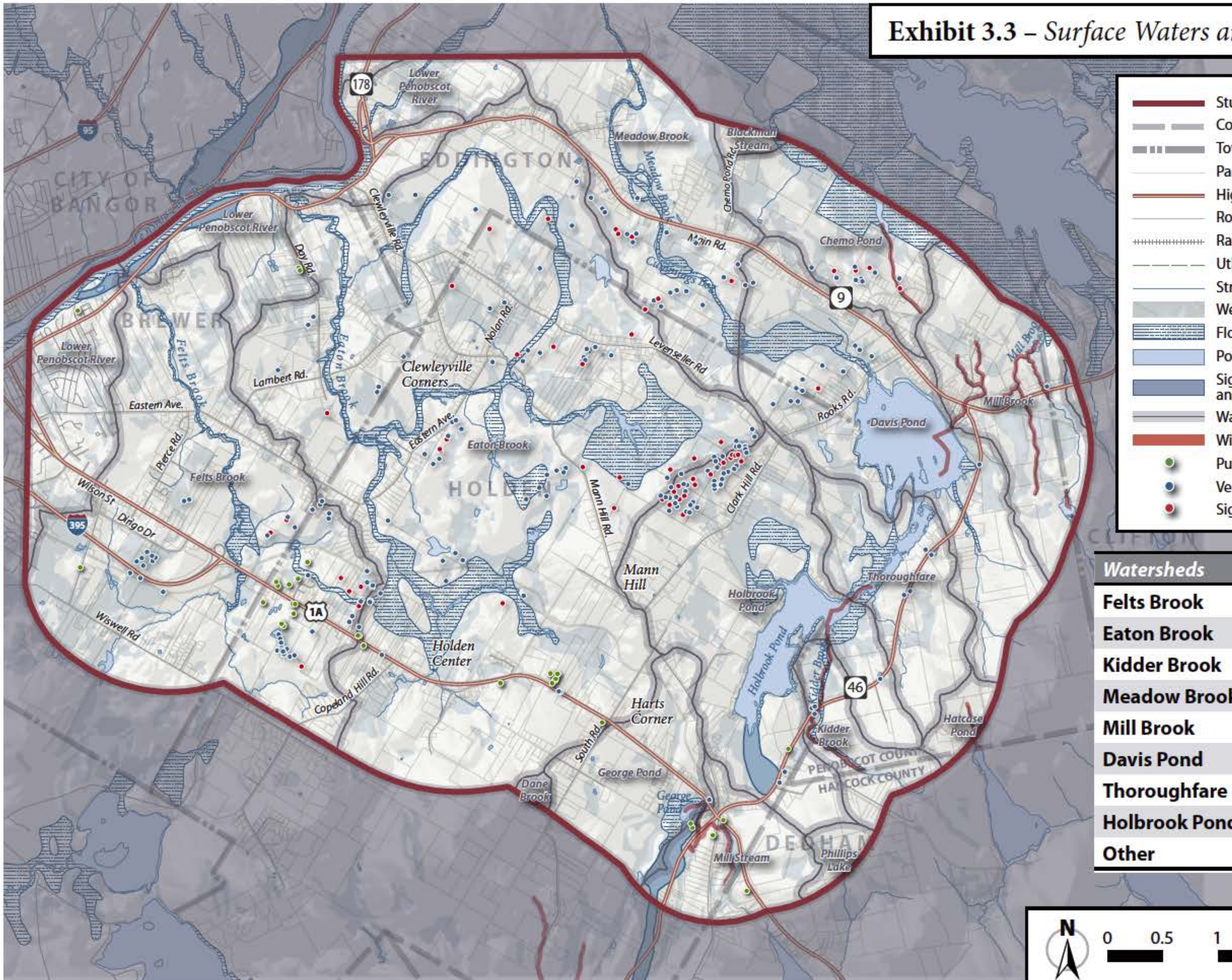
Surface Waters. The predominant surface-water features in the study area are the Penobscot River, Felts Brook, Eaton Brook, Kidder Brook, Meadow Brook, Mill Brook, Davis Pond (also known as Eddington Pond), and Holbrook Pond (exhibit 3.3). The study area is located in the Lower Penobscot River watershed; many sub-watersheds are also located in the study area.

The Penobscot River and the waters of its contributing drainage basin are classified as Class B waters (exhibit 3.4). The Maine Department of Environmental Protection (MDEP) is responsible for protecting these water classifications. Additionally, the Maine legislature ruled that the free-flowing habitat of the segment of the Penobscot River in the study area provides irreplaceable social and economic benefits and that this use must be maintained [38 MRSA § 467-7A (5), (6), and (7)].

At 350 miles long, the Penobscot River is the longest river in Maine. The Eastern and Western Branches of the Penobscot River converge at the town of Medway. The river flows south past the study area to Penobscot Bay.

Felts Brook, approximately 5.3 miles long, begins to the south and east of the I-395/Route 1A interchange, flows to the north and west, and ultimately discharges into the Penobscot River in Brewer. Felts Brook averages approximately 20 feet in width and two feet in depth near the I-395/Route 1A interchange. Its short steep banks are prone to slumping along meanders or where vegetation is sparse. Although the upper and lower reaches of Felts Brook are well shaded, the central portion receives considerable sunlight because it flows largely through land where woody riparian vegetation has been removed. The central and lower portion of Felts Brook has a silty substrate with few rocks and cobbles and a low gradient.

Exhibit 3.3 – *Surface Waters and Wetlands*



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 3.4 – *Maine Standards for Classification of Fresh Surface Waters*

Classification	Class	Designated Uses	Habitat	Aquatic Life/Bacteria	Discharge of Pollutants
1	**AA**	Drinking water after disinfection, fishing, recreation and navigation, habitat for aquatic life	Free-flowing and natural	As naturally occurs	None allowed, except stormwater
2	**A**	All uses of AA, hydroelectric power generation, industrial process and cooling water supply	Natural	As naturally occurs	Permitted only if effluent will be equal to or better than the water quality of receiving waters
3	**B**	Same as Class A	Unimpaired	Mean amount of bacteria of human origin may not exceed 64 ppm	Receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving waters
4	**C**	Same as Class A	Unimpaired	Mean amount of bacteria of human origin may not exceed 142 ppm	May cause some changes to aquatic life, but receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving waters

Source: *Maine Public Law, Standards for Classification of Fresh Surface Waters, 38 MRSA §465.*

The main stem of Eaton Brook, approximately 6.8 miles long, begins near Copeland Hill Road in Holden, flows to the north and ultimately discharges into the Penobscot River in North Brewer. Eaton Brook is approximately 15 to 20 feet wide and averages approximately 18 inches deep. The upper reaches of Eaton Brook are well shaded with generally well-defined banks and low flow. Eaton Brook also exhibits low gradient. The lower reaches are well shaded with defined banks and slightly greater flow. There are several well-defined pools in the lower reaches of Eaton Brook. It has many well-defined tributaries that extend several miles through the central and north-central portions of the study area.

Kidder Brook, approximately 2.3 miles long, begins to the east of Route 46 and crosses under it before discharging into Holbrook Pond. Kidder Brook has a dense forest canopy and exhibits a higher gradient compared to Felts Brook and Eaton Brook. It is typically six to 12 feet in width and exhibits a series of stepped pools and riffles east of the crossing at Route 46. West of Route 46, Kidder Brook exhibits lower gradient and meanders to its confluence with Holbrook Pond.

Meadow Brook is approximately eight feet wide and is an outlet of Davis Pond. From Davis Pond, Meadow Brook flows northwest through Cummings Bog, out of the study area, and empties into the Penobscot River approximately 4 miles north of the Routes 9 and 178 intersection. Meadow Brook is approximately 11.8 miles long. In the study area, it flows mainly through undeveloped forested land.

Mill Brook is approximately 20 feet wide and also is an outlet of Davis Pond. From Davis Pond, Mill Brook flows north approximately 1.9 miles to its confluence with Chemo Pond. In the study area, Mill Brook flows mainly through forested areas until north of East Eddington along the Eddington-Clifton town line, where it meanders through an open marsh area before entering Chemo Pond.

Davis Pond and Holbrook Pond are located on the Holden–Eddington town line. Holbrook Pond is a warmwater pond approximately 350 acres in size, with a maximum depth of 28 feet (PEARL, 2005). Davis Pond is approximately 415 acres in size and has a maximum depth of 14 feet. It is connected to Holbrook Pond by a marshy area known as the "Thoroughfare" (PEARL, 2005). Both Davis Pond and Holbrook Pond are classified as Class GPA waters (38 MRSA § 465A) (exhibit 3.5).

Davis Pond and Holbrook Pond are on the MDEP list of lakes most at risk from new development (MDEP, 2006). In Maine, a lake is considered most at risk from new development if it is:

- a public water supply
- identified by the MDEP as being in violation of class GPA water-quality standards or as particularly sensitive to eutrophication based on:
  - » current water quality
  - » potential for internal recycling of phosphorus
  - » potential as a coldwater fishery
  - » volume and flushing rate
  - » projected growth rate in the watershed (MDEP, 2006)

Davis Pond and Holbrook Pond receive runoff from land uses that contribute to nutrient-loading and turbidity.

A watershed is the geographic area where all water running off the land drains to a given stream, river,

Exhibit 3.5 – *Maine Standards for Classification of Lakes and Ponds*

Class	Designated Uses	Tropic State	Bacteria	Discharge of Pollutants
GPA	Drinking water after disinfection, recreation, fishing, industrial process and cooling water supply, hydroelectric power generation, navigation, habitat for aquatic life	Based on measures of chlorophyll "a" content, Secchi disk transparency, and total phosphorus content; must be stable or decreasing and subject only to natural fluctuations; must be free of algal blooms	Bacteria of human origin may not exceed a geometric mean of 29 ppm	No new direct discharge of pollutants is allowed, other than aquatic pesticide treatments, chemical water restoration treatments, or stormwater runoff

Source: *Maine Public Law, Standards for Classification of Fresh Surface Waters, 38 MRSA §465-A.*

lake, wetlands, or coastal water. Watershed planning and management comprise an approach to protecting water quality and quantity that focuses on an entire watershed. The main watersheds in the study area are Felts Brook, Eaton Brook, Kidder Brook, Meadow Brook, Mill Brook, Davis Pond, the Thoroughfare, and Holbrook Pond (exhibit 3.3). All of the watersheds are located in the Lower Penobscot sub-watershed.

Stormwater runoff in urban areas is one of the leading sources of water pollution in the United States. Impacts to surface waters result from the following:

- bridging, enclosing in culverts, and rechanneling
- new impervious area that increases contaminants or sediments carried in runoff
- development in stream corridors and reduction in buffers of streams and waterways that would impact the ability of the buffer to treat stormwater

The No-Build Alternative would not impact surface waters.

The build alternatives would impact four or five streams; streams would be impacted by bridging them and enclosing portions in culverts, or both, once or more than once. 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 222 to 567 feet (exhibit 3.6).

During final design of Alternative 2B-2/the Preferred Alternative, the 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 the 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 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

Exhibit 3.6 – *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 2 10'X10' box culverts - 342 feet	1 bridge - 100 feet	1 bridge - 100 feet 1 culvert - 212 feet, 5-foot diameter	5 bridges - 475 feet 3 culverts - 554 feet
5A2B-2	46	1 bridge - 25 feet	1 bridge - 25 feet	1 bridge - 25 feet 2 10'X10' box culverts - 355 feet	1 bridge - 100 feet	1 bridge -100 feet 1 culvert - 212 feet, 5-foot diameter	5 bridges- 275 feet 3 culverts - 567 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.

available to attenuate materials that are washed off the roadway from a storm, which leads to sedimentation and contamination.

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. 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/Maine Turnpike Authority Memorandum of Agreement, Stormwater Management, November 14, 2007 and Chapter 500 Rules.

During final design of Alternative 2B-2/the Preferred Alternative, the MaineDOT would further analyze opportunities to maintain and restore predevelopment (pre-construction) hydrology.

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 MDEP. 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.

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

Groundwater. The entire study area is underlain by shallow sand and gravel aquifers and deeper bedrock aquifers. The sand and gravel aquifers in the glacial deposits are the primary groundwater sources for municipal, industrial, and domestic wells in Maine. The State of Maine defines sand and gravel deposits capable of yielding 10 or more gallons per minute (gpm) to a properly installed domestic well as "significant sand and gravel aquifers" that occur primarily in the valleys of major rivers and their tributaries (exhibit 3.3) (Nell, Steiger, and Weddle, 1992).

In the study area, significant sand and gravel aquifers are present in localized areas along the Penobscot River and near Route 46 (Foster and Smith, 2008). These sands are generally very permeable and, where saturated, can yield large quantities of water. Till and glacial marine deposits, which blanket the bedrock in most of the study area, generally do not have well-sorted deposits of sand and gravel and are considered poor aquifers.

Bedrock aquifers are the main source of groundwater in the study area. Groundwater movement is controlled by the distribution and characteristics of brittle fractures in the bedrock. The highest yields are found where the bedrock is extensively fractured. The bedrock aquifer is generally capable of supplying small to intermediate public and private needs (Loiselle, 2007).

Topography is a controlling influence on both depth to groundwater and direction of groundwater flow. The water table is generally shallower in valleys and deeper on hilltops. The presence of wetlands reflects the intersection of the water table with the ground surface. On average, the depth to the water table is expected to be less than 15 feet in the study area (Nell, Steiger, and Weddle, 1992; Maine Geological Survey, 2008). Localized groundwater-flow direction is quite variable due to the irregular topography. In general, the western two-thirds of the study area drains to the west to the Penobscot River, and the eastern one-third of the area drains to the east toward Holbrook Pond and Davis Pond.

Private wells in areas not currently served by the municipal or other public water systems were identified by the Maine Geological Survey (MGS). The database consists of private wells that have been installed since 1988, when mandatory reporting of new well installations began in accordance with provisions of the Maine Water Well Information Law (i.e., 12 MRSA § 550-B). The database consists of those wells identified through both voluntary reporting prior to 1988 and well surveys conducted in the 1970s.

The Private Water Well Database maintained by the MGS showed 134 wells in the study area. Well depths range from 40 to 495 feet, with most wells between 100 and 300 feet deep. Well yields are generally less than 10 gpm (Maine Geological Survey, 2008).

Smaller public water-supply well systems exist for commercial and residential establishments such as restaurants, inns, gasoline stations, and mobile-home parks. The State of Maine defines a public water system as "…any publicly or privately owned system of pipes, structures, and facilities through which water is obtained for or sold, furnished, or distributed to the public for human consumption." A public water system must have at least 15 service connections and regularly serve a minimum average of 25 people daily for a minimum of 60 days of the year or through the sales of bottled water (Maine Department of Human Services, Division of Health Engineering, 2001).

The Maine Drinking Water Program showed 33 public water-supply wells in the study area (exhibit 3.3). Most drinking water in Holden comes from private drilled wells (Maine Department of Human Services, 2004). Eddington is served by water lines from Bangor and Brewer (Hinkley, 2001).

Groundwater quality in the study area is generally good. Water from bedrock is often higher in chloride, nitrates, and hardness than water from glacial sediments. Elevated levels of iron and manganese may be present in some groundwater (Prescott, 1966).

No sole-source aquifers, as defined by the U.S. Environmental Protection Agency (USEPA), exist in the study area (USEPA, 2009).

Impacts to groundwater result from the following:

- increased number of impervious areas that reduce the ability of the ground to absorb water and replenish groundwater supplies
- introduction of contaminants into groundwater

The No-Build Alternative would not impact groundwater.

The build alternatives would not impact significant sand and gravel aquifers (i.e., aquifers yielding 10 gpm or more) or recorded public water-supply wells.

The build alternatives would result in an increase in impervious surfaces. This would increase runoff and reduce the area available to absorb runoff.

Precipitation and runoff from highways would be collected in the highway's drainage system, where it would enter the soil and contribute to groundwater recharge. Similar to surface waters, contaminants discharged with runoff from highways have the potential to infiltrate groundwater and impact groundwater quality. The highway drainage system would be designed in accordance with the MDEP/MaineDOT/Maine Turnpike Authority Memorandum of Agreement, Stormwater Management, November 14, 2007 ensuring that the impacts of highway-associated contaminants to groundwater are minimized.

3.1.2.2 Aquatic Habitats and Fisheries

Waterways. 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 that are harvested both commercially and recreationally.

According to the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Lower Penobscot River 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).

The lower reaches of Felts Brook and Eaton Brook adjacent to the Penobscot River potentially maintain viable Atlantic salmon populations and, therefore, constitute high-value fisheries. The riparian corridors along Felts Brook and Eaton Brook are generally well established and provide abundant shade and woody debris to enhance fish habitat (Town of Holden, 2007). However, the riparian corridors along the central portions of these streams have been degraded by the removal of woody vegetation, particularly in association with agricultural activities.

The MDIFW classified Holbrook Pond and Davis Pond as having moderate fishery values. Holbrook Pond presents good opportunities for catching smallmouth bass. The principal fish species in Davis Pond include yellow perch, hornpout, American eel, white sucker, minnow, and sunfish. Both ponds have been invaded by non-native largemouth and smallmouth bass that may adversely affect the existing warmwater fisheries (Town of Holden, 2007).

On September 3, 2008, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) published a proposed rule (73 *Federal Register* 51415) to list an expanded Gulf of Maine (GOM) Distinct Population Segments (DPS) of Atlantic salmon as endangered under the Endangered Species Act (ESA) of 1973, as amended (16 USC 1531 et. seq.). On September 5, 2008, the NMFS published a proposed rule (73 *Federal Register* 51747) to designate critical habitat for this expanded GOM DPS of Atlantic salmon. In June 2009, the NMFS and the USFWS jointly published a final rule to list the expanded GOM DPS as an endangered species (74 Federal Register 29344). The GOM DPS was originally listed as an endangered species in 2000, but the geographic extent of that listing was considerably smaller than the current GOM DPS as an endangered species. (74 *Federal Register* 29344). The NMFS also designated critical habitat for the expanded DPS (74 *Federal Register* 29300).

The study area is in the range of the GOM DPS of Atlantic salmon in Maine, a federally endangered species under the joint jurisdiction of the USFWS and the NMFS. The Atlantic salmon GOM encompasses all naturally spawned and conservation hatchery populations of diadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine Coast to the Dennys River, an area that includes the Penobscot River, and wherever these fish occur in the estuarine and marine environment. The Penobscot River and its tributaries are included within the range of the GOM DPS. Also included in the GOM DPS are the associated conservation hatchery populations used to supplement these natural populations. The study area occurs within the Penobscot River watershed and that has been designated as critical habitat for Atlantic salmon by the NMFS. Critical habitat is designated to include all perennial rivers, streams, estuaries, and lakes connected to the marine environment within the designated watershed (USFWS, 2008).

Designating habitat as critical requires federal agencies to identify the habitats' Primary Constituents Elements (PCEs). For Atlantic salmon, the PCEs are (1) migration habitat, and (2) spawning and rearing habitat. For an adult to successfully migrate to freshwater for suitable spawning grounds, holding areas must be available en route. These allow for resting and provide refuge in the event that adverse conditions occur. Holding areas can include deep pools or deadwaters, lakes and ponds, and even the estuary. On occasion, an adult can reach the spawning ground weeks or even months in advance of spawning. These early arrivers require holding areas in proximity to spawning areas that provide shade; cover from predators; and protection from environmental variables such as high flows, high temperatures, and sedimentation. Optimal spawning habitat is gravel substrate with adequate water circulation to keep buried eggs well oxygenated. As such, spawning sites (i.e., redds) are typically positioned within flowing water to allow for percolation through the gravel or where upwellings of groundwater occur. A redd that is constructed in waters that are too shallow are at risk of desiccation or freezing, whereas one that is too deep may not have enough flow for adequate permeation of oxygenated water through the substrate to the eggs. Additionally, water velocities that are too low can result in accumulation of fine sediments in the redd and prevent the proper cleaning of eggs; flows that are too high can result in excessive scouring and cause redd excavation. Also, spawning adults require adequate space. A typical redd encompasses slightly more than 40 square feet of spawning habitat (NOAA Fisheries Service, 2010).

Alewife and blueback herring are fish that spend the majority of their life at sea but return to freshwater to spawn and are native to Maine rivers. However, alewife's and blueback herring's population has declined; dams, pollution and overfishing have taken their toll. On November 2, 2011, these fishes were listed as candidate species under the ESA until further review was conducted (NOAA, 2012).

The American eel has a catadromous life cycle, that is, it spawns in the ocean and migrates to fresh water to grow to adult size. As adult eels mature, they leave the brackish/freshwater growing areas in the fall (August to November), migrate to the Sargasso Sea and spawn during the late winter. After spawning, the adult eels die.

Impacts from road-stream crossings are loss of stream flow complexities (e.g., riffles and pools), loss of natural stream substrate, shading and lowering of temperature, removal of riparian vegetation and opening up the stream channel to additional sun-light if the forest canopy is removed, reduction of water quality from highway runoff, alteration of stream hydrology, reduction in mobility of aquatic biota through loss or alteration of habitat, and loss of stream-bank complexity. These impacts result in the loss of aquatic habitat and a decline in the quality of habitat for fish and other aquatic life. These impacts are limited to the area of the individual road-stream crossings and channelization (sections 3.1.2.4 and 3.1.4.4) However, a road-stream crossing that is not "well" designed for aquatic habitat can have impacts on habitat both upstream and downstream of the crossing footprint.

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 3.6). Because road-stream crossings with natural bottoms would be used, small amounts of stream channel bottom habitat may be impacted during construction.

Road-stream crossings can create restrictions or localized changes in flows so that animal movement could be inhibited. The MaineDOT's *Waterway Crossing Policy and Design Guide* is intended to reduce the likelihood that road-stream crossings would create a barrier to the movement of aquatic organisms. The MaineDOT would further evaluate opportunities to shorten the length of road-stream crossings and preserve the natural stream bottoms. 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. 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, the MaineDOT would analyze opportunities to further minimize impacts to aquatic habitat and fisheries.

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 essential fish habitat (EFH) consultation 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 physical, chemical, and biological properties of aquatic areas currently or 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. The following information is provided to meet the EFH assessment requirement.

When the NMFS receives information regarding a federal action that may adversely affect EFH, that agency must conduct an EFH assessment. The assessment is a review of the proposed project and its potential impacts to EFH. As set forth in the rules, EFH assessments must include the following:

- a description of the proposed action
- an analysis of the impacts, including cumulative impacts of the action on EFH, the managed species, and associated species by life-history stage
- the federal agency's views regarding impacts of the action on EFH
- proposed mitigation, if applicable

Description of the Proposed Action. The MaineDOT and the FHWA are preparing a DEIS/Section 404 Permit application that considers four alternatives, including the No-Build Alternative, to improve the transportation-system linkage, safety, and mobility between I-395 and Route 9 in southern Penobscot County, Maine (Chapter 1). The need (i.e., the problem) for transportation improvements is based on poor roadway geometry in the study area combined with an increase in local and regional commercial and passenger traffic that has resulted in poor system linkage, safety concerns, and traffic congestion.

The alternatives retained for further consideration are (Chapter 2) as follows:

- No-Build Alternative
- Alternative 2B-2/the Preferred Alternative
- Alternative 5A2B-2
- Alternative 5B2B-2

Essential Fish Habitat. In "Report to Congress: Status of the Fisheries of the United States (September 1997)", the NMFS determined that Atlantic salmon is considered overfished, based on an assessment of stock level. EFH for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine (NOAA, 2009a). In the study area, the Penobscot River and Eaton and Felts Brooks are EFH for Atlantic salmon (NOAA, 2009b; New England Fishery Management Council (NEFMC), 2006).

The Penobscot River has been designated as habitat areas of particular concern (HAPC) for Atlantic salmon. HAPCs are described as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPCs are not afforded any additional regulatory protection under the Act; however, federal projects with potential adverse impacts to HAPCs will be more carefully scrutinized during the consultation process.

Analysis of the Impacts of the Action on EFH, the Managed Species, and Associated Species by Life

Exhibit 3.7 – *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 cobbles 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%)

History Stage. The No-Build Alternative would not impact EFH.

The build alternatives may affect EFH through the road-stream crossing and channelization of streams (exhibit 3.7).

The road-stream crossings may affect Atlantic salmon during their eggs and larvae stages (exhibit 3.6). Construction of the road-stream crossings increases sediments that could affect migrating adult salmon.

There would be temporary impacts from construction of a build alternative and occur during and following construction. The time for individual or specific construction impacts to dissipate varies with the type of activity performed and resource impacted; most construction impacts cease immediately after the activity in an area is completed. Other impacts on aquatic resources, such as those from a bridge with considerable in-stream activity, could take years to recover to preconstruction conditions.

The USFWS and NMFS's Views regarding Impacts of the Action on EFH. This DEIS provides information on the potential impacts from the proposed action on EFH. The federal agency's views on the potential impacts from the proposed action on EFH would be incorporated into the FEIS.

Proposed Mitigation. 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.

Other practices that could minimize impacts to EFHs are installing new structures with inverts below streambed elevation; installing structures with no bottoms (e.g. bottomless arch culverts or three-sided boxes or bridges); allowing existing streambed characteristics to be maintained naturally to the extent practicable and required to maintain passage for identified species; not exceeding the existing natural gradient taken over stream segments upstream and downstream of the crossings; and calculating flow depths during species-specific periods of movement for the pipe design at appropriate-specific passage design flows.

Mitigation for potential impacts from the build alternatives would be to limit alterations in flow characteristics caused by road-stream crossings and to limit noise and vibration impacts during construction. Stream crossings would be designed in accordance with the MaineDOT's *Waterway and Wildlife Crossing Policy and Design Guide* (MaineDOT, 2008e). During final design, the MaineDOT would analyze opportunities to further minimize impacts to EFH by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material reducing culvert length.

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 semipermanent 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.

The NRPA's definition of a vernal pool, also referred to as a seasonal forest pool, is a temporary to semipermanent 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 have no permanent inlet or outlet and no viable populations of predatory fish. A vernal pool may provide the primary breeding habitat for wood frogs, spotted salamanders, blue-spotted salamanders, and fairy shrimp, and valuable habitat for other plants and wildlife including rare, threatened, and endangered species. The presence of fairy shrimp, blue-spotted salamanders, spotted salamanders, or wood frogs (in any life stage and abundance) would designate the water body as a vernal pool (USACE, 2010a). The USACE does not rate or rank vernal pools similar to Maine's regulation of only significant vernal pools; the USACE considers information on vernal pools, including those determined to be significant by the State of Maine.

Spotted salamanders and blue-spotted salamanders migrate to and from vernal pools in early spring on warm rainy nights when the air temperature is 50 degrees F or more and it rains at least 0.15 inch over a 24-hour period (Rorer et al., 1983). They spend approximately one month or so breeding in vernal pools before dispersing to terrestrial habitat, which is usually moist upland woods. They hide under rotting logs or in the leaf litter until they make their way into burrows. These are usually small-mammal burrows where the salamanders overwinter below the frost line.

Wood frogs spend approximately one month in the vernal pools and disperse to primarily forested wetlands, although they are known to use other wetlands types. The frogs feed and forage in the wetlands and overwinter by freezing solid in the leaf litter.

Vernal-pool species usually migrate no more than tens to hundreds of feet from vernal pools, known as their dispersal habitat. This means that landscape changes surrounding vernal pools can have direct impacts on a large fraction of an amphibian population and the incremental destruction of vernal pools and the surrounding forest habitat increases pond isolation, potentially impairing connectivity among populations. Loss of connectivity can be harmful for vernal-pool species. Long-term data suggest that vernal-pool species are less likely to be present, and less likely to persist when the nearest sources of colonies are farther away. This implies that long-term persistence of vernal-pool species within a pool depends on successful dispersal of individuals from other pools (Calhoun and deMaynadier, 2008).

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).

In the study area, three vernal-pool indicator species (spotted salamander, blue-spotted salamander, and wood frog) and 12 herptile species were identified (exhibit 3.8). The MDEP and/or the MDIFW believe that less than half of all Maine vernal pools are considered "significant." There were 251 vernal pools identified: 55 significant and 196 that do not meet the significant criteria (exhibit 3.3). Green frogs were the most commonly encountered species in the study area. Wood-frog adults and larvae and spotted-salamander egg masses were locally abundant in some of the vernal pools.

Vernal-pool species need vernal pools to breed (although they do occasionally breed in other aquatic habitats) but they spend much of their lives in other habitats and need safe passage to those areas. Roads would present a barrier for these species unless safe passage is available. Research indicates that winter maintenance salts would impact amphibian development in vernal pools (Karraker, 2006; 2011).

Potential impacts to vernal pools result from:

- filling of pools
- filling or alteration of dispersal habitat

Exhibit 3.8 – *Vernal Pools and Herptiles in Vernal Pools in the Study Area*

Common Name	Observed in a Vernal Pool[1] (Yes/No)	Number of Vernal Pools that Exceeds Abundance Criteria[2]
Spotted Salamander[3]	Yes	37
Blue-Spotted Salamander[3]	Yes	1
Eastern Red-Spotted Newt	Yes	
Wood Frog[3]	Yes	16
Green Frog	Yes	
Bull Frog	Yes	
Mink Frog	Yes	
Spring Peeper	Yes	
Gray Tree Frog	Yes	
American Toad	Yes	
Eastern Painted Turtle	Yes	
Eastern Garter Snake	No	
Ribbon Snake	No	

Note:
[1] Observations could be of adult, larvae, eggs, or vocalization.
[2] Some vernal pools have more than one indicator species that exceeds the state's significance criteria.
[3] Indicator species.

Exhibit 3.9 – *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

- creating a barrier to animal dispersal by roadway placement
- anti-icing and de-icing practices
- winter sand and sediment from runoff degrading habitat

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 (exhibit 3.9). The build alternatives may impact upland dispersal habitat 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 the MaineDOT during final design. During final design of Alternative 2B-2/the Preferred Alternative, the MaineDOT would work to further avoid and minimize impacts to dispersal habitat for vernal pools by considering minor shifts in the alignment of Alternative 2B-2/the Preferred Alternative and increasing the slope of fill material.

3.1.2.3 Floodplains

Federal protection of floodplains is afforded by Executive Order 11988, "Floodplain Management," and implemented under 44 CFR 9.00. 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.

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 3.10). The Eaton Brook watershed has the most floodplains, and the Davis Pond watershed has the largest percentage of floodplains in its landmass area.

Land within the 100-year floodplain is primarily forested and is located adjacent to the Penobscot River, Felts Brook, Eaton Brook, Cummings Bog, Holbrook Pond, and Davis Pond in the study area (exhibit 3.3) (FEMA, 1997).

In the State of Maine, wetlands in the 100-year floodplain are included in definitions of and protections provided for wetlands of special significance under the NRPA and the wetlands rules found in 38 MRSA §480 et. seq.

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.

Exhibit 3.10 – *Floodplains*

Watersheds	*Acres of Floodplains*	*Percent of Floodplains in Watersheds*
Felts Brook	140	2.8
Eaton Brook	1,327	11.8
Kidder Brook	27	4.6
Meadow Brook	133	6.0
Mill Brook	7	0.4
Davis Pond	611	22.1
Thoroughfare	149	4.5
Holbrook Pond	493	15.2
Other	435	6.7
Study Area	3,322	9.7

Impacts to floodplains result from:

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

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 3.11).

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.

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.

Exhibit 3.11 – *Impacts to Floodplains by Watershed (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.

3.1.2.4 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 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.

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). For the purposes of this study, hydric soils were assumed to be wetlands; some hydric soils, however, would not be wetlands based on a field delineation and totals used in this EIS/Section 404 Permit Application Supporting Information may slightly over estimate the amount of wetlands in the study area.

Following the identification of wetlands from the NWI and hydric soils information, the MaineDOT performed a reconnaissance of the corridors of the alternatives retained for further consideration. The purpose of the reconnaissance was to confirm the accuracy of the information from the NWI and information detailing the locations of hydric soils. The MaineDOT will delineate wetlands for Alternative 2B-2/the Preferred Alternative during the final design phase; the delineation of the LEDPA would be done to meet the USACE's requirements.

Approximately 10,962 acres (31.9 percent) of the study area is wetlands (exhibits 3.3 and 3.12). Large wetlands 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.

Palustrine wetlands exist throughout the study area. The term *palustrine* refers to a system of wetlands which consists of "all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent"(Mitsch and Gosselink, 2007). Historic or traditional names for palustrine wetlands include marsh, swamp, bog, fen, and prairie, as well as other water bodies such as ponds (USFWS, 1979). These wetlands are distributed fairly evenly throughout the study area; however, they are most prevalent near Holbrook Pond, Davis Pond, and Cummings Bog.

Wetlands Protection and Definitions

Federal

Executive Order 11990, "Protection of Wetlands," requires federal agencies to avoid, to the extent practicable, long- and short-term impacts associated with the destruction or modification of wetlands. More specifically, it directs federal agencies to avoid new construction in wetlands unless there is no practical alternative. It further states that where wetlands cannot be avoided, the proposed action must include all practical measures to minimize harm to the wetlands.

Section 404 of the U.S. CWA provides protections for waters of the United States and wetlands, including special aquatic sites. The definition of special aquatic sites including mudflats, which are vegetated shallows harboring areas of permanently inundated, rooted aquatic vegetation such as eelgrass. Work in or affecting navigable waters is regulated under Section 10 of the U.S. Rivers and Harbors Act of 1899.

State

The MDEP regulates activities in wetlands under the NRPA (38 MSRA §§ 480-A through 480-BB). This act provides protection for resources that are defined to include coastal dune systems; coastal wetlands; significant wildlife habitat; freshwater wetlands; great ponds; and rivers, streams, and brooks. These requirements are implemented through a state regulatory framework that includes the Chapter 310 Wetlands Protection rules as codified in Maine regulations (06-096 CMR 310). Activities that have a greater potential to affect certain protected resources – including coastal wetlands under the NRPA and other "freshwater wetlands of special significance," as defined under Chapter 310 of the wetlands rules – are generally subject to more extensive and restrictive permitting requirements. For these activities, the hierarchical analysis of avoidance, minimum alteration, compensation, and no unreasonable impact would apply.

Exhibit 3.12 – *Wetlands by Watershed*

Watersheds	Wetlands	Acres of Wetlands	Percentage Wetlands in Watershed	Percentage Wetlands in Study Area
Study Area				
Palustrine	Emergent, Persistent Wetlands	770		7.0%
	Forested Wetlands	7,693		70.1%
	Scrub-Shrub	1,172		10.6%
	Unconsolidated Bottom	172		1.5%
Lacustrine		924		8.4%
Riverine		231		2.1%
Total		*10,962*		*100%*
Felts Brook				
Palustrine	Emergent, Persistent Wetlands	141	9.3%	1.3%
	Forested Wetlands	1,119	73.8%	10.2%
	Scrub-Shrub	234	15.4%	2.1%
	Unconsolidated Bottom	23	1.5%	0.2%
Lacustrine		-	-	-
Riverine		-	-	-
Total		***1,517***	***100%***	***13.8%***
Eaton Brook				
Palustrine	Emergent, Persistent Wetlands	269	7.8%	2.5%
	Forested Wetlands	2,647	76.8%	24.1%
	Scrub-Shrub	439	12.7%	4.0%
	Unconsolidated Bottom	90	2.6%	0.8%
Lacustrine		-	-	-
Riverine		1	-	0.0%[1]
Total		***3,445***	***100%***	***31.4%***

[1]*Less than one tenth of one percent.*

Watersheds	Wetlands	Acres of Wetlands	Percentage Wetlands in Watershed	Percentage Wetlands in Study Area
Kidder Brook				
Palustrine	Emergent, Persistent Wetlands	1	0.6%	0.0%[1]
	Forested Wetlands	119	94.9%	1.1%
	Scrub-Shrub	1	1.1%	0.0%[1]
	Unconsolidated Bottom	–	–	–
Lacustrine		4	3.4%	0.0%[1]
Riverine		-	-	-
Total		***125***	***100%***	***1.1%***
Meadow Brook				
Palustrine	Emergent, Persistent Wetlands	26	3.5%	0.2%
	Forested Wetlands	629	86.0%	5.7%
	Scrub-Shrub	67	9.1%	0.6%
	Unconsolidated Bottom	10	1.4%	0.1%
Lacustrine		-	-	-
Riverine		-	-	-
Total		***732***	***100%***	***6.6%***
Mill Brook				
Palustrine	Emergent, Persistent Wetlands	49	9.5%	0.4%
	Forested Wetlands	438	84.1%	4.0%
	Scrub-Shrub	25	4.8%	0.2%
	Unconsolidated Bottom	6	1.2%	0.1%
Lacustrine		2	0.4%	0.0%[1]
Riverine		-	-	-
Total		***520***	***100%***	***4.7%***

[1]*Less than one tenth of one percent.*

Exhibit 3.12 – *Wetlands by Watershed (continued)*

Watersheds	Wetlands	Acres of Wetlands	Percentage Wetlands in Watershed	Percentage Wetlands in Study Area
Davis Pond				
Palustrine	Emergent, Persistent Wetlands	71	5.8%	0.6%
	Forested Wetlands	536	43.3%	4.9%
	Scrub-Shrub	168	13.6%	1.5%
	Unconsolidated Bottom	7	0.6%	0.0%[1]
Lacustrine		454	36.7%	4.1%
Riverine		-	-	-
Total		***1,236***	***100%***	***11.1%***
Thoroughfare				
Palustrine	Emergent, Persistent Wetlands	84	23.0%	0.8%
	Forested Wetlands	201	55.2%	1.8%
	Scrub-Shrub	16	4.4%	0.1%
	Unconsolidated Bottom	1	0.3%	0.0%[1]
Lacustrine		62	17.1%	0.6%
Riverine		-	-	-
Total		***364***	***100%***	***3.3%***
Holbrook Pond				
Palustrine	Emergent, Persistent Wetlands	45	3.7%	0.4%
	Forested Wetlands	679	56.2%	6.2%
	Scrub-Shrub	83	6.8%	0.8%
	Unconsolidated Bottom	8	0.6%	0.1%
Lacustrine		395	32.7%	3.6%
Riverine		-	-	-
Total		***1,210***	***100%***	***11.1%***

[1]Less than one tenth of one percent.

Watersheds	Wetlands	Acres of Wetlands	Percentage Wetlands in Watershed	Percentage Wetlands in Study Area
Chemo Pond				
Palustrine	Emergent, Persistent Wetlands	22	4.3%	0.2%
	Forested Wetlands	463	91.0%	4.2%
	Scrub-Shrub	22	4.3%	0.2%
	Unconsolidated Bottom	2	0.4%	0.0%[1]
Lacustrine		-		
Riverine		-		
Total		***509***	***100%***	***4.6%***
Other				
Palustrine	Emergent, Persistent Wetlands	62	-	0.6%
	Forested Wetlands	862	-	7.9%
	Scrub-Shrub	117	-	1.1%
	Unconsolidated Bottom	25	-	0.2%
Lacustrine		7	-	0.1%
Riverine		230	-	2.1%
Total		***1,303***	-	***12.0%***
TOTAL in Above Watersheds		***10,962***		***100%***

[1]Less than one tenth of one percent.

Approximately 9,807 acres (28.5 percent) of the study area is classified as palustrine wetlands.

Lacustrine wetlands are found in the study area. A lacustrine system consists of wetlands and deep-water habitats with all of the following characteristics (USFWS, 1979):

- The wetlands are situated in a topographic depression or a dammed river channel.
- The wetlands are lacking trees, shrubs, persistent emergents, or emergent mosses or lichens with more than 30 percent area coverage.
- The wetlands total area exceeds 20 acres.

The lacustrine system consists of permanently flooded lakes and reservoirs and intermittent lakes (USFWS, 1979). Examples of these wetlands are Holbrook Pond and Davis Pond. Approximately 924 acres (2.7 percent) of the study area is classified as lacustrine wetlands.

Riverine wetlands include "all wetlands and deep water habitats contained within a channel with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and (2) deep water habitats with water containing ocean-derived salts in excess of 0.5 parts per thousand (ppt)" (Mitsch and Gosselink, 2007). Upland islands or palustrine wetlands may occur in the channel, but they are not part of the riverine system (USFWS, 1979). These wetlands are most prevalent along Felts Brook and Eaton Brook and along the Penobscot River in the study area. Approximately 230 acres (0.7 percent) of the study area is classified as riverine wetlands.

Generalized wetlands function and value evaluations were completed for four major wetlands complexes in the study area: Felts Brook, Eaton Brook, Cummings Bog, and the Thoroughfare between Davis Pond and Holbrook Pond. These wetlands areas were selected as representative of the major types of wetlands found in the study area. The evaluation was intended to provide an overall generalized assessment of the function and value of large wetlands complexes in the study area. No wetlands delineations in accordance with the USACE *Wetlands Delineation Manual* (USACE, 1987) were completed. Evaluations were based on an office review of existing data and a limited field assessment of wetlands areas. Evaluations were also based on guidance from the USACE *Highway Methodology Workbook Supplement* (USACE, 1995) and *Northcentral and Northeast Supplement* (USACE, 2009). There are no unique or unusual wetlands in the study area.

The MaineDOT will delineate wetlands and conduct a field assessment of functions and values of the specific wetlands that would be impacted for the selected alternative during the final design phase.

Wetlands functions relate to self-sustaining properties of wetlands that contribute to its continued existence. Functions such as primary production and nutrient-cycling are processes necessary for self-maintenance of the wetlands ecosystem. Therefore, functions relate to the ecological significance of wetlands regardless of their subjective human values.

Wetlands values are benefits to society that derive from either one or more ecological function and the physical characteristics associated with a wetlands (USACE, 1995). The value of a particular wetlands function is based on qualitative, educated judgment of the worth, merit, quality, or importance attributed to those functions.

Wetlands associated with Felts Brook are generally palustrine forested. The general function and values attributable to wetlands in the Felts Brook complex are flood-flow alteration, sediment retention, shoreline stabilization, and fish and wildlife habitat. These wetlands are located primarily along the floodplain of Felts Brook and provide a variety of habitats for aquatic and terrestrial wildlife.

The wetlands in the Eaton Brook complex are generally palustrine forested and scrub-shrub wetlands in the floodplain. These wetlands generally provide for floodplain alteration, sediment retention, shoreline stabilization, and fish and wildlife habitat. In addition, wetlands that are associated with Eaton Brook and Felts Brook perform a ground-water discharge function that adds to the base flow and may keep the stream temperatures down.

The wetlands associated with Cummings Bog are predominantly palustrine forested and palustrine scrub-shrub wetlands. These wetlands generally support flood-flow alteration, sediment retention, shoreline stabilization, and wildlife habitat. Additionally, this complex provides aesthetic value because of its variety of habitat, wildlife support, and location in a largely undeveloped area.

Palustrine-forested wetlands and areas of open water dominate the wetlands complex between Davis Pond and Holbrook Pond. These wetlands generally offer habitat to support fish and bird populations. These wetlands offer some aesthetic qualities in combination with the adjacent lake or pond areas that are used for recreational purposes.

Wetlands are not only highly productive, they are also rich in wildlife species. The association of some species with wetlands is very strong. These species can include the black bear, bobcat, common gray, Eastern red bat, ermine, fisher, Hoary bat, Little brown myotis, Long-tailed weasel, Masked shrew, Meadow vole, mink, moose, muskrat, Northern short-tailed shrew, raccoon, Silver-haired bat, Smoky shrew, Southern bog lemming, Star-nosed mole, Virginia opossum, Water shrew, and woodchuck. Birds in the study area consist of the American redstart, Baltimore oriole, Bank swallow, Barred owl, Blue-winged teal, Brown creeper, Canada goose, Canada warbler, Chipping sparrow, Common grackle, Common yellowthroat, Cooper's hawk, Dark-eyed junco, Eastern kingbird, Great-crested flycatcher, Great-horned owl, Hermit thrush, House wren, Long-eared owl, Nashville warbler, Northern parula, Northern rough-winged swallow, Northern waterthrush, Olive-sided flycatcher, Red-shouldered hawk, Red-tailed hawk, Rose-brested grosbeak, Ruffed grouse, Song sparrow, Tree swallow, Tufted titmouse, Turkey vulture, Veery, Virginia rail, Warbling vireo, and the Yellow rail.

Most wetlands mammals are herbivores or omnivores (i.e., they consume wetlands plants directly or have a mixed animal–plant diet). Wildlife is attracted to wetlands because they provide food, water, cover, and nesting sites, and they provide habitat for feeding, raising young, and traveling. Many species live their entire lives in wetlands and are completely dependent on them for survival (Maine Audubon Society, 2006; NRCS, 2001).

Approximately 40 percent of vernal pools were found in wetlands (section 3.1.2.2).

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 not impact wetlands.

The build alternatives would impact 26 to 31 acres (0.2 to 0.3 percent) of wetlands (exhibit 3.3 and exhibit 3.13). The 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), the 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, the 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, the MaineDOT would continue to coordinate with the federal and state regulatory and resource agencies.

The MaineDOT submitted an individual Section 404 Permit Application to the USACE for the discharge of fill material into waters of the United States (Appendix E). The MaineDOT would prepare and submit an NRPA Permit application to the MDEP during final design of Alternative 2B-2/the Preferred Alternative. The MaineDOT would coordinate the identification and development of compensatory mitigation with federal and state regulatory and resource agencies (see section 3.8).

Exhibit 3.13 – *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	0.5	13	3		16.5 (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%)

3.1.2.5 Wild and Scenic Rivers

No wild and scenic rivers are present in the study area (National Park Service, 2008b).

The No-Build Alternative and the build alternatives would not impact wild and scenic rivers.

3.1.3 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 consist 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 (exhibit 3.14), 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.

The net amount of forested land in Brewer has increased over time due to vegetational succession. Much of the forested land in Brewer has resulted from the abandonment of agricultural fields during the early part of the 20th century. Agricultural fields in this area were historically forested. These forested areas contain pioneer species such as birch, poplar, and cherry (City of Brewer, 1995). Areas of Holden and Eddington encompass much older forests than Brewer, dominated by species such as pine, spruce, eastern hemlock, and shade-tolerant hardwoods such as sugar maple and beech.

The No-Build Alternative would not impact vegetation.

The build alternatives would impact 102 to 136 acres (0.4 to 0.5 percent, respectively) of vegetation (exhibit 3.15). 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

Exhibit 3.14 – *Land Use and Land Cover*

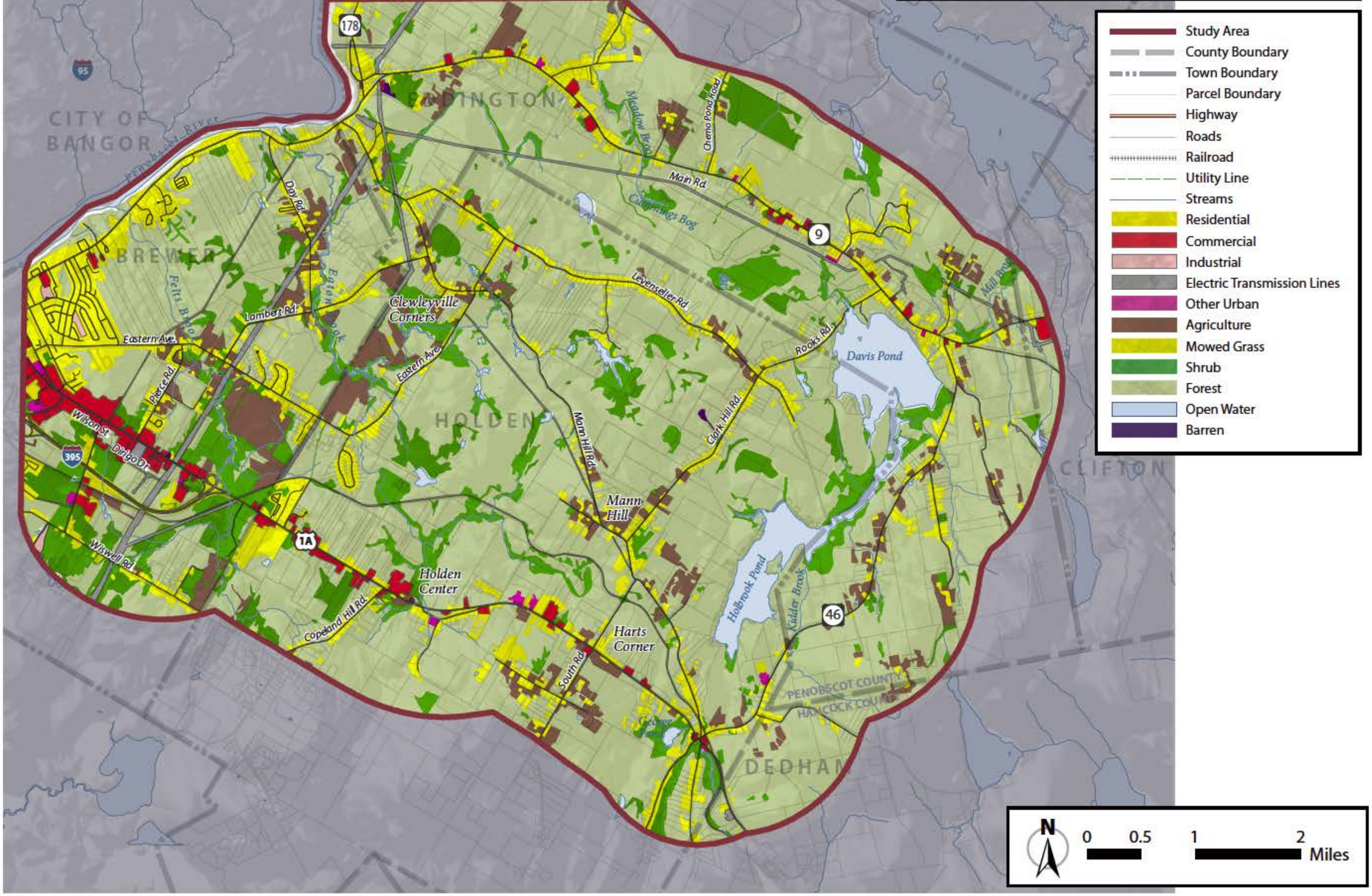


Exhibit 3.15 – *Impacts to Vegetation (acres/percent)*

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	63	0[1]	8	102 (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.*

bittersweet, Japanese knotweed, Norway maple, multiflora rose, and Morrow's honeysuckle.

3.1.4 Wildlife Habitats and Wildlife

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

3.1.4.1 Wildlife Habitat

The State of Maine has identified key components of wildlife habitat in a program called "Beginning with Habitat," which is a habitat-based landscape approach to assessing wildlife and plant conservation needs and opportunities. It is a planning tool developed by state and nongovernmental natural-resource advocacy agencies to incorporate wildlife and wildlife habitat needs into state, municipal, and private development planning efforts. The goal of the program is to maintain sufficient habitat to support native plant and animal species that have much of their life history in Maine. The Beginning with Habitat program provides Maine municipalities with maps and information depicting and describing those habitats of statewide and national significance that are found in their town. The maps provide information to help guide conservation of habitats, which is the basis of habitat coordination and planning used by the MaineDOT. This information promotes conservation by stewardship and is not regulatory. The beginning with Habitat program allowed MaineDOT to minimize impacts to undeveloped habitat blocks.

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. Typically, there are few or no houses, businesses, or other human habitation. Because studies have demonstrated that edge effects are greatest in the first 160 to 650 feet from development, the Beginning with

Habitat buffer absorbs most of the effects on wildlife. Rounded shapes provide more interior habitat with a minimal amount of edge habitat; linear blocks provide more edge habitat.

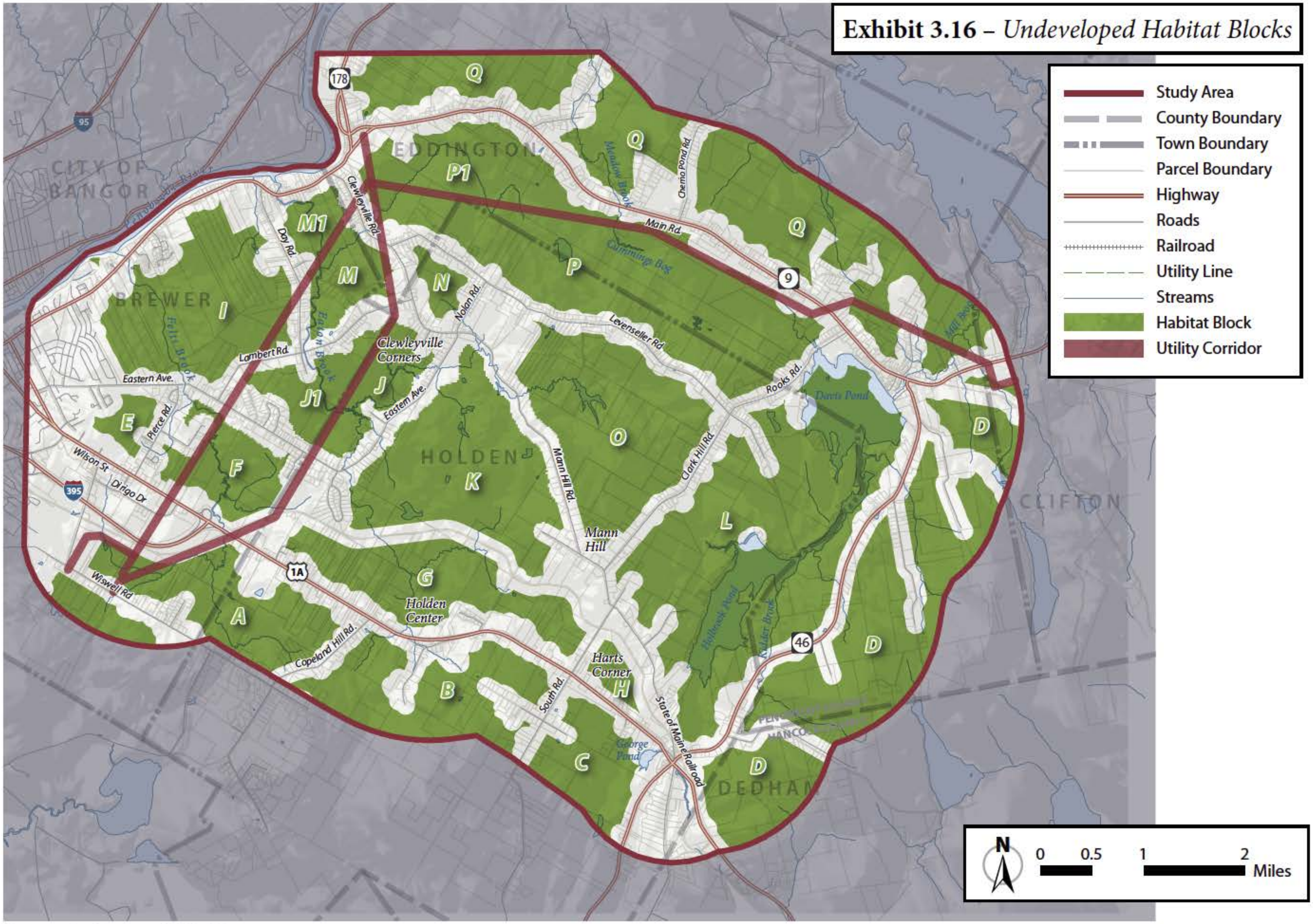
Undeveloped habitat blocks are both linear and rounded in shape. The buffer considers the edge effect including the modified impact of predators. Edge habitat generally contains more species that could adversely affect interior species. For example, the animals that are attracted by edge are crows, blue jays, deer, and raccoons, among others, which can use a variety of habitats. Many of these animals prey on interior species. Species that require large forested blocks differ from those that require large grassland blocks.

There are 20 blocks of undeveloped habitat in the study area according to the Beginning with Habitat program (exhibit 3.16). 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 3.17). These undeveloped habitat blocks are located between roads that traverse the study area. Approximately 11 percent of the undeveloped habitat blocks are located in the study area; the remainder is portions of blocks that extend beyond the study-area limits.

Utility easements are linear features with vegetation that is periodically mowed, creating discontinuity with the natural vegetation in the area. Utility easements create tracts of edge habitat at the boundary between the vegetation in the easement and natural vegetation. Utility easements can inhibit the movement of small mammals, amphibians, and reptiles. Isolated populations of wildlife species are more vulnerable to crashes in populations from catastrophic events such as fire and disease and are liable to loss of genetic diversity (Strevens, 2007).

The undeveloped habitat blocks contain different habitat types within their boundary. The most abundant habitat cover is deciduous forest and mixed forest (exhibit 3.18 and 3.19).

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 wetlands habitats that link these larger areas. The Felts Brook and Eaton Brook watersheds are well forested and serve as riparian wildlife travel corridors (Beginning with Habitat, 2008). The predominant large-game wildlife species in the study area is the whitetail deer. Less prevalent but not uncommon are the black bear and moose, which most



Source: Beginning with Habitat, 2008

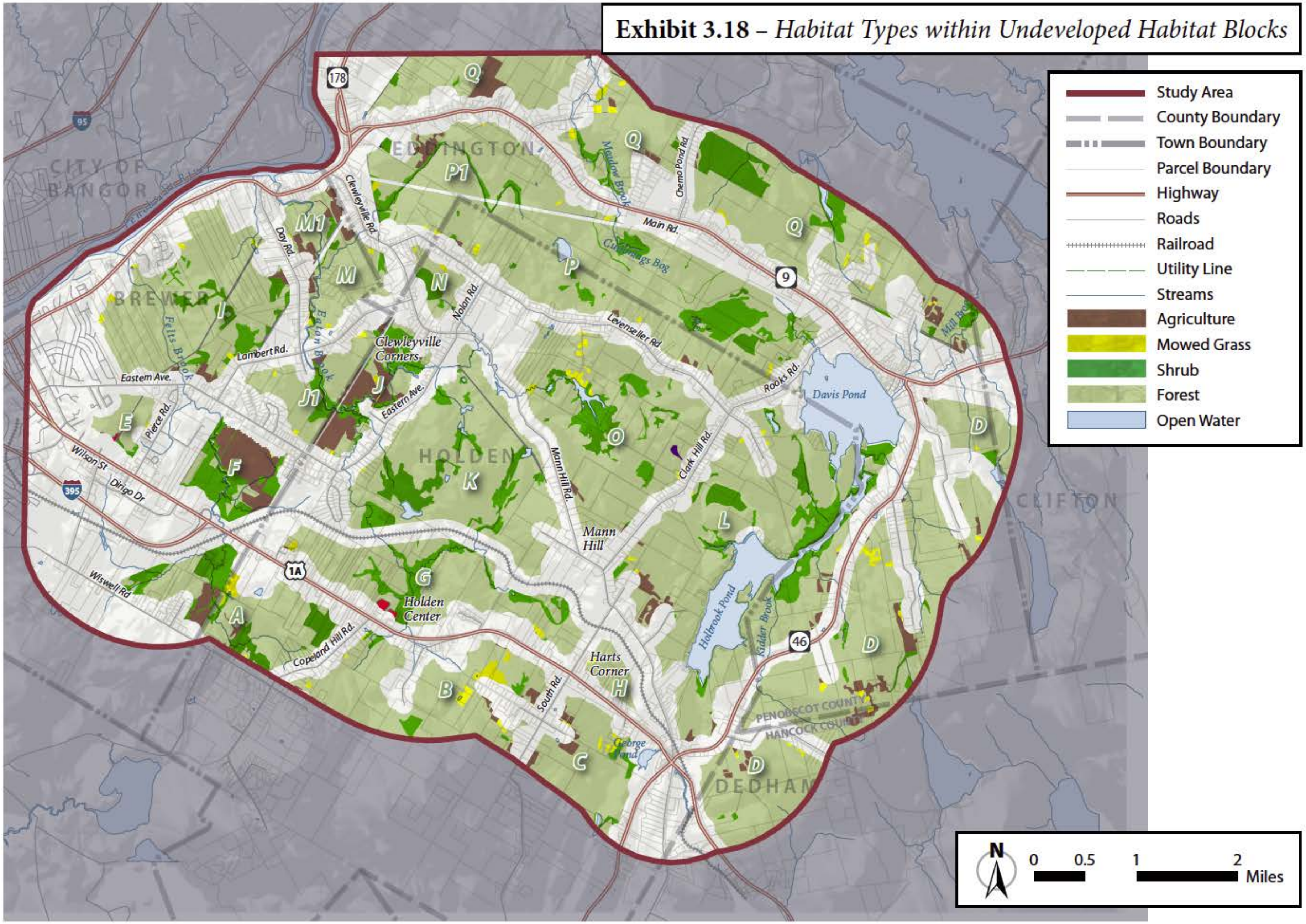
Exhibit 3.17 – *Undeveloped Habitat Block Sizes*

Block	Acres	Acres in Study Area	Percentage of Block in Study Area
A	719	719	100%
B	12,003	888	7.4%
C	1,362	501	36.8%
D	46,895	2,352	5.0%
E	117	117	100%
F	351	351	100%
G	890	890	100%
H	103	103	100%
I	1,194	1,194	100%
J	316	316	100%
J1	304	304	100%
K	1,459	1,459	100%
L	2,900	2,900	100%
M	291	291	100%
M1	157	157	100%
N	115	115	100%
O	1,471	1,471	100%
P	2,010	2,010	100%
P1	626	626	100%
Q	108,216	2,273	2.1%
Total	*181,510*	*19,037*	-

often can be seen near isolated bogs and marshes. Other frequently encountered species in the study area include ruffed grouse, snowshoe hare, gray squirrel, woodcock, blue-winged teal, wood duck, Canada goose, beaver, mink, river otter, and muskrat, great blue heron, and a wide variety of passerine bird species.

Some species of wildlife, called "area-sensitive," need large blocks of uninterrupted habitat. They are sensitive to human disturbance and are often preyed upon by species that are found on the edge of two different habitat types (exhibit 3.20). Other wildlife species need access to more than one habitat type to maintain a population. Enough habitat must be available for the minimum number of individuals of a given species to interbreed and maintain a healthy and genetically diverse population. Where habitat has been fragmented into smaller blocks, some animals would need to travel to other nearby habitat blocks to meet their life history requirements. Travel corridors provide habitat connections between fragmented blocks (Maine Audubon Society, 2000).

Power-line corridors can provide important breeding habitat for shrub-land birds. In a naturally forested landscape, power lines may be the only locations where birds that nest in shrub thickets occur. Species such as the common yellowthroat, indigo bunting, mourning warbler, prairie warbler, and chestnut-sided warbler may nest on power lines or gas easements if the landscape is otherwise forested. The vegetation along power lines typically supports a rich diversity of shrub-land birds because these birds depend on low shrub-land and vine tangles (DeGraaf and Yamasaki, 2001). However, these utility corridors likely displaced natural forest or other wildlife habitats and the bird species that depended on these habitats.



Source: Beginning with Habitat, 2008

Exhibit 3.19 – *Habitat Types and Sizes within Undeveloped Habitat Blocks (acres)*

Habitat Block	Agriculture	Mowed Grass	Shrub	Dense Shrub	Deciduous Forest	Coniferous Forest	Mixed Forest	Open Water	Wetlands[1]
A	42	14	86	122	320	31	102	0.5	87
B	15	24	34	-	226	178	394	1	109
C	23	-	17	4	88	9	347	4	124
D	84	0.5	25	9	1,385	123	698	1	272
E	-	-	2	3	108	-	-		37
F	164	-	147	-	33	-	-	6	93
G	-	4	138	16	394	325	-	0.5	378
H	-	-	-	-	100		-		13
I	19	3	50	68	940	55	37	1	363
J	7	37		-	265	-	-	3	87
J1	108	2	93	-	93	-	-	7	107
K	-	-	104	132	1,187	-	-	25	472
L	49	-	230	72	1,797	-	7	740	1,767
M	11	0.5	6	2	89	23	151	5	147
M1	31	-	4	-	106	13	-	3	27
N	-	2	3	29		-	81		78
O	6	4	113	59	158	-	1,086	20	595
P	9	0.5	222	32	1,715	2	-	23	975
P1	23	-	31	7	562	-	-		97
Q	80	9	102	154	1,705	-	177	13	808

Notes:
[1] Wetlands are found within the other habitat types.

Impacts to wildlife and wildlife habitat result as follows:

- impacts from the roadway footprint, including the required clear zone adjacent to the road
- impacts to the integrity of large undeveloped forested areas
- impacts to animal passage and habitat connectivity
- increased wildlife mortality from vehicle strikes

Exhibit 3.20 – *Area-Sensitive[1] Forest and Grassland Birds Found in the Study Area*

Species	May Occur in Blocks <250 Acres	Occur in Blocks 250-500 Acres	Occur in Blocks 500-1,000 Acres	Occur in Blocks >1,000 Acres
Red-shouldered hawk			X	X
Pileated woodpecker[2]	X	X	X	X
Yellow-billed cuckoo[3]	X	X	X	X
Downy woodpecker[3]		X	X	X
Hairy woodpecker			X	X
Least flycatcher		X	X	X
Great crested flycatcher[2]	X	X	X	X
Tufted titmouse[2]	X	X	X	X
White-breasted nuthatch	X	X	X	X
Brown creeper[2]			X	X
Veery		X	X	X
Hermit thrush			X	X
Wood thrush			X	X
Gray catbird[3]	X	X	X	X
Red-eyed vireo[2]	X	X	X	X
Northern parula				X
Black-throated blue warbler				X
Black-throated green warbler[2]			X	X
Black-and-white warbler			X	X
American redstart		X	X	X
Ovenbird			X	X
Northern waterthrush			X	X
Canada warbler				X
Scarlet tanager		X	X	X
Rose-breasted grosbeak[2]	X	X	X	X

Note:
[1]Bird species that are uncommon in smaller forests or grasslands.
[2]Some studies did not classify these species as area-sensitive.
[3]Some studies classified these species as area-sensitive, but most did not. These are more likely not area-sensitive.
Source: *Maine Audubon Society, 2000.*

The No-Build Alternative would not result in additional impacts to wildlife and wildlife habitat.

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 (exhibit 3.15).

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. Fragmentation of habitat is detrimental to wildlife that requires large areas of undeveloped habitat, and it increases the potential for wildlife highway mortality.

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 3.21).

Although the build alternatives were designed to minimize impacts to undeveloped habitat blocks, they would fragment habitat into smaller tracts (exhibit 3.16). The impacts range from minor to severe. The coniferous and mixed forest areas provide some winter

Exhibit 3.21 – *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	

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.

3.1.4.2 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

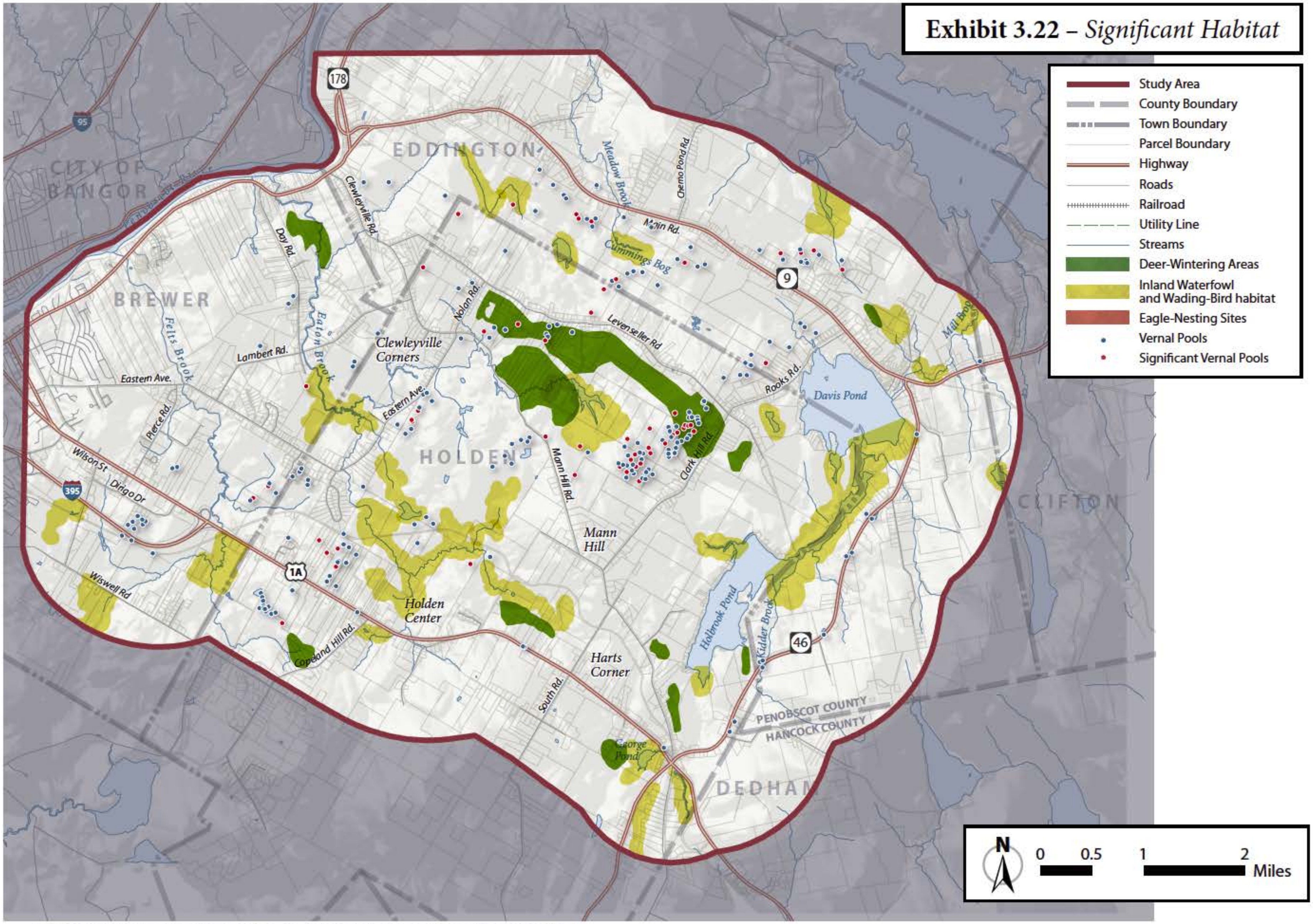
Under the NPRA, the Maine Department of Inland Fisheries and Wildlife (MDIFW) is responsible for defining the high- and moderate-value deer-wintering areas; waterfowl and wading-bird habitats; shorebird nesting, feeding, and staging areas; and seabird nesting islands.

The MDIFW was consulted regarding the presence of significant habitat areas in the study area. Deer-wintering areas and waterfowl and wading-bird habitats are present in the study area (exhibit 3.22). The MDIFW is responsible for identifying and mapping these significant wildlife habitat areas.

Deer-Wintering Areas. An area is considered a high- or moderate-value deer-wintering area (DWA) when:

- snow depth exceeds 12 inches in the open and in hardwoods
- deer sinking depth exceeds eight inches in the open and in hardwoods
- average daily temperature is below 32 degrees F, provided that:
    - » deer use is documented during a minimum of two years in the most recent 10-year period at the time of designation, including a ground survey
    - » the area excludes nonforested wetlands, agriculture, development, clearcuts, hardwood-forest types, and forest stands dominated by Eastern larch
    - » the area – through a combination of intensity of deer use, quality of softwood shelter, and area size – is rated high or moderate

Eleven DWAs totaling 1,051 acres exist in the study area (exhibit 3.22). 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).



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

Impacts to DWAs result from the following:

- conversion of one habitat type to another non-compatible use
- disturbance caused by development such as the introduction of a new roadway facility into or adjacent to a resource

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 3.23).

High- and Moderate-Value Inland Waterfowl and Wading-Bird Habitat. Waterfowl and wading birds are a diverse group of species that make considerable but not exclusive use of inland and coastal wetlands. 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.

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 (exhibit 3.22) (MDIFW, MGIS, 2009). These areas are classified as significant wildlife habitat by the MDIFW.

Waterfowl use portions of the study area for feeding 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. Impacts to IWWH result from the following:

- filling
- conversion of one habitat type to another
- disturbance caused by the introduction of a new highway into or adjacent to the habitat

Exhibit 3.23 – *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 29 acres (0.1 and one percent respectively) of IWWH (exhibit 3.23).

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 semipermanent 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.

Beginning on September 1, 2007, significant vernal pool habitat is protected by law under the NRPA (section 3.1.2.2) (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 3.9). The build alternatives may impact upland dispersal habitat from vernal pools not within the alignments of a build alternative.

Essential Habitat. Essential habitat consists of "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management consideration" (MDIFW, 2008). If an area is designated as essential habitat, the Maine Endangered Species Act (Maine ESA) requires that no state agency or municipal government shall permit, license, fund, or carry out projects that would significantly alter the habitat or violate protection guidelines adopted for the habitat (MDIFW, 2008). If a project takes place partly or wholly within an essential habitat, it must be evaluated by the MDIFW before state and/or municipal permits can be approved or project activities can commence. Identification of essential habitat is based on species observations and confirmed habitat use. The No-Build Alternative and the build alternatives would not impact essential habitat.

3.1.5 Endangered, Threatened, and Other Protected Species

There are species in the state that receive state and federal 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 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.

3.1.5.1 Federal Endangered and Threatened Species

According to the NMFS, there are species of diadromous fish in the study area of which two are endangered, two are candidate species, and one is a species of concern. The Atlantic salmon and the shortnose sturgeon are listed as endangered on the Federal Endangered List; the alewife and blueback herring are candidate species; and rainbow smelt is a species of concern for Maine (Maine Department of Marine Resources, 2008, ; NOAA, 2012).

According to the USFWS, the Red knot bird is listed as a candidate species, the Atlantic salmon is listed as endangered, and the Canada Lynx is listed as threatened for Penobscot County (USFWS, 2012).

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

The build alternatives may affect Atlantic salmon and its designated critical habitat through the road-stream crossing and channelization of streams. The road-stream crossings may affect Atlantic salmon during their eggs and larvae stages. Construction of the road-stream crossings increases sediments that could affect migrating adult salmon.

The build alternatives would not impact other known federal, listed or proposed, endangered and threatened species.

3.1.5.2 State Endangered and Threatened Species

Three bird species are listed as threatened and four bird species are listed as endangered in Maine that occur in the study area (MDIFW, 2008). The barrow's goldeneye, upland sandpiper, and common moorhen are listed as threatened and the least bittern, black tern, peregrine falcon, and sedge wren are listed as endangered.

There are no essential habitats that were identified for the listed species that occur in the study area (section 3.1.4.2).

The No-Build Alternative and the build alternatives would not impact known state, listed or proposed, endangered and threatened species.

3.1.5.3 Other Protected Species

The Bald and Golden Eagle Protection Act (16 USC 668-668c), enacted in 1940, protects the bald and golden eagle. The Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald and golden eagles, including their parts, nests, or eggs. The Act defines take as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Bald eagles occur within the study area.

In addition to immediate impacts, this definition of take covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present if, on the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits and causes injury, death, or nest abandonment (USFWS, 2009).

The MDIFW documented two nesting sites for the bald eagle (*Haliaeetus leucocephalus*) along the east bank of the Penobscot River and Eaton Brook in the study area (exhibit 3.22) . These two nests are alternate nest sites within the breeding territory of a single pair of bald eagles.

The Maine Natural Areas Program (MNAP) documented one rare plant species, water stargrass, in the study area (MNAP, 2008). In Maine, this species requires lakes with relatively clear water and has been documented in Davis Pond in Eddington. There is good probability that water stargrass also occurs in Holbrook Pond and the connecting water between Holbrook Pond and Davis Pond (MNAP, 2008).

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

The build alternatives would not impact known federal or state, other listed or proposed protected species, other than Atlantic salmon.

3.2 Atmospheric Environment

3.2.1 Climate Change

Greenhouse gases (GHGs) are chemical compounds found in the Earth's atmosphere that allow sunlight to freely enter the atmosphere. When sunlight strikes the Earth's surface, some of it is radiated back toward space as infrared radiation (i.e., heat); GHGs absorb this heat and trap it in the atmosphere. Some of the GHGs occur naturally (i.e., water vapor, carbon dioxide, methane, and nitrous oxide); however, human industrial processes are the main source (i.e., carbon dioxide). Carbon dioxide has increased from a preindustrial (early 18th century) level of 280 parts per million (ppm) to the current level of 380 ppm, increasing the temperature of the Earth. Unless steps are taken to lessen further releases of GHGs, these levels are projected to increase to 450 ppm by 2025, 550 ppm by 2050, and more than 600 ppm in the second half of the 21st century (Solomon et al., 2007). If no action is taken, the Intergovernmental Panel on Climate Change (IPCC) identifies the following as likely consequences:

- an increase in the incidence and severity of extreme weather events such as storms, droughts, floods, and heat waves
- a rise in the global sea level, including stresses on estuaries, bays, and wetlands
- changes in precipitation rates that will impact water supplies and food production
- shifts in and/or expansion of certain disease and pest vectors
- further stress on already vulnerable species and ecosystems

For the past century, the *rate* of warming in Maine has been increasing. All three of Maine's climate divisions are warmer today than 30 years ago. There are measurable changes in seasonal variation and in patterns of precipitation, with particular impacts on groundwater that can reasonably be associated with climate change (MDEP, 2004). Maine's social and economic well-being depends on the health and productivity of Maine's forests, fields, lakes, rivers, and the marine waters of the GOM. The diversity of these natural systems and the plants and animals within them result from the wide range of geologic, topographic, and climatic conditions present in the state. Although many states have a wide variety of environments, few have anything approaching Maine's range of climates in close proximity. Maine's unique diversity of climates means that change will not be uniform across the state (University of Maine, 2009).

Reducing human and ecosystem vulnerability to harm and increasing resilience in the face of change is both an economic and a moral imperative. A 2003 Maine law (i.e., PL 237) required the MDEP to develop and submit a Climate Action Plan (CAP) for Maine. The goals of the CAP are to reduce GHG emissions to 1990 levels by ten percent below those levels by 2020, and by a sufficient amount to avert the threat of global warming over the longer term, which could be as much as 75 percent. The law directed the MDEP to undertake "Lead by Example" initiatives, including conducting emissions inventories for state facilities and programs; obtaining voluntary carbon-reduction agreements with private-sector businesses and non-profit organizations; participating in a regional GHG registry; and establishing an annual statewide GHG emissions inventory (MDEP, 2004).

The No-Build Alternative would impact climate change. As traffic congestion increases, CO_2 emissions and fuel consumption increase. Traffic congestion often is categorized by the LOS it provides to travelers. By 2035, it is expected that the roadways would decline from levels of C, D, and E to levels of D, E, and F (section 1.3.3).

The build alternatives would result in a slight improvement in the LOS and the v/c ratios over the

No-Build Alternative (exhibit 3.24). The build alternatives would lower greenhouse gas emissions by approximately 14 percent over the No-Build Alternative.

CO_2 emissions can be lowered by improving traffic operations, particularly by reducing traffic congestion (Barth and Boriboonsomin, 2008). The build alternatives would improve regional mobility and traffic congestion in the study area by reducing the number of vehicles that use existing roadways.

Traveling at a steady-state speed would lower emissions and fuel consumption compared to a stop-and-go driving pattern. By decreasing stop-and-go driving from congested traffic, CO_2 emissions can be reduced. The build alternatives would decrease the stop-and-go driving by reducing traffic congestion on Routes 1A, 9, and 46.

When traffic congestion lowers the average vehicle speed to less than 45 mph, there is a net negative impact on CO_2 emissions. Vehicles spend more time on the road, which results in higher CO_2 emissions. Conversely, if moderate congestion lowers average speeds from a free-flow speed of about 65 mph to 45 to 50 mph, it actually lowers CO_2 emissions. Extremely high speeds of more than 65 mph can increase CO_2 emissions. If high speeds can be controlled, there would be not only direct safety benefits but also indirect benefits of CO_2 reduction. The build alternatives' posted speed limits are between 45 and 55 mph, which is an ideal speed for reducing CO_2 emissions.

Overall, small changes in traffic speed can have significant impacts on CO_2 emissions. Several methods to reduce CO_2 by improving traffic operations (with emphasis on freeway operations) include (1) congestion-mitigation strategies that reduce severe congestion such that higher average traffic speeds are achieved (e.g., ramp metering and incident management); (2) speed-management techniques that can reduce excessive speeds to more moderate speeds of approximately 45 to 55 mph (e.g., enforcement and active accelerator pedal); and (3) traffic-flow-smoothing techniques that can reduce the number of acceleration and deceleration events (e.g., variable speed limits).

According to the Council on Environmental Quality (CEQ), if a proposed activity is subject to GHG emissions accounting requirements — such as Clean Air Act (CAA) reporting requirements that apply to stationary sources that directly emit 25,000 metric tons or more of CO_2 equivalent annually — the agency should disclose this information for consideration by decision makers and the public. The build alternatives

Exhibit 3.24 – *Impacts to Greenhouse Gas Emissions (MtCO2e)*

Alternative	Greenhouse Gas Emission	Change from No-Build
No-Build	102.81	-
2B-2/the Preferred Alternative, 5A2B-2, 5B2B-2	88.24	14.57

would emit less than 25,000 metric tons of CO_2 equivalent annually (CEQ, 2010); therefore, the No-Build Alternative and the build alternatives would not significantly impact climate change.

3.2.2 Air Quality

The study area is in a portion of Penobscot County that is classified by the 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 (NO_x), and, to a much lesser extent, respirable particulate matter (PM_{10}) and ($PM_{2.5}$), 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.

The MDEP ozone-monitoring station nearest to the study area is at the summit of Rider Bluff in Penobscot County. At this location, there were no exceedances of the federal 8-hour ozone standard of 0.075 ppm during the 2009–2011 monitoring period (i.e., the most recent complete years for which data are available). The fourth maximum measured hourly ozone concentration in 2009 was 0.057 ppm, in 2010 was 0.059 ppm, and in 2011 was 0.055 ppm; all were below the 8-hour standard (USEPA, 2011).

The MDEP particulate matter $PM_{2.5}$ monitoring station nearest to the study area is at Pump Station-Washington Street in Bangor. At this location, there were no exceedances of the federal $PM_{2.5}$ standard of 35 $\mu g/m^3$ for the 24-hour average and 15 $\mu g/m^3$ for the annual average during the 2009–2011 monitoring period (i.e., the most recent complete years for which data are available). The maximum measured 24-hour $PM_{2.5}$ concentration was 23 $\mu g/m^3$ in 2010 and the maximum measured annual $PM_{2.5}$ concentration was 7.8 $\mu g/m^3$ in 2011; the maximum measured annual $PM_{2.5}$ that are below the NAAQS standards (USEPA, 2011a).

The region in which the study area is located is an attainment area for CO. The MDEP CO monitoring station nearest the study area is in Hancock County, approximately 25 miles southeast of the study area. There were no exceedances of the state and federal CO standards of 35 ppm for the 1-hour average and 9 ppm for the 8-hour average at this station during the 2009–2011 monitoring period (USEPA, 2011).

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).

3.2.2.1 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.

3.2.2.2 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.

3.2.2.3 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 EIS 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.

3.2.2.4 $PM_{2.5}$ 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.

3.2.3 Noise

Fourteen general noise-sensitive areas (NSAs), each encompassing many individual receptors, were identified in the study area (exhibit 3.25), as follows:

- NSAs 1, 2, and 3 represent mixed residential and commercial development along Route 1A

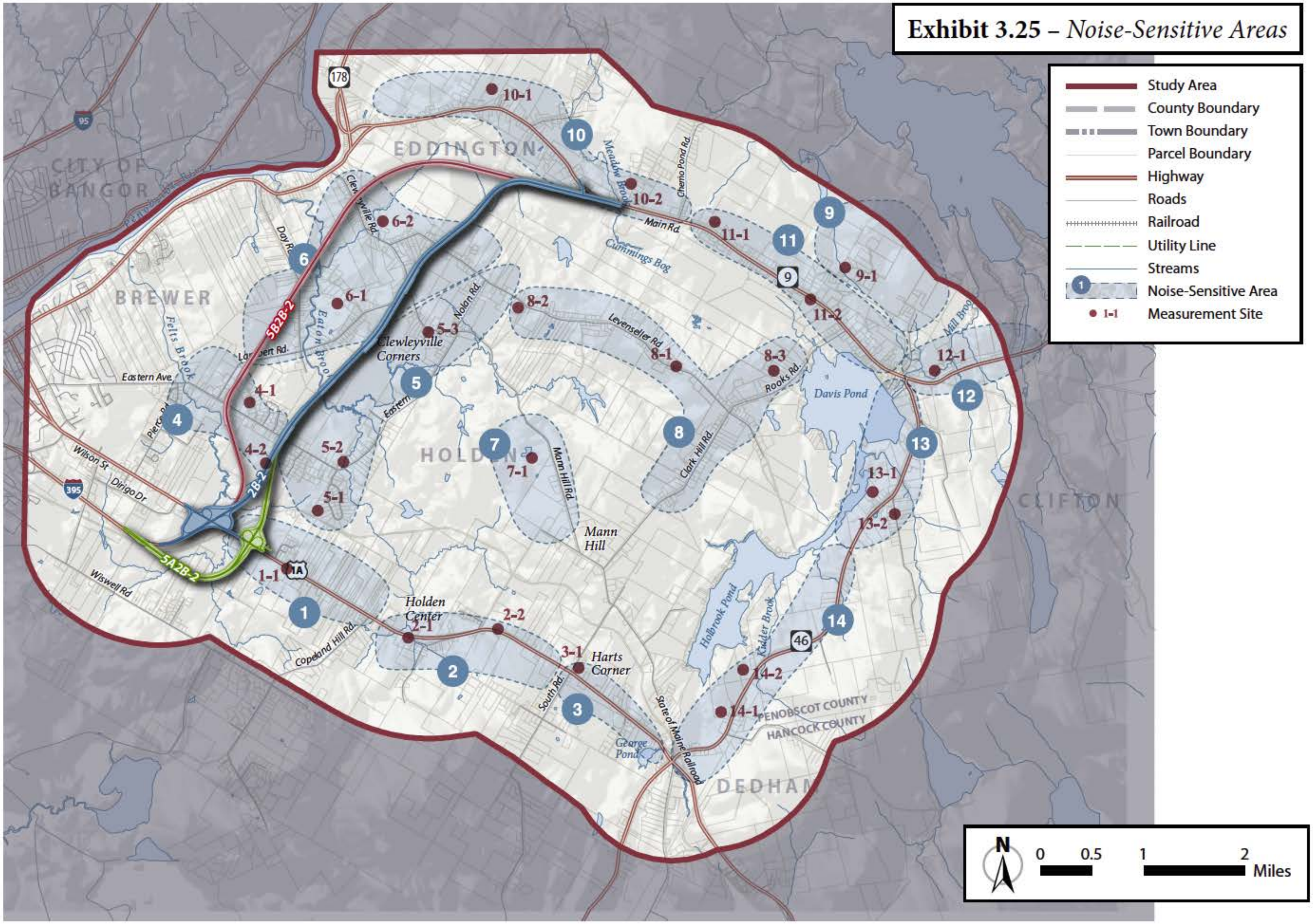


Exhibit 3.25 – Noise-Sensitive Areas
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
Noise-Sensitive Area
Measurement Site
EDDINGTON
CITY OF BANGOR
BREWER
HOLDEN
CLIFTON
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Clewleyville Corners
Holden Center
Harts Corner
Mann Hill
Davis Pond
Cummings Bog
Holbrook Pond
George Pond
5B2B-2
2B-2
5A2B-2
Miles

from I-395 to Route 46. Measured noise levels in those NSAs were dominated by traffic on Route 1A.

- NSAs 4, 5, and 6 represent residences located along or near Eastern Avenue, Lambert Road, Mann Hill Road, and the western end of Levenseller Road. Noise levels in those three NSAs were influenced primarily by local road traffic, which was very light at most locations. Traffic noise from major highways was noticeable only as distant background noise.
- NSA 7 represents a small rural residential area along Mann Hill Road, a lightly traveled secondary road. Traffic noise from Route 1A was occasionally audible as background noise during the measurement period.
- NSA 8 represents several residential areas and individual residences located along Levenseller Road, Clark Hill Road, and Rooks Road, and three local roads with light and intermittent traffic.
- NSA 9 represents several isolated residences on Stony Ridge Road north of Route 9. One vehicle passed by during the measurement period, and noise from Route 9 traffic was barely audible in the background.
- NSAs 10, 11, and 12 represent mixed residential and commercial development along Route 9 from Route 178 to the town of Clifton to the east. Traffic on Route 9 was the primary source of noise during the measurement periods.
- NSAs 13 and 14 represent residences along Route 46 between Routes 1A and 9. Measured noise levels were influenced primarily by traffic noise from Route 46.

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 (L_{eq} (h) dBA). The hourly L_{eq}, 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 (exhibit 3.26). Along Routes 1A, 9, and 46, traffic was the major source of ambient 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 the 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 (exhibit 3.27). 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

Exhibit 3.26 – *Noise Measurement Data*

NSA and Measurement Location	Setback from Edge of Near Roadway (ft)	Measured Noise Level Leq(h) (dBA)	Total Hourly Traffic During Measurement Period
1-1 Gravel parking area, Route 1A	70	65.8	1,341
2-1 Gravel parking area at Maine Kitchen Equipment & Supply Co. at 421 Route 1A	72	71.0	1,170
2-2 Holden School, Route 1A	110	64.7	576
3-1 Front yard of residence at 708 Route 1A	50	71.3	1,614
4-1 Shoulder of road in front of residence at 83 Woodridge Road	5	41.2	Background
4-2 On cul-de-sac in front of residence at 76 Brian Drive	95	45.7	Background
5-1 Front yard of residence at 150 Eaton Ridge	80	44.5	Background
5-2 Front yard of residence at 915 Eastern Avenue	60	54.8	84
5-3 Front yard of residence at the corner of Eastern Avenue and Mann Hill Road	66	54.9	Background
6-1 Grassy area next to driveway at 29 Lambert Road	110	47.8	18
6-2 Grassy area next to driveway of residence at 52 Levenseller Road	60	50.4	33
7-1 Front yard of residence at 638 Mann Hill Road	100	50.7	54
8-1 Driveway of residence at 431 Levenseller Road	80	50.5	42
8-2 Front yard of residence at 753 Levenseller Road	90	43.4	36
8-3 Front yard of residence at 183 Rooks Road	80	53.1	75
9-1 Undeveloped homesite along Stony Ridge Road	52	41.1	Background
10-1 Edge of driveway in front of residence at 752 Route 9	98	63.9	381
10-2 Yard next to residence at 990 Route 9	64	63.5	330
11-1 Grassy area next to abandoned commercial property at 1024 Route 9	87	64.7	363
11-2 Backyard of residence at Hope Manor, Route 9	68	62.4	384
12-1 Edge of parking lot of residence at 1499 Route 9	100	63.5	459
13-1 Cleared gravel area along Route 46 south of Hatcase Pond Road	65	61.4	222
13-2 Along Hatcase Pond Road	50	38.8	6
14-1 Next to parking lot in front of Holbrook School Along Route 46	80	58.0	123
14-2 Front yard of residence at 4 Edge of Town Road Along Route 46	95	58.7	81

on traffic data, roadway design, topographic features, and the relationship of the analysis site to the roadway.

The noise levels for receicers for the future year were compared to the absolute NAC levels and to increases over existing-year noise levels using the MaineDOT's NAC to determine noise impacts (exhibit 3.28). 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 present and 2035 and the redistribution of traffic with the build alternatives. Drawings of the build alternatives noise level and modeling locations are in Appendix D.

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.

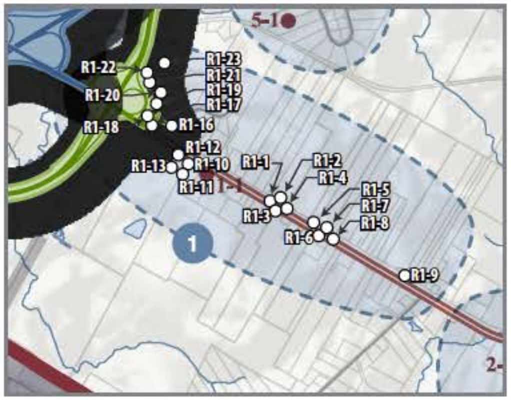
Noise from Alternative 2B-2/the Preferred Alternative would impact fifteen properties: three properties in NSA 4, one property in NSA 5, and eleven properties in NSA 6. The projected 2035 noise levels at the properties range from 44 to 66 dBA; the increase over existing noise levels is 3 to 32 dBA.

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

Exhibit 3.27 – *Noise Abatement Criteria*

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

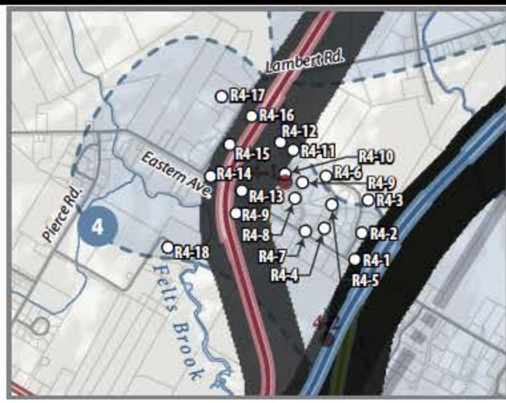
Exhibit 3.28 – *Summary of Predicted Noise Levels*



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

Exhibit 3.28 – *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

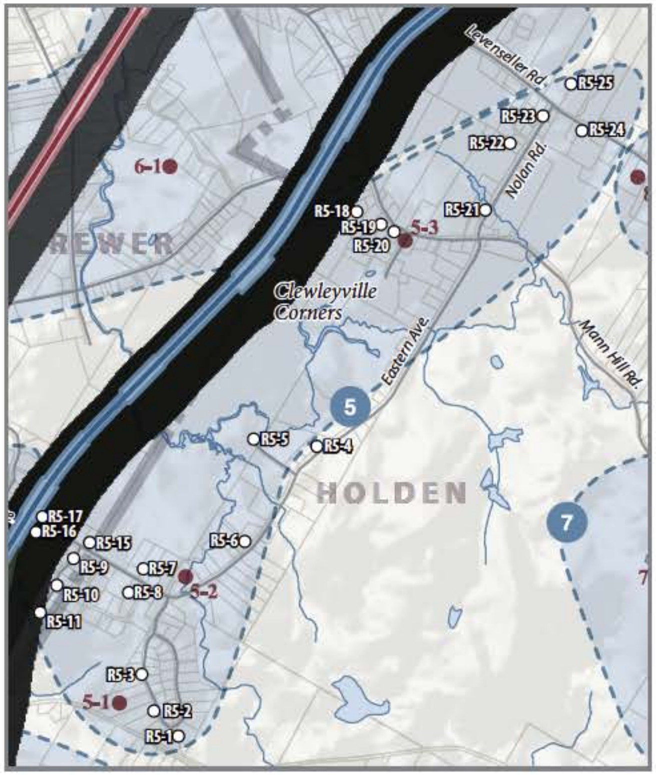
dBA = Decibels on the A-weighted scale

IOE = Increase over existing

= 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 3.28 – *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

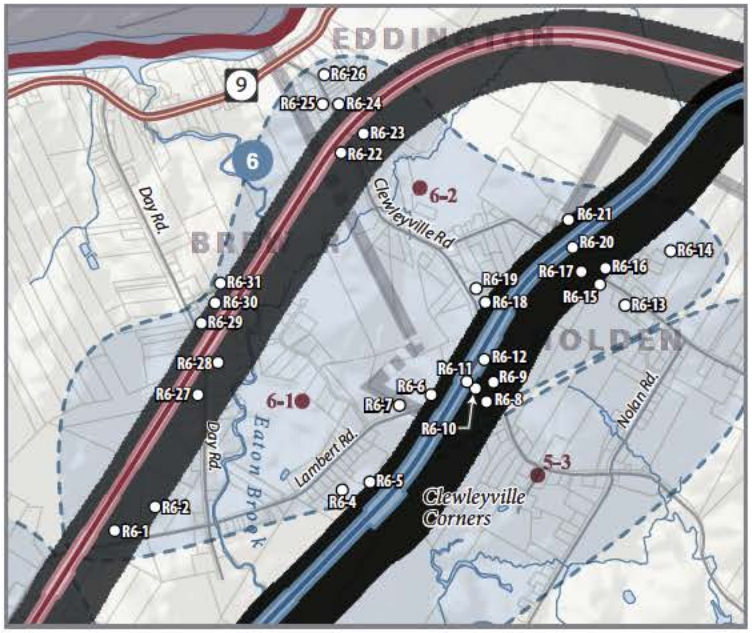
dBA = Decibels on the A-weighted scale

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.

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

Exhibit 3.28 – *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

(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.

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

Exhibit 3.28 – *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.

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 the MaineDOT criteria for feasibility and reasonableness. For a barrier to be feasible under the 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, the 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 3.29). 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.

Five of these analysis sites included only one impacted receptor. Mitigation is most effective when receptors are in proximity to each other in small communities or in residential subdivisions. Receptors along the build alternatives are not clustered but rather are isolated, making abatement inefficient. Mitigation results indicate that mitigation in the vicinity of the three build alternatives would not be reasonable due to high cost/benefited receptors. Barrier costs ranged from $194,968 to $1,043,724 per benefited receptor.

Although no reasonable barriers appear likely, certain techniques can sometimes be used as part of the highway's design that has the potential for somewhat reducing noise levels. Such techniques have variable effectiveness based on the relationship of the receptor to the roadway. Examples of such techniques are as follows:

- additional berming at the top of cut slopes, assuming right-of-way requirements permit
- use of glare screen or Jersey barrier on fill sections in lieu of guardrail

3.3 Transportation Environment

3.3.1 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.

I-395 is a principal arterial highway between I-95 in Bangor and Route 1A in the study area. I-395 is a controlled-access highway with two eastbound and two westbound lanes separated by an approximate 50-foot grass median. I-395 connects to Route 1A with a partial cloverleaf interchange. It has a posted speed limit of 55 mph and has a paved shoulder approximately 10 feet wide.

Route 1A is a principal arterial highway connecting the greater Bangor and Brewer area with Ellsworth and the coast at Bar Harbor. West of the I-395 interchange, Route 1A has two eastbound lanes and two westbound lanes. East of the I-395 interchange, Route 1A has one eastbound lane, one westbound lane, and a center turn lane from Brewer to approximately 1.3 miles east of the I-395 interchange. The remainder of Route 1A in the study area and to the coast has one eastbound and one westbound lane with no center turn lane. Access to Route 1A from its adjacent properties is not controlled and is subject to the state's rules on access management. Route 1A in the study area is posted at 35 to 45 mph, depending on location, and has a paved

Exhibit 3.29 – *Summary of Noise Abatement*

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

shoulder approximately six feet wide. The land uses adjacent to Route 1A in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 1A are becoming increasingly more commercial.

Route 46 is a two-lane minor arterial road connecting Route 1A to Route 9. Access to Route 46 from adjacent properties is not controlled and is subject to the state's rules on access management. Portions of Route 46 are steep and exceed the State of Maine's design criteria. Route 46 is posted at 35 or 45 mph and has a gravel shoulder approximately four feet wide. The land cover adjacent to Route 46 is primarily mature forested areas with scattered residences and open areas. Approaching Route 9, the land uses adjacent to Route 46 are primarily residential. Because of the mature forest canopy, considerable portions of Route 46 are shaded, and snow and ice cover does not melt rapidly.

Route 9 is a two-lane principal arterial highway connecting the greater Bangor and Brewer area with Washington County and the Canadian Maritime Provinces to the east. Access to Route 9 from its adjacent properties is not controlled and is subject to the State's rules on access management. Route 9 is posted at 45 or 35 mph, depending on location, and has a paved shoulder approximately eight feet wide. The land uses adjacent to Route 9 in the study area are primarily commercial and residential with some undeveloped and underdeveloped areas. Over time, the areas adjacent to Route 9 are becoming increasingly more developed. To the east of the study area, the land uses and land cover adjacent to Route 9 quickly become less developed and more forested, and the speed limit increases to 55 mph. Most of the land adjacent to Route 9 east of the study area to the Canadian border is undeveloped.

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.

Brewer is part of the federally designated Metropolitan Planning Organization (MPO) known as the Bangor Area Comprehensive Transportation System (BACTS), which collaborates with the MaineDOT on area transportation projects.

Brewer is served by Bangor's public bus system — the BAT Community Connector — which operates Monday through Saturday (City of Bangor, 2011) generally between 6:30 a.m. and 6:30 p.m. The closest bus station for Holden and Eddington residents is located at the Wal-Mart along Wilson Street (i.e., Route 1A) in Brewer. The BAT Brewer route serves both North and South Brewer with access into greater Bangor and connections to Old Town and Hampden.

The Penquis Community Action Program bus service — the Lynx — is available for residents with special physical and social needs in Penobscot and Piscataquis Counties. This bus service operates Monday through Friday between 8:00 a.m. and 4:30 p.m. and is supported financially through the MaineCare program of the Maine Department of Health and Human Services.

Pedestrians and bicyclists are permitted to use the roads in the study area with the exception of I-395.

Commercial air service is available at the Bangor International Airport, which is owned and operated by the city of Bangor. Although no rail or water transportation is available in Holden and Eddington, both rail and waterborne freight-transportation carriers serve Brewer.

One inactive rail line, the state-owned railroad (or Calais Branch), crosses the study area. It enters the study area from Brewer, crosses I-395, passes under Route 1A and bisects the town of Holden, crosses Route 46 at grade, and passes to the east of the study area. There are no plans to restore rail service in the near future, but the possibility exists in the long term.

The town of Holden has public parking lots available at the public works area, municipal building, Holden Elementary School, and Holbrook School (Town of Holden, 2007).

The No-Build Alternative would not impact the transportation facilities and systems in the study area and region, or pedestrians and bicyclists.

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 2.12); 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 2.15).

The build alternatives would either bridge over or pass underneath the roads it crosses (exhibits 2.11, 2.14, and 2.16).

The build alternatives would connect to Route 9 at a "T" intersection (exhibit 2.13). Route 9 eastbound would be controlled with a stop sign.

The build alternatives would facilitate the future re-designation of a portion of the NHS in the study area from Water Street in Bangor to the selected 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.

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

3.3.2 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.

Continuity in the transportation system is essential for the safe and efficient movement of vehicles and travel patterns. System continuity can be defined and measured by how often an existing highway transitions from wider, higher-speed segments to narrower, lower-speed segments. System linkage and improved mobility results from smooth interconnections and transitions between regional, high-speed, high-capacity highways. In connecting these types of highways, highway design and design principles attempt to provide for gradual and consistent transitions in travel speed, roadway geometry, and capacity.

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 intersection of Routes 1A and 46 is a signalized intersection. It handles traffic traveling to and from the areas of Downeast Maine, the Ellsworth area, and the coast. The MaineDOT has made improvements to this intersection over time to improve safety and capacity. In 2035, this intersection is projected to be overcapacity (i.e., the number of vehicles on the roads that approach the intersection exceed the capacity of the roads) and to operate with considerable delays (i.e., more than 80 seconds per vehicle).

Route 9 in the vicinity of Route 46 is posted at 35 mph and has limited sight distance approaching Route 46 in both directions. The intersection of Routes 46 and 9 is an unsignalized intersection, and traffic on Route 46 is controlled by a stop sign. Trucks experience considerable difficulty when turning from Route 46 onto Route 9 eastbound and from Route 9 westbound onto Route 46. The northbound approach of Route 46 to the intersection with Route 9 operates in an acceptable condition. With increases in the traffic volume, the delays on Route 46 turning onto Route 9 are projected to increase from 6.5 seconds in 1998 to 119.4 seconds in 2035.

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.

3.3.3 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. 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 1.6) 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 1.8). 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 3.30). 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

Exhibit 3.30 – *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

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 heavy-truck traffic along Route 9 west of Route 46 would increase over the No-Build Alternative.

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 3.31).

3.3.4 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 the study area, the section of Route 1A between Parkway South and I-395 and the intersection of Route 9

Exhibit 3.31 – *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

(known locally as North Main Street) and Riverside Drive are the sites of six HCLs (exhibit 1.5).

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 either 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

Exhibit 3.32 – *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

controlled-access design. By reducing the number of 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 3.32).

3.3.5 Mobility 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 3.33 – *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.

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 3.33).

Monetized benefits for 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).

Using USDOT guidance on the *Valuation of Travel Time in Economic Analysis* (USDOT, 2003), values

Exhibit 3.34 – *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.

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 3.34).

Exhibit 3.35 – *Existing Land Use*

Land Use	Acres
Residential	3,179
Commercial	500
Industrial	26
Other Urban	54
Transportation	406
Agriculture	1,696
Grassland/Mowed Grass	513
Shrub/Dense Shrub	3,593
Deciduous Forest	16,894
Coniferous Forest	829
Mixed Forest	5,013
Open Water	1,228
Barren	12
Electric Transmission Lines	473
Total Study Area	***34,416***

3.4 Land Use and Cultural, Social, and Economic Environments

3.4.1 Land Use

3.4.1.1 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 (exhibits 3.14 and 3.35). 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.

The No-Build Alternative would result in 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

Exhibit 3.36 – *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.*

environment should be valued more highly than the natural environment (section 4.3).

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 3.36).

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.

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).

3.4.1.2 Relocations

Acquisition of the property for the right-of-way for the build alternatives would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (49 USC 4601 et seq.) and the Civil Rights Act of 1964. 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. Relocation resources are available to all residential and business relocatees without discrimination. The 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 protect landowners from unfair and inequitable acquisition of property.

The build alternatives would displace 6 to 15 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. Alternative 2B-2/the Preferred Alternative and Alternative 5B2B-2 would impact the Eastern Maine Healthcare parking lot (exhibit 3.37).

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.

Exhibit 3.37 – *Displacements*

	Residences	Businesses	Business Impacts
No-Build			
2B-2/ the Preferred Alternative	8		Eastern Maine Healthcare Parking Lot – 130 parking spaces (20 percent)
5A2B-2	15	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	Eastern Maine Healthcare Parking Lot – 130 parking spaces (20 percent)

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 February 2012 and concluded sufficient replacement housing exists in the area. In February 2012, there were approximately 100 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 150 homes of comparable size and price range for sale.

Following the circulation of the DEIS/Section 404 permit application supporting information, MaineDOT would coordinate with those potentially displaced residents to determine special relocation considerations and any measures required to resolve relocation concerns.

Owners of the residences and/or commercial businesses would be relocated in the same general area, if desired and reasonably possible. Relocation assistance provided by the MaineDOT would include reimbursements of reasonable moving costs and settlement fees.

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: $17,800
- Alternative 5A2B-2
  - Brewer: $42,700
  - Holden: $19,100
  - Eddington: $17,000
- 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.

3.4.1.3 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.

Brewer's state-certified comprehensive plan was last revised in 1995. Brewer's Land Use Code was recently revised and amended to expand its subdivision regulations regarding open-space criteria, off-site open space, and fee in lieu of open-space requirements.

The city wants to bring the waterfront back to the center of economic and recreational activities as prior land-use patterns pushed development outside the original downtown. Planning goals identified by the city include development and maintenance of areas to walk and bike; more efficient use of the Penobscot River shoreland; and revitalization of Wilson Street and Main Street (two of the most visible downtown streets), Day Road, Eastern Avenue, and Wiswell Road. Some commercial and professional development is expected along Route 1A and Eastern Avenue (The Trust for Public Land, 2009; City of Brewer, 1995).

Much of the land in the study area in Brewer is zoned for rural uses (exhibit 3.38). Most of the western portion of Brewer along the Penobscot River is zoned as medium- and low-density residential. General business areas are located along Route 1A and local roads (City of Brewer, 1995).

Holden's state-certified comprehensive plan was last revised in 2007. The town of Holden has a zoning ordinance and a subdivision ordinance to address open space and development. The town continues to face pressure to approve larger-scale developments than allowed in the limited commercial zone. According to the comprehensive plan, the zoning ordinance is wide-ranging but some changes were needed. Recommendations were to reduce lot sizes to encourage village-scale growth; alter the Community Service/Institutional zone because it was nearly the same as the Limited Commercial Zone; and create a mechanism to provide for well-planned, village development along the alignment of the highway selected from the I-395/Route 9 transportation study. Amendments to the zoning ordinance were made to reflect the comprehensive plan. The town passed a Conservation Subdivision Ordinance in April 2008 that requires 50 percent of lands designated for subdivision be set aside for open space (The Trust for Public Land, 2009).

Residential growth in Holden is expected throughout the rural areas of the town, particularly along Levenseller Road, Clark Hill Road, Mann Hill Road, Route 1A, and Wiswell Road (Town of Holden, 2007).

Most of the land in Holden is zoned rural resource and residential development (exhibit 3.39). Holden has some general and limited commercial zoning along Route 1A. Areas surrounding wetlands complexes are predominantly zoned as resource protection zones and shoreland/flood hazard zones. Areas surrounding Holbrook Pond and Davis Pond are zoned for shoreland residential development (Town of Holden, 2007).

Eddington has a state-certified comprehensive plan that was revised in 2002 and last updated in 2004. There are no restrictions, open-space set-asides, or limits on development. The Future Land Use Plan requires that new residential developments submit plans for open-space/recreational areas.

Eddington's comprehensive plan identifies the following goals: protect plant and wildlife habitats, ensure safe drinking water, replace malfunctioning septic tanks, manage development in floodplains, encourage protection of open space and water resources, and ensure that environmental resources are considered during the development review process (The Trust for Public Land, 2009).

Exhibit 3.38 – *Zoning*

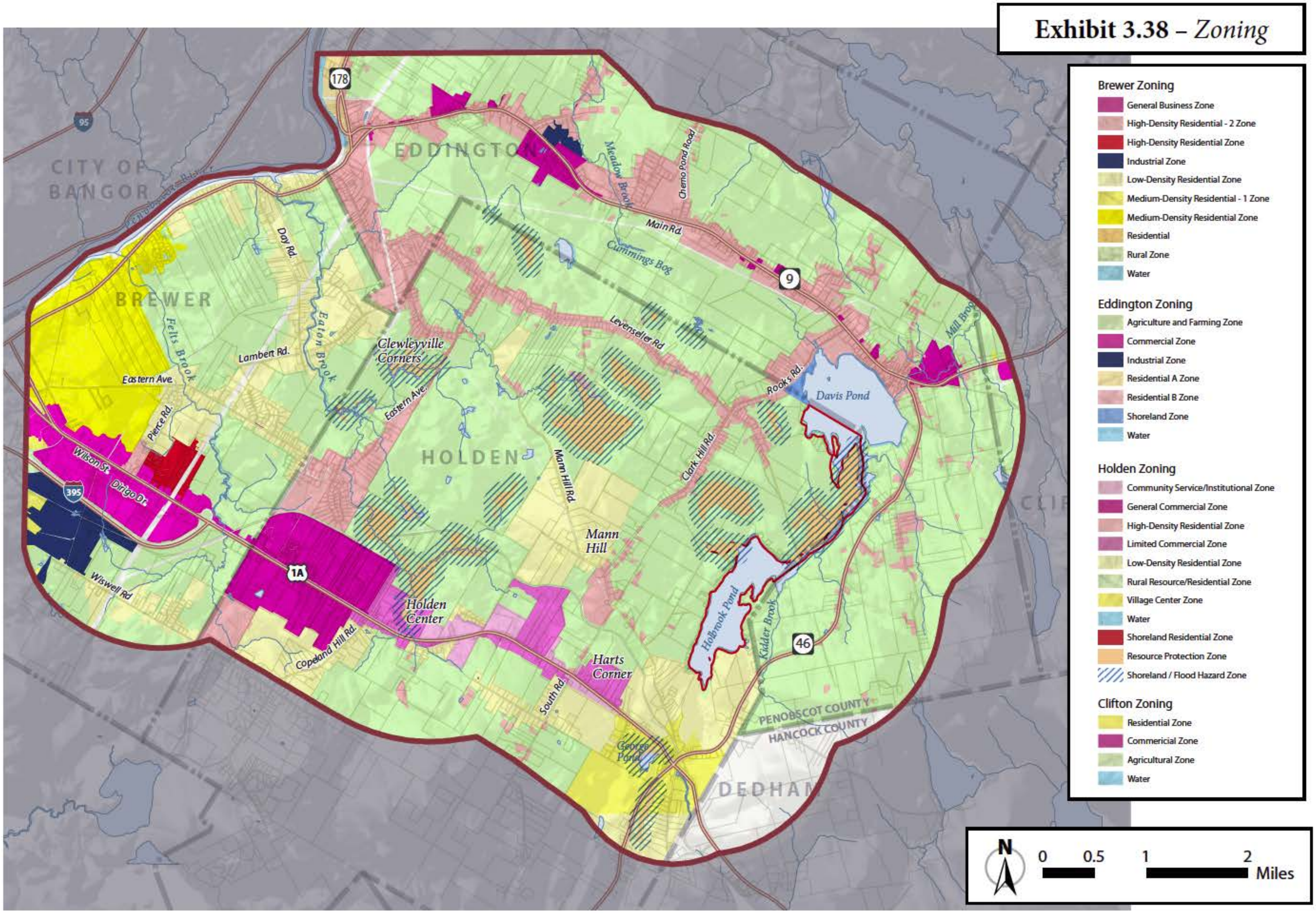


Exhibit 3.39 – *Impacts to Land Use with Zoning Designations (acres)*

	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.*

In the town of Eddington, a substantial increase is expected in residential subdivision development, particularly along Route 9. Utility upgrades are expected in the town, including gas and electric (Town of Eddington, 2007).

Most of the land in Eddington is zoned for agriculture and farming (exhibit 3.39). Areas zoned for residential and commercial uses exist along Route 9, Route 46, and other local roads (Town of Eddington, 2002).

Most of the land in Clifton is zoned as agriculture or rural resource. Growth is expected to occur in the industrial/commercial district, moderate-density district, and low-density district.

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 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 3.39). 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.

3.4.1.4 Communities and Neighborhoods

A community is defined as a group of people living together because of geography, background, or heritage. Common heritage characteristics of community include race, ethnicity, and religion. Geographical characteristics of a community include central locations that foster a sense of collective identity (Garreau, 1991).

There are no communities identified in the local study area.

A neighborhood is defined as a group of people living in proximity to one another. Local roadways, topography, common lot or property size, and architecture help to define a neighborhood. Many small, well-defined neighborhoods are located in the study area (exhibit 3.40).

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 impact community cohesion. 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 3.41). 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.

3.4.1.5 Community Facilities and Services

The educational facilities in Brewer are Brewer High School and the Brewer Community School (exhibit

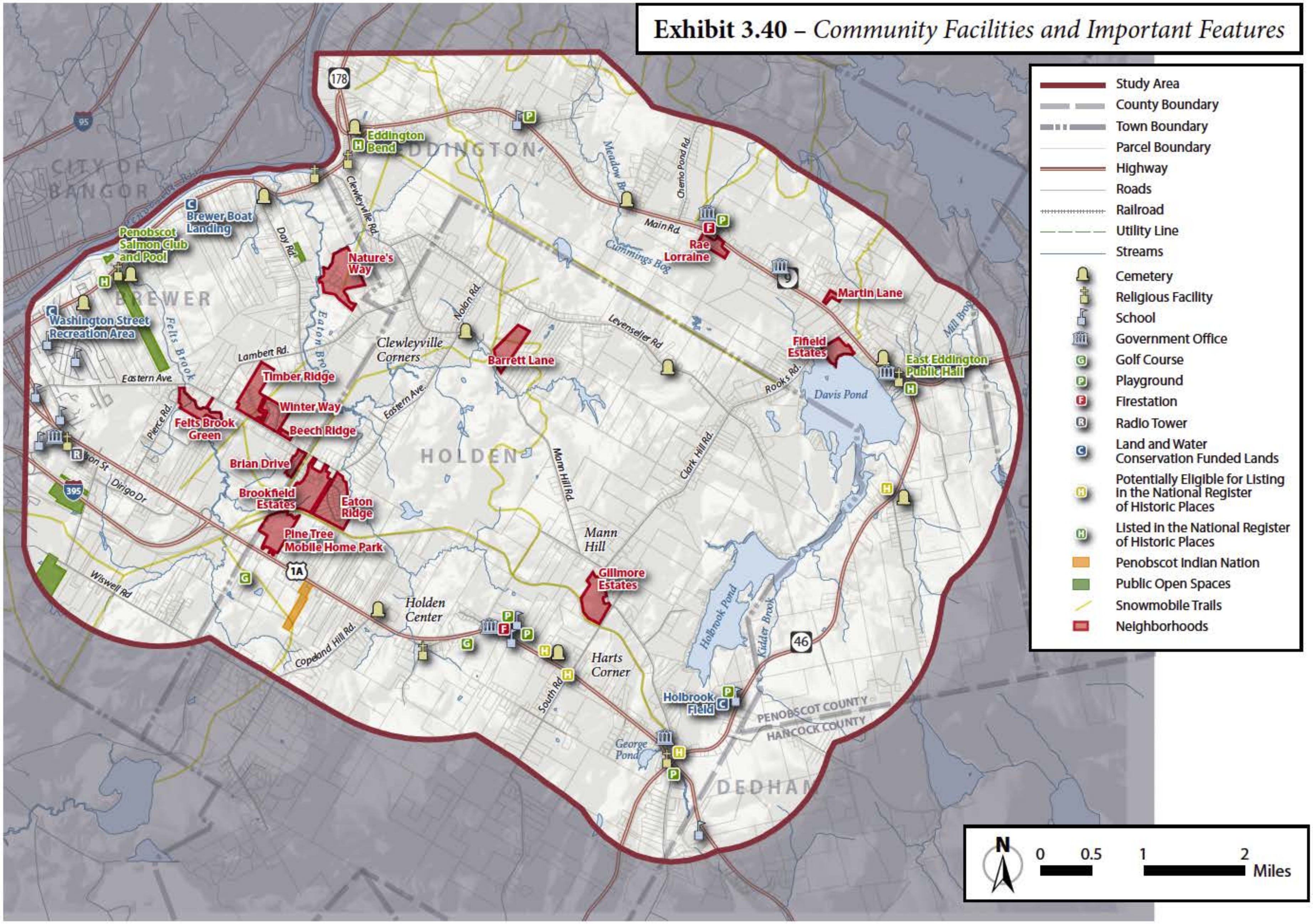


Exhibit 3.40 – Community Facilities and Important Features
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
Cemetery
Religious Facility
School
Government Office
Golf Course
Playground
Firestation
Radio Tower
Land and Water Conservation Funded Lands
Potentially Eligible for Listing in the National Register of Historic Places
Listed in the National Register of Historic Places
Penobscot Indian Nation
Public Open Spaces
Snowmobile Trails
Neighborhoods
0 0.5 1 2 Miles
N
CITY OF BANGOR
BREWER
HOLDEN
DEDHAM
Eddington Bend
Brewer Boat Landing
Penobscot Salmon Club and Pool
Washington Street Recreation Area
Nature's Way
Timber Ridge
Winter Way
Beech Ridge
Felts Brook Green
Brian Drive
Brookfield Estates
Eaton Ridge
Pine Tree Mobile Home Park
Barrett Lane
Gillmore Estates
Rae Lorraine
Martin Lane
Fifield Estates
East Eddington Public Hall
Holbrook Field
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
PENOBSCOT COUNTY
HANCOCK COUNTY
Main Rd.
Meadow Br.
Chemo Pond Rd.
Levenseller Rd.
Rooks Rd.
Clark Hill Rd.
Mann Hill Rd.
South Rd.
Copeland Hill Rd.
Wiswell Rd.
Dirigo Dr.
Pierce Rd.
Eastern Ave.
Lambert Rd.
Eaton Brook
Felts Brook
Day Rd.
Clewleyville Rd.
Nolan Rd.
Kidder Brook
Mill Brook
178
1A
46
395
95

Exhibit 3.41 – *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

3.40). The educational facilities in Holden and Eddington are Holden Elementary School (grades K-4), Holbrook School (grades 5-8), and Eddington School (grades K-4) (Town of Holden, 2007).

Seven religious facilities are located in the study area: three in Brewer, two in Holden, and two in Eddington (exhibit 3.40).

Brewer's emergency facilities consist of full-time fire and police departments and rescue and ambulance services. Brewer has established mutual-aid agreements with Orrington, Eddington, Hampden, Holden, and Bangor when personnel or equipment is insufficient for firefighting. Brewer provides rescue services for Holden and Eddington (City of Brewer, 1995). A new public-safety building, which houses both police and fire services, was recently constructed on Parkway South, east of I-395 (City of Brewer, 2007). Emergency facilities in Holden include the police department, volunteer fire department, and rescue squad, all of which are located in the municipal building on Route 1A (exhibit 3.40) (Town of Holden, 2007). Eddington's volunteer fire department is housed in the town office building on Route 9 (exhibit 3.40). The fire station was renovated in 2007 (Town of Eddington, 2007). Eddington employs two constables, who work in cooperation with the Penobscot County Sheriff's Department and the Maine State Police (Town of Eddington, 2002).

A cancer treatment center was built along Dirigo Drive in Brewer (City of Brewer, 2007).

The study area has 11 cemeteries: three in Brewer, six in Holden, and five in Eddington (exhibit 3.40).

Municipal-government services in Brewer include the Public Works Department, City Hall Water District Office, landfill, and wastewater treatment plant.

The Brewer armory is a state-owned facility and the post office is federally owned (City of Brewer, 1995). Municipal facilities in Holden include the municipal building and the Public Works Department (Town of Holden, 2007). Municipal facilities in Eddington include the municipal building (renovated in 2007) and the public hall (Town of Eddington, 2002). The MaineDOT owns and operates a maintenance facility along Route 9 in the eastern portion of the study area.

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 and the build alternatives would not impact religious facilities.

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 Alternative 5A2B-2 would not impact healthcare facilities. Alternative 2B-2/the Preferred Alternative and Alternative 5B2B-2 would impact healthcare facilities by displacing approximately 20 percent of Eastern Maine Healthcare's parking lot. Functions performed by Eastern Maine Healthcare would not be impacted. During final design of the selected alternative, the MaineDOT would coordinate further with Eastern Maine Healthcare to replace the lost parking spaces.

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

The No-Build Alternative and the build alternatives would not impact other governmental services.

3.4.1.6 Tribal Trust Lands

There are no tribal trust lands located in the study area (NationalAtlas.gov, 2008). The Penobscot Indian Nation owns an approximate 25.8-acre property south of Route 1A which was acquired as an investment (exhibit 3.40) (Penobscot Indian Nation, 2008).

The No-Build Alternative and the build alternatives would not impact tribal trust lands.

3.4.1.7 Farmlands, Prime and Unique Farmland Soils

Limited active farmland exists in the study area. The study area consists of approximately 38 farms, most of which have 50 acres or less devoted to cropland. Most farms consist of a combination of pasture and woodland. The principal crops grown in the study area are strawberries and wild blueberries. Nursery and greenhouse products and hay, alfalfa, and other small grains are also locally important agricultural commodities. Of the approximate 38 farm operators in the study area, only eight list farming as their primary occupation; 30 have other principal occupations; and 29 farm operators earn less than $10,000 a year from the sale of agricultural products (USDA, National Agriculture Statistics Service, 2004).

Prime farmland soils and soils of statewide importance in the study area are located mainly in Brewer and along I-395, Route 9, and Route 1A (section 3.1.1.2).

The No-Build Alternative would not impact existing farm operations, prime farmland soil, or farmland soils of statewide importance.

The build alternatives would impact soils (section 3.1.1.2).

In accordance with the FPPA of 1981 [7 USC 4202 Section 1541 (b)], the impact of the conversion of farmland to nonagricultural uses was considered and coordinated with the USDA's NRCS for Penobscot County. 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 (section 3.1.1.2).

3.4.2 Uncontrolled Petroleum and Potential Areas of Hazardous Wastes

An assessment of potential uncontrolled petroleum and hazardous wastes in the study area was conducted (MaineDOT, 2001, 2008c). The purposes of the assessment were to identify areas of known or potential environmental impacts to soil and groundwater and to evaluate the possible effect of these locations on development of the alternatives. A secondary purpose of the assessment was to obtain information for the design phase of the project to guide future subsurface explorations to specific areas with potential or known soil and groundwater contamination. Future subsurface explorations would define the location, type, and concentration of contaminants that could adversely impact land-acquisition costs, design elements, construction expenses, and worker health and safety.

Soil and/or groundwater contamination by petroleum or hazardous substances likely exists at 21 known and 23 potential sites (exhibit 3.42). Known spills consist of kerosene, diesel fuel, leaded gasoline, fuel oil, motor oil, and other hazardous materials. Most of the spill locations are in the city of Brewer (MaineDOT, 2008c).

The No-Build Alternative and the build alternatives would not impact sites containing uncontrolled petroleum and hazardous wastes.

3.4.3 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires that federal actions be reviewed for their impact on potentially significant historic resources. The term "historic" consists of architectural and archeological resources. A significant historic resource is one that is either listed or determined eligible for listing on the National Register of Historic Places (NRHP).

Section 110 of the NHPA outlines the review criteria for historic properties determined to be National Historic Landmarks – an elevated designation that indicates the property is of national importance – and that may be adversely affected by a federal action.

3.4.3.1 Architectural Resources

The study area has three resources listed on the NRHP: the Penobscot Salmon Club and Pool in North Brewer, East Eddington Public Hall, and Eddington Bend (Site 74-8) (exhibit 3.40) (National Park Service, 2008a).

The Penobscot Salmon Club and Pool was listed on the NRHP on September 15, 1976. The club was organized in 1884 as the first salmon club in the United States. The original clubhouse was built next to the Bangor Salmon Pool in 1887, which is where the building stood until it caught fire. The clubhouse was reconstructed in 1923 (NOAA, NMFS, and USFWS, 2009).

The East Eddington Public Hall was listed on the NRHP on January 24, 2004. It is located on Airline Road and is also known as Grange Hall or Cumins Hall. The hall was built in 1879, but the rear section was not completed until 1911. It has been used for events by the East Eddington Grange, Boy Scouts, town meetings, elections, dances, church suppers, reunions, and family events. Repairs and changes have taken place in recent years, beginning in the 1980s (Town of Eddington, 2002).

The Eddington Bend was listed on the NRHP on September 9, 1988. It is the sharp curve in the Penobscot River where Routes 9 and 178 intersect. The Eddington Bend is at the junction of the Old River Road,

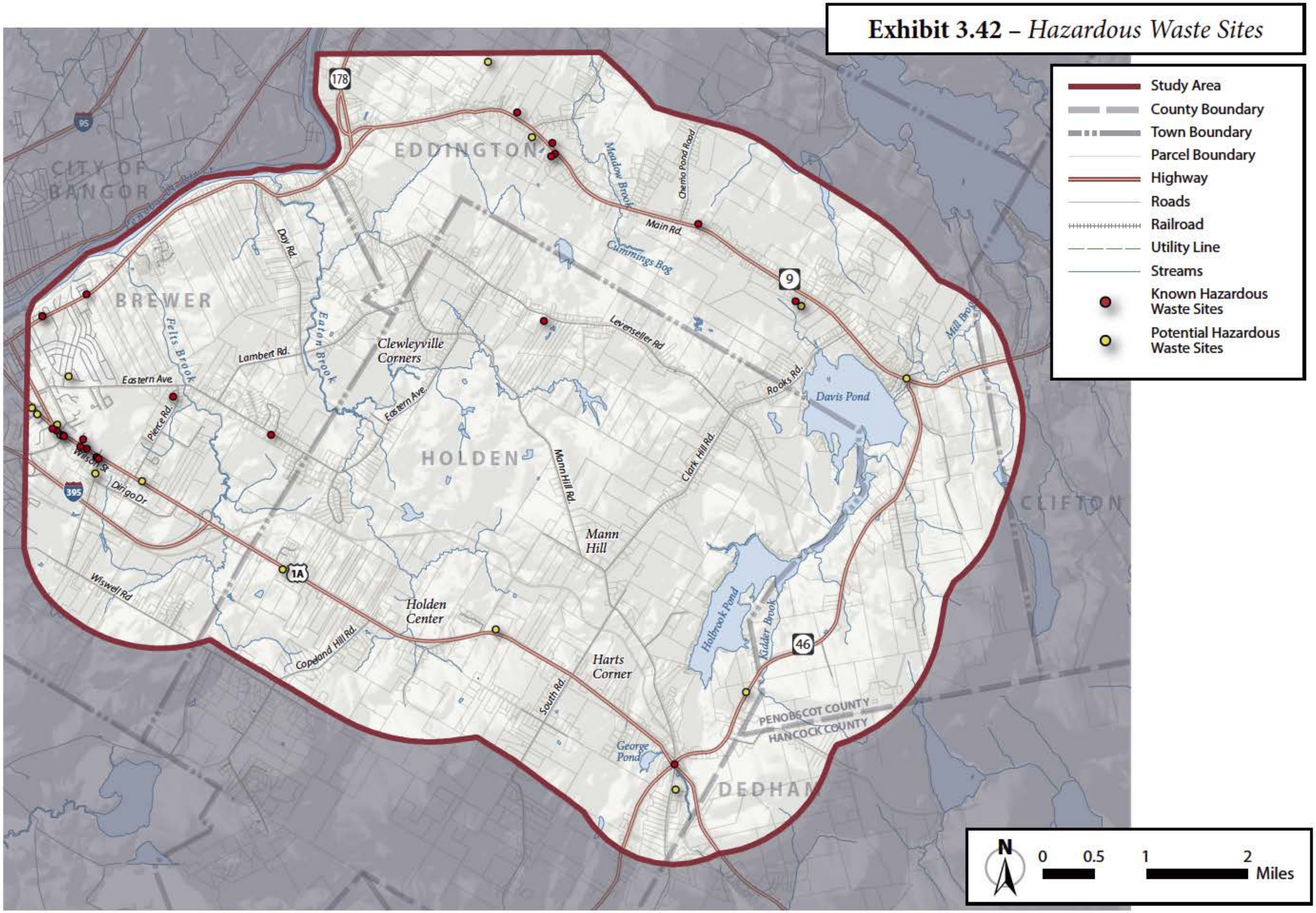


Exhibit 3.42 – Hazardous Waste Sites
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Utility Line
Streams
Known Hazardous Waste Sites
Potential Hazardous Waste Sites
0
0.5
1
2
Miles
N
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
Meadow Brook
Felts Brook
Eaton Brook
Kidder Brook
Mill Brook
Main Rd.
Day Rd.
Lambert Rd.
Eastern Ave.
Pierce Rd.
Wilson St.
Dirigo Dr.
Wiswell Rd.
Copeland Hill Rd.
South Rd.
Mann Hill Rd.
Clark Hill Rd.
Rooks Rd.
Levenseller Rd.
Chemo Pond Road
PENOBSCOT COUNTY
HANCOCK COUNTY
178
95
395
1A
9
46

or Military Road, to Houlton and the Old Airline Stage Route to Aurora and Calais. Its historic function was agriculture/subsistence, domestic, camping, fishing, and graves or burials sites. Its current function is a forested landscape.

According to the Maine Historic Preservation Commission (MHPC), four individual structures and properties should be considered potentially eligible for listing on the NRHP (exhibit 3.40). They are located along Routes 1A and 46 in Holden and Eddington (i.e., 204-0004, 204-0009, 140-0027, and 140-0031) (Johnson, 2002).

Site 204-0004 is the Philander Pond House in Holden. It was built in 1863 and its primary use is commercial and trade. Site 204-0009 is the Rodney Pinkham House located in Holden. It was built in 1883 and is in good condition. Site 140-0027 is the Emery Ward House located in Eddington. It was built in 1846. Site 140-0031 is the Jonathan Sibley House in Holden. It was built in 1804 with the primary use of single-family residential and is in good condition (MHPC, 2009).

The No-Build Alternative would not impact historic resources listed or potentially eligible for listing on the NRHP.

According to the MHPC, the build alternatives would not impact historic resources listed or potentially eligible for listing on the NHRP (MHPC, 2005, 2011; Turk Tracey and Larry Architects, 2004).

3.4.3.2 Archaeological Resources

The MHPC conducted archaeological surveys of the study area in 2001 and 2007. The historic-period survey focused on locating, mapping, and archaeologically testing sites depicted on the 1859 and 1875 town maps and that appear in the study area. The purposes of the surveys were as follows:

- identify landforms that conform to prehistoric site-location models and test the most promising
- revisit previously identified archeological sites and record their status
- find previously listed historic archaeological sites with unidentified locations

The surveys identified 28 sites, two of which are prehistoric sites (i.e., an encampment on Eaton Brook in Brewer and Site 74.171); the remainder (26 sites) are historic sites (exhibit 3.43).

The sites included 14 homesteads/farmsteads, seven mills, three schools, two blacksmith shops, a carriage shop, and a tannery (MHPC, 2007).

The No-Build Alternative and the build alternatives would not impact archaeological resources listed on or potentially eligible for listing on the NHRP (MHPC, 2011).

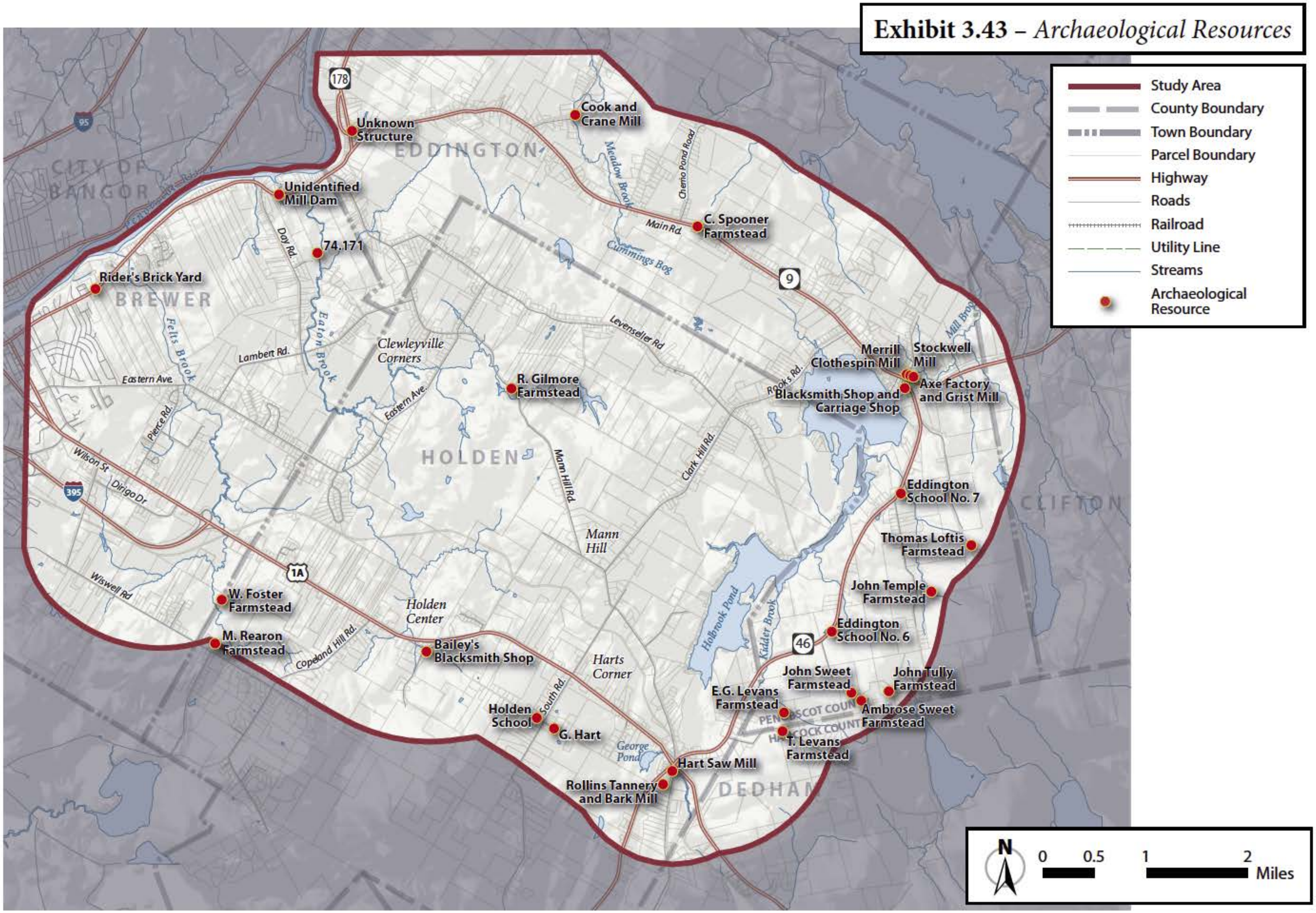


Exhibit 3.43 – *Archaeological Resources*

3.4.3.3 Traditional Cultural Properties

No known traditional cultural properties exist in the study area (National Park Service, 2008a: NationalAtlas.gov, 2008).

The No-Build Alternative and the build alternatives would not impact traditional cultural properties.

3.4.4 Public Parks and Recreation Lands

The Land and Water Conservation Fund (LWCF) was established to assist federal, state, and local governments in the acquisition and/or development of public outdoor recreation facilities. Administered at the federal level by the National Park Service (NPS) and at the state level by the Bureau of Parks and Lands in the Maine Department of Conservation (MDOC), LWCF grants can provide up to 50 percent of the allowable costs for approved acquisition or development projects.

Three outdoor recreation facilities in the study area were partially funded by the LWCF (exhibit 3.40): the Brewer Boat Landing, Washington Street Recreation Area in Brewer, and Holbrook Field in Holden are afforded consideration and protection by Section 6(f)(3) of the LWCF (16 USC 4601-4) (MDOC Grants and Community Recreation, 2001).

Brewer has a network of parks and playgrounds for the community's outdoor recreation needs. These consist of Creative Playground, Capri Street School, Indian Trail Park, Washington Street School, Eastern Park, Pendleton Street School, Memorial Field and Track, School Street Playground, Maple Street Park, Fling Street Tot Lot, and Brewer Community School playground. Brewer's most recent comprehensive plan sets a goal to develop pathways along the Penobscot and Calais rail line and trails along feeder streams. The city recently approved preservation of a ten-acre neighborhood parcel as open space, and a nature trail was created on the property. City officials and the Brewer Land Trust are considering other trail connections with the goal of providing a network of interconnected trails (The Trust for Public Land, 2009).

Holden has no public parks. Holden formed a committee to lead the development of an open-space plan that will outline the vision, priorities, and strategies for parks, trails, recreation, and conservation for the community in the next 20 years. The Maine Audubon Center and the Holden Community Learning Nature Trails are the only public-use trails in Holden (The Trust for Public Land, 2009).

Recreational facilities consist of school basketball, baseball, and soccer fields at the public schools. Holden has a community playground at Holden Elementary School (Town of Holden, 2007).

Eddington has no public parks (Town of Eddington, 2002). Blackcap Mountain is a recreational area to the east of Route 46 in the town of Eddington.

Public recreational facilities in Eddington are a ballpark and a skating rink. The ballpark is rarely used and the rink is not municipally maintained. There are two campgrounds: Deans Landing on Chemo Pond with beach access and Greenwood Acres on Route 178, which has a public pool. Residents have expressed an interest in walking and bike trails.

Part of Maine's Interconnected Trail System for snowmobiles crosses through Brewer and Holden (exhibit 3.40) (Maine Snowmobile Association, 2008).

The No-Build Alternative and the build alternatives would not impact public parks, recreation lands, or other lands or facilities afforded consideration and protection under Section 4(f) of the USDOT Act of 1966 or Section 6(f)(3) of the LWCF.

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, the MaineDOT would evaluate options for maintaining the integrity of the existing snowmobile trail system.

3.4.5 Social and Economic Environment

3.4.5.1 Population, Demographics, and Labor Force

The U.S. Census Bureau prepares annual estimates of total population for states, counties, and all other units of general-purpose government. In 2010, the Penobscot County population accounted for approximately 11.6 percent of Maine's population (i.e., 153,923 of 1,328,361). Penobscot County ranks third in population among Maine's 16 counties. The city of Brewer, with a population of 9,482, is the most populated municipality in the study area. The towns of Holden and Eddington have populations of 3,076 and 2,225, respectively (U.S. Census Bureau, 2010).

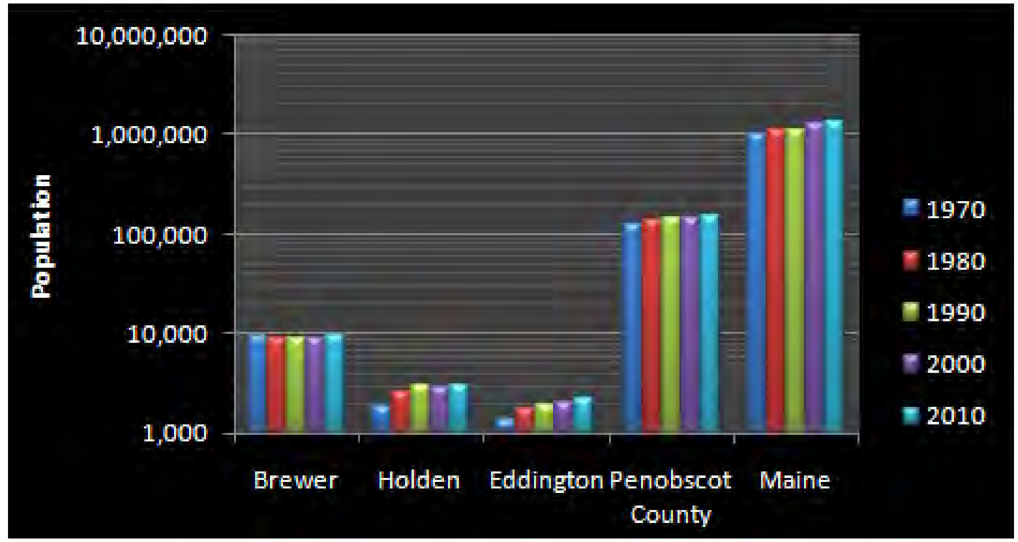
From 1970 to 2010, the population of both Holden and Eddington increased, whereas the population of Brewer remained relatively constant, with a slight increase in the 2000s (exhibit 3.44). Holden and Eddington experienced higher rates of population growth (67 and 64 percent, respectively) than Penobscot County (23 percent) and Maine as a whole (34 percent), and Brewer experienced a two percent increase (U.S. Census Bureau, 2000, 2010, and 1981).

The projected population for 2020 is expected to experience minor changes from existing levels. Population projections suggest that Penobscot County would experience growth of about 0.8 percent between 2005 and 2020 (approximately 1,100 persons). Brewer is projected to experience a decrease of about 0.8 percent (approximately 71 fewer persons) by 2020. Holden is projected to experience an increase in population of about 8.0 percent (approximately 254 persons) by 2020. Eddington is projected to experience growth of about 5.7 percent (approximately 132 persons) by 2020 (Maine State Planning Office, 2008b).

Brewer, Holden, and Eddington have age distributions similar to Penobscot County and Maine (exhibit 3.45). The majority of the population in the study area is between the ages of 25 and 44. People in this age group are frequently engaged in forming new households and raising children. They are the basic segment of the population that comprises the local labor force, and they most frequently engage in home-buying or building. Approximately 51.1 percent of the population in the study area (7,182 persons) is female and approximately 48.9 percent (6,871 persons) is male. In comparison, approximately 48.7 percent of both Penobscot County and Maine is male (U.S. Census Bureau, 2009).

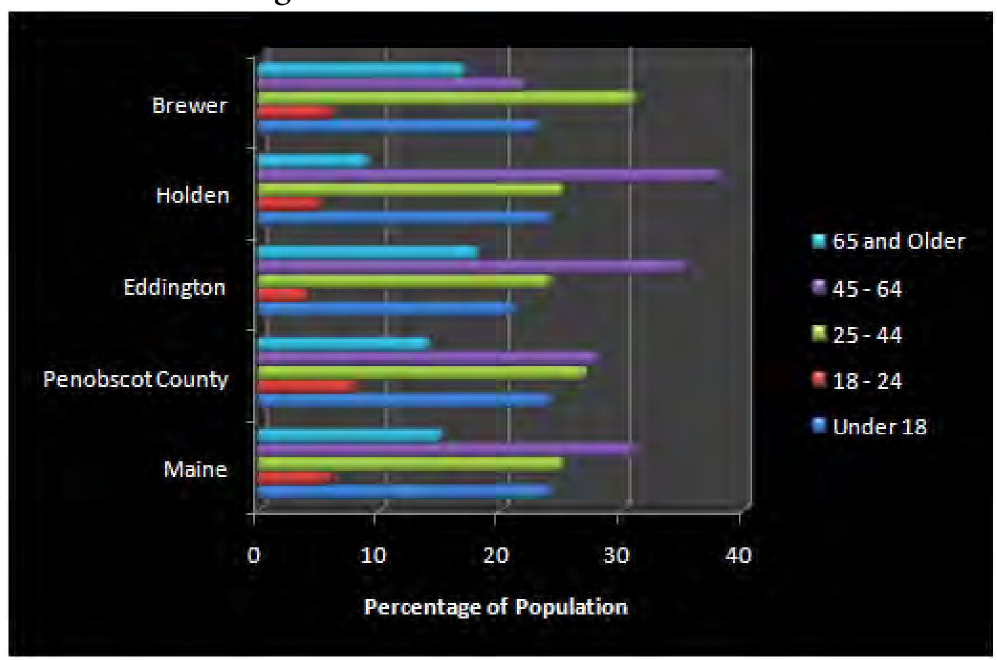
More than half of the residents in the study area are in the labor force (exhibit 3.46). Unemployment rates in the study area are slightly lower than those experienced by Penobscot County (8.3 percent) and Maine (7.9 percent). Unemployment rates for Holden (7.7 percent), Brewer (7.5 percent), and Eddington (7.0 percent) were lower than the Penobscot County

Exhibit 3.44 – *Population Growth*



Source: *U.S. Census Bureau, 2010, 2000, and 1981*

Exhibit 3.45 – *Age Distribution*



Source: *U.S. Census Bureau, 2009*

Exhibit 3.46 – *Labor Force*

Jurisdiction	2010 Population	Total Labor Force (Residents 16 Years of Age and Older)	Total Labor Force Employment	Percentage of Labor Force Unemployed
Brewer	9,482	4,839	4,474	7.5%
Holden	3,076	1,685	1,555	7.7%
Eddington	2,225	1,320	1,227	7.0%
Penobscot County	153,923	78,210	71,740	8.3%
Maine	1,328,361	697,300	642,000	7.9%

Sources: *U.S. Census Bureau, 2010; MSPO, 2010*

Exhibit 3.47 – *Educational Attainment*

Jurisdiction	Less Than 9th Grade	High School Graduate or Higher	Bachelor's Degree or Higher
Brewer	1.9%	90.7%	26.5%
Holden	1.7%	94.4%	24.9%
Eddington	7.4%	86.8%	17.7%
Penobscot County	3.9%	89.2%	22.9%
Maine	4.0%	89.3%	26.1%

Source: *U.S. Census Bureau, 2009*

Exhibit 3.48 – *Income Levels*

Jurisdiction	2009 Per Capita Income	2009 Median Household Income
Brewer	$24,941	$43,292
Holden	$30,427	$50,150
Eddington	$24,062	$46,679
Penobscot County	$22,813	$42,366
Maine	$24,980	$46,541

Source: *U.S. Census Bureau, 2009*

and Maine unemployment rates (U.S. Census Bureau, 2009).

The No-Build Alternative and the build alternatives would not impact population, age and sex distribution, or the number of people in or composition of the labor force.

3.4.5.2 Community Characteristics and Conditions

The educational attainment levels in Brewer and Holden are higher than the Penobscot County and Maine levels (90.7 and 94.4 percent, respectively; high school graduate or higher). The percentage of Eddington residents with high school diplomas (86.8 percent) is lower than Penobscot County and Maine levels (89.2 and 89.3 percent, respectively); the levels of post–high school educational attainment in Eddington are lower than those of the other municipalities, Penobscot County, and Maine (U.S. Census Bureau, 2009) (exhibit 3.47).

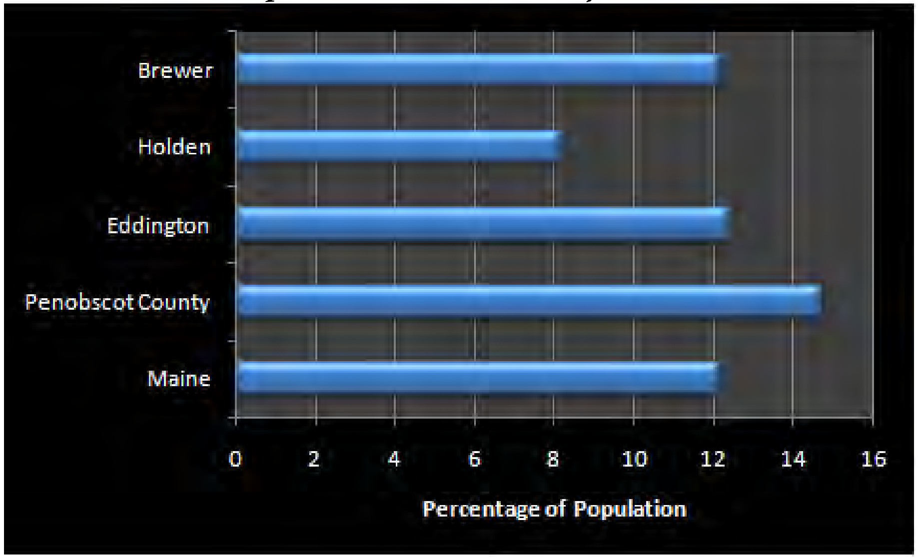
Per capita incomes in Holden are higher than Maine's level, whereas in Brewer and Eddington they are similar to Maine's level (exhibit 3.48). Median household incomes for Holden are higher in comparison to the median household income for Brewer, Eddington, Penobscot County, and Maine. Median household income in Brewer is slightly higher in comparison to Penobscot County and slightly lower in comparison to Eddington and Maine (U.S. Census Bureau, 2009).

Holden has the highest income levels in the study area and the lowest proportion of people living below the poverty level (8.2 percent) (exhibit 3.49). In comparison, Brewer and Eddington have 12.2 and 12.4 percent living below the poverty level, respectively. The proportion of people in the study area living below the poverty level (10.9 percent) is lower than the levels in Penobscot County (14.7 percent) and Maine (12.2 percent) (U.S. Census Bureau, 2009).

Single-family homes are the predominant type of housing in the study area (exhibit 3.50). Holden and Eddington have a larger proportion of single-family homes (78.5 and 72.2 percent, respectively) compared to Penobscot County and Maine (63.5 and 68.9 percent, respectively), reflecting their rural/suburban character. Mobile homes and trailers constitute a larger portion of the available housing in Holden and Eddington (16.8 and 16.3 percent, respectively) than in Brewer (5.5 percent), and Brewer has a larger number of multifamily housing units (U.S. Census Bureau, 2009).

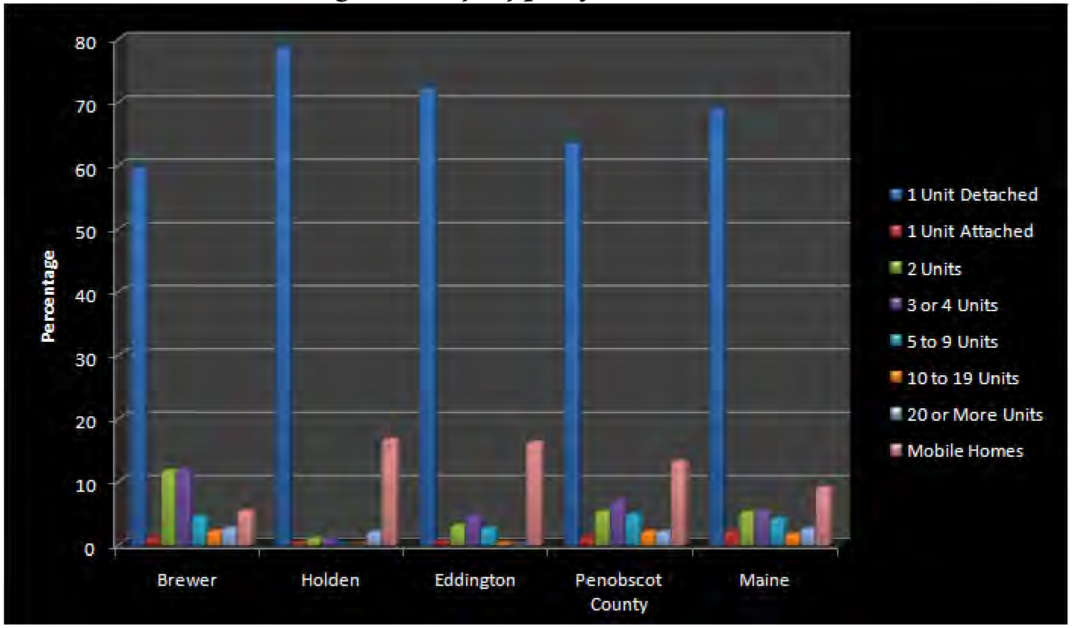
Median owner-occupied home values in Holden ($152,800), Brewer ($160,00), and Eddington ($133,400) are higher than median home values in Penobscot County ($126,400), whereas median home values in Maine ($172,100) are higher than values in

Exhibit 3.49 – *Population Below Poverty Level*



Source: *U.S. Census Bureau, 2009*

Exhibit 3.50 – *Housing Units by Type of Structure*



Source: *U.S. Census Bureau, 2009*

the study area. The median rent for renter-occupied housing units in Eddington ($801) is slightly higher than Penobscot County ($643) and Maine ($688) median rents. The median rents in both Holden ($564) and Brewer ($636) are comparable to those of Penobscot County and Maine (U.S. Census Bureau, 2009).

The No-Build Alternative and the build alternatives would not impact educational attainment.

The No-Build Alternative and the build alternatives would not impact per capita and median household income levels or the percentage of the population living below the poverty level.

The No-Build Alternative and the build alternatives would not impact the type and composition of housing; however, some houses would be displaced (section 3.4.1.1).

3.4.5.3 Employment and Industry Trends

The majority of residents in the labor force in the study area are employed in educational, health, and social services and retail trade (exhibit 3.51). Compared to Penobscot County and Maine, the three municipalities of Brewer, Holden, and Eddington have a greater percentage of employment in the retail sector (15.7 percent) and a lesser percentage in the manufacturing sector (7.1 percent) (U.S. Census Bureau, 2009). Penobscot County has 13.6 and 7.5 percent of the labor force employed in the retail trade and manufacturing sectors, respectively. In comparison, Maine has 13.7 and 10.3 percent of the labor force employed in the retail trade and manufacturing sectors, respectively.

Penobscot County experienced a decline in manufacturing-sector employment from 1980 to 1990. In 1980, the manufacturing sector accounted for 25 percent of employment (14,006 jobs) (U.S. Census Bureau, 1981). By 1990, manufacturing-sector employment had decreased to 16 percent of total employment.

From 1990 to 2000, manufacturing-sector employment in Penobscot County continued to decline, decreasing from 16 percent in 1990 to 11.9 percent (8,308 persons) in 2000 and 7.5 percent (5,446 persons) in 2009. Maine experienced a similar trend from 19.0 percent in 1990 to 14.2 percent in 2000 to 10.3 percent in 2009 (U.S. Census Bureau, 2009).

The city of Brewer's economic base is a mix of manufacturing, healthcare professional centers, and retail. The largest employers are Eastern Maine Healthcare, Lemforder, Wal-Mart, and Cianbro Eastern Manufacturing Facility.

The largest employers in Holden are the school district, Holden Cabinet, Rhodes Lumber, and Granville Stone.

The Town of Eddington's economic base is mainly residential, serving as a bedroom community for Bangor and Brewer. The majority of businesses in Eddington are classified as small retail, service, construction, and maintenance. The three largest employers are Commonsense Housing, Katahdin Scout Reservation, and New Hope Hospice. In 2002, the top three taxpayers were Maritimes and Northeast Pipeline Co., Inc., Bangor Hydro-Electric Company, and J. G. Faulkner (The Trust for Public Land, 2009).

The No-Build Alternative would not impact employment or industry trends in the study area or Penobscot County.

The build alternatives would not impact industry trends in the study area or Penobscot County.

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

Exhibit 3.51 – *Employment by Industry*

	Brewer		Holden		Eddington		Penobscot County		Maine	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Agriculture, Forestry, Fishing and Hunting, and Mining	60	1.3%	0	0	57	5.8%	1,634	2.3%	16,312	2.5%
Construction	319	6.6%	106	7.3%	104	10.6%	4,737	6.5%	52,201	8%
Manufacturing	268	5.6%	105	7.2%	83	8.4%	5,446	7.5%	67,501	10.3%
Wholesale Trade	237	4.9%	69	4.8%	0	0%	2,147	3%	18,312	2.8%
Retail Trade	738	15.4%	273	18.8%	156	15.9%	9,858	13.6%	89,747	13.7%
Transportation and Warehousing, and Utilities	273	5.7%	94	6.5%	74	7.5%	3,796	5.2%	26,636	4.1%
Information	75	1.6%	45	3.1%	17	1.7%	1,474	2%	13,488	2.1%
Finance, Insurance, Real Estate, and Rental and Leasing	370	7.7%	39	2.7%	82	8.3%	3,437	4.7%	40,372	6.2%
Professional, Scientific, Management, Administrative, and Waste Management Services	309	6.4%	71	4.9%	70	7.1%	4,817	6.6%	52,906	8.1%
Educational, Health, and Social Services	1,283	26.7%	339	27.5%	229	23.3%	23,500	32.4%	167,516	25.5%
Arts, Entertainment, Recreation, Accommodation, and Food Services	264	13%	70	4.8%	34	3.5%	5,515	7.6%	53,962	8.2%
Public Administration	97	2%	117	8.1%	19	1.9%	3,163	4.4%	30,174	4.6%
Other Services	144	4%	63	4.3%	58	5.9%	3,014	4.2%	27,284	4.2%

Source: *U.S. Census Bureau, 2009*

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 jobs.

3.4.5.4 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 will 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.

3.4.6 Minority and Disadvantaged Populations

Racial diversity in the study area is low. Approximately two percent of the approximately 14,783 people living in the study area are non-white. Minorities comprise the following approximate percentages of population: Black and African American, 0.6 percent; American Indian and Alaskan Native, 0.6 percent; Asian, 0.7 percent; Native Hawaiian and Other Pacific Islander, 0.01 percent; Other Race, 0.2 percent; and Two or More Races, 1.5 percent. No concentrated populations of racial minorities are known to reside in the study area (U.S. Census Bureau, 2010).

The percentage of people in Holden (8.2 percent), Brewer (12.2 percent), and Eddington (12.4 percent) living below the poverty level is relatively the same or lower than in Maine (12.2 percent) and lower than in Penobscot County (14.7 percent). Eddington has the largest percentage of people living below the poverty level in the study area (U.S. Census Bureau, 2009).

The study area has low-income and/or subsidized housing. The city of Brewer has approximately 367 government-subsidized apartments (City of Brewer, 1995). This housing is equally divided between public-housing apartments and assistance for living in private apartments (i.e., Section 8), and housing for elderly people and families. Holden has one low-income housing facility, Holden Square Apartments, and a youth group home, Harrington House (Town of Holden, 2007).There are no low-income housing facilities in Eddington.

In accordance with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," and subsequent procedures developed by the USDOT, activities that have the potential to generate a disproportionately high and adverse effect on human health or the environment shall include explicit consideration of their effects on minority and low-income populations. In making an assessment of whether environmental justice has been served, information regarding race, color, or national origin and income level should be obtained where relevant, appropriate, and practical. Specific consideration should be given to those populations that are most directly served or affected by the proposed action.

The No-Build Alternative and the build alternatives would not result in discriminatory or disproportionate high and adverse impacts to minority or low-income populations.

3.5 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.

3.6 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 will 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 and safety and savings in time.

3.7 Indirect Impacts and Cumulative Impacts

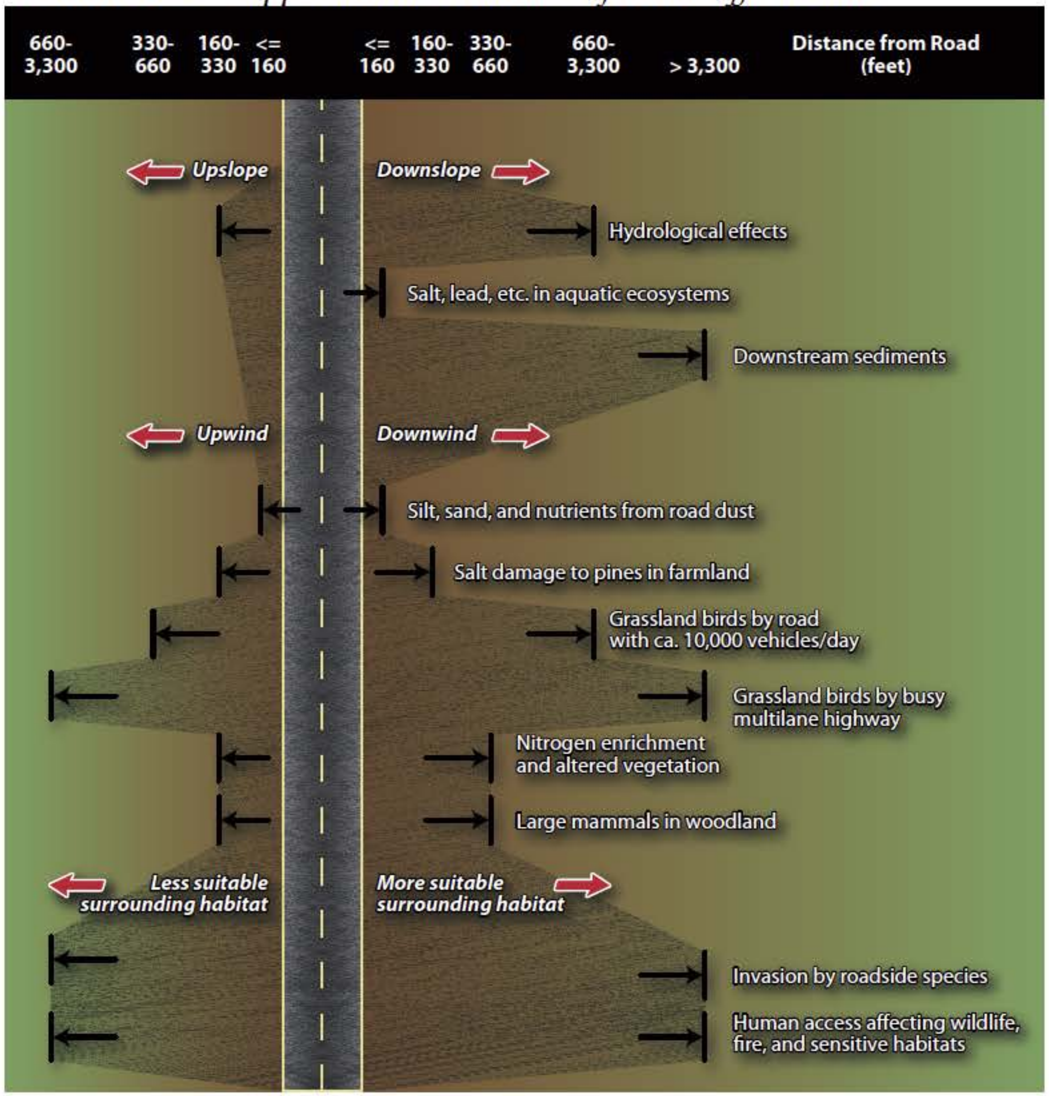
3.7.1 Indirect Impacts

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 CEQ 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 3.52). The build alternatives create a road-effect zone in which indirect impacts extend beyond the road and the immediate surrounding areas (exhibit 3.53). 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 selected alternative. Changes to soil in specific areas would impact soil-dependent species (i.e., vegetation and wildlife). Erosion from cut slopes would affect water

Exhibit 3.52 – *Approximate Distances of Road-Effect Zones*



Source: *Maine Audubon Society, 2007*

quality in surface waters during and after construction. 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). 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

Exhibit 3.53 – *Indirect Impacts of Alternatives*

Resources		Distances (feet)		Alternative Indirect Impacts (acres)							
		Upslope/ Upwind	Downslope/ Downwind	No-Build Alternative[3] Upslope	No-Build Alternative[3] 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			46%		60%		78%		83%	
	Area	750[2]		480		278		395		146	
	Percent Forested			53%		63%		59%		69%	
Floodplains		0	100[4]	0	1	0	11	0	5	0	15
		160[1]		4		22		8		28	
Wetlands		0	100[4]	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[4]	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] No-Build Alternative consisted of Route 1A from I-395 to Route 46, and Route 46 from Route 1A to Route 9.

[4] USEPA, 2010

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 amount of chlorides required is dependent primarily on the type of corridor, the desired LOS, the condition of the pavement, and the storm specifics (MaineDOT, 2012). Early application of salt brine and rock salt occurs on many roads to prevent snow and ice from bonding to the road surface. This approach requires less salt than to de-ice a road after packed snow and ice has bonded to it.

Salt from a highway is introduced into surface waters when:

- runoff occurs from highways and flows are carried into rivers and streams
- snow is plowed together with the salt, the accumulated pile on the roadside melts during warmer weather, and then runs off into rivers and streams

The use of anti-icing materials for winter maintenance would not impact the availability of potable water supplies. The MaineDOT continually investigates and evaluates snow and ice-control industry standards and updates its salt-priority program in an effort to use salt judiciously while providing safe and effective traffic movement. In the unlikely event that a localized issue is observed, the MaineDOT would implement corrective actions as mandated by state law (23 MRSA § 652).

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.

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. 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 3.1.2.4).

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.

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.

3.7.1.1 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, hotels, restaurants, and convenience stores) within approximately a half-mile of the interchanges and intersections. 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). 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, nonintensive 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 3.54). There may be some small impacts to wetlands in the future. 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.

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.

Commercial and residential development would occur with the No-Build Alternative; however, it would 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.

3.7.2 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

Exhibit 3.54 – *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)

the quantity, quality, or context of those resources within a broad geographic scope. Under the CEQ 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 (section 3.2.1). 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 3.55).

The year 1987 was used as the limit for the timeframe of past actions considered. It was chosen because it was the year that construction of the extension of I-395 from I-95 to Route 1A was completed and opened to traffic. 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 3.56). Reasonably

Exhibit 3.55 – *Cumulative-Effects Study Area*

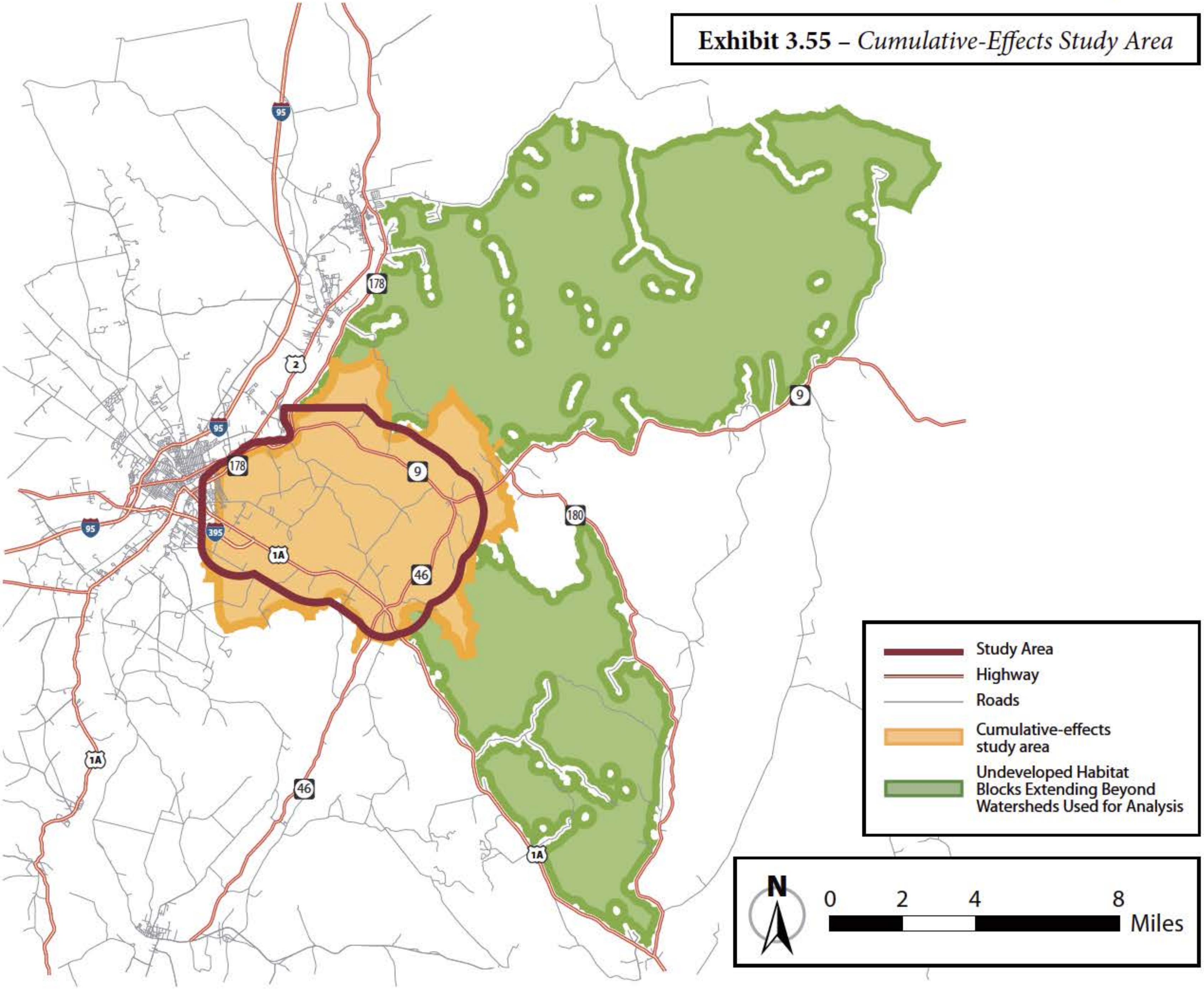


Exhibit 3.56 – *Cumulative Impacts*

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	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 Realibility Interconnect Electric Transmission Upgrade		1	8	Conversion of 18 acres of forests/vegetation land to utility use	21

Exhibit 3.56 – *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 3.56 – *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

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 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 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 222 and 567 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.

Current practices result in a number of road-stream crossings (public and private) being built or replaced with structures that negatively impact stream habitat and aquatic organism passage.

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.

3.8 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. The mitigation measures would be developed further during preparation of the FEIS/Section 404 permit and its review and final design of Alternative 2B-2/the Preferred Alternative.

3.8.1 Mitigation

Prospective compensatory mitigation opportunities for the unavoidable wetlands impacts from the build alternatives were identified within the Penobscot River and neighboring 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.

On-site – the build alternatives are largely on new alignments and no on-site opportunities exist to restore wetlands previously filled by highway construction. No other potential on-site compensation areas were identified in the preliminary screening process.

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.

3.8.2 Commitments

The following is a summary of the commitments from the MaineDOT and the FHWA in support of the development of the build alternatives to avoid and minimize impacts to a variety of natural resources:

- Alternative 2B-2/the Preferred Alternative will be a controlled-access facility; motorists would be permitted to enter and exit from I-395 in Holden 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 MOA, 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.
- 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).
- 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.
- A Biological Assessment will be prepared to assess possible impacts from the preferred alternatve to endangered species.
- 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.

- 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 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 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.
- During final design of the selected alternative, the MaineDOT would evaluate options for maintaining the integrity of the existing snowmobile trail system.

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Chapter 4
Coordination and Consultation

Chapter 4 summarizes the coordination and consultation activities performed for this study among the federal, state, and local agencies and the public.

Throughout this study, the MaineDOT and the FHWA, acting as joint lead agencies, coordinated with federal and state regulatory and resource agencies, the tribes, BACTS (i.e., the MPO), the city and towns in the study area, the regional and other special-interest groups, and the public.

Scoping. There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed "scoping" (40 CFR 1501.7).

A complete description of the public-involvement program, including meeting agendas, handouts, maps, presentations, displays, and minutes, is on the study website www.i395-rt9-study.com on the "Stay Informed" page.

4.1 Scoping and Early Coordination

In support of the preparation of the EA, a public scoping and informational meeting was held on April 11, 2001. The purposes of the meeting were to (1) review the planning and programming activities that led to the initiation of the study, and (2) provide an opportunity for public comments at the beginning of the study. The meeting was preceded by an informal open house; the formal part of the meeting consisted of a presentation and discussion of the history, purpose and needs of the study, and a broad review of strategies and alternatives for satisfying the purpose and needs. About 60 people attended the meeting, most of which was spent in questions and answers about the time required to complete the study, methods for collecting traffic data and predicting traffic volumes, relationship of the study to the east–west highway initiative, use of rail to move people and goods, sources of funding, and subsequent phases, including construction. Suggestions from the public were to use rail to ease truck traffic and reduce speed limits to improve safety.

Chapter Contents

The MaineDOT and the FHWA conducted scoping with the federal and state regulatory and resource agencies using the MaineDOT monthly interagency coordination meetings. Scoping was initiated in late 2000 and concluded in early 2001.

In December 2000, scoping and early-coordination letters were mailed to federal and state regulatory and resource agencies, the city and towns in the study area, and regional and special-interest groups, in accordance with the procedural provisions of the NEPA and requirements and policies of the MaineDOT and the FHWA. Letters accompanied by a map of the study area, a description of the study purpose and the need for action, and an outline of the study to be conducted were mailed to provide notification of the study, request specific information pertaining to the study area, and encourage participation by identifying areas of initial concern for consideration and inclusion in the study (exhibit 4.1). There were no key resources or issues of primary concern identified.

In October 2005, the FHWA elevated the I-395/Route 9 transportation study to an EIS because of potential impacts to wetlands and difficulty in identifying mitigation for those impacts. In response to the need to prepare an EIS, the FHWA published the NOI to prepare the EIS on December 1, 2005, in the *Federal Register* (*Federal Register*, Vol. 70, No. 230, pages 72144-72145).

Following the decision to prepare an EIS, a second agency scoping and field view of the study area was conducted on June 3, 2008. The agencies in attendance were the MaineDOT and the FHWA, acting as joint lead agencies, with the USACE, USEPA, and USFWS acting as cooperating agencies. The discussions included the activities conducted to date, key resources in the study area, methods for analysis of impacts to the key resources, opportunities and expectations for mitigation for impacts to waters of the United States, and specifics for conducting the study using an integrated EIS and Section 404 format. The key resources and issues of concern were potential impacts to wetlands, potential difficulty in identifying mitigation for those impacts, and wildlife habitat. Several "connectors" between the westernmost alternatives were suggested for development and analysis.

Following the decision to prepare an EIS, a second public scoping and informational meeting was held on June 4, 2008. The purposes of the meeting were to provide (1) an update to the study, the reasons that an EIS was being prepared, and the differences between an EA and an EIS; and (2) an opportunity for the public to comment and indentify concerns to be addressed in the study. The meeting was preceded by an informal open house; the formal part of the meeting consisted of a presentation and discussion of the legislative framework guiding the study, the study's purpose and why it

Exhibit 4.1 – *Summary of Scoping and Early Coordination Letters during Preparation of the EA*

Agency or Organization	Information Requested	Information Received
Federal Agencies		
U.S. Army Corps of Engineers	General letter requesting comments	No response received
U.S. Fish & Wildlife Service	Federally listed or proposed threatened or endangered species and known critical habitats	Bald eagle is known to occur in the study area
U.S. Department of Agriculture, Maine State Office	General letter requesting comments	No response received
U. S. Department of Agriculture, Natural Resources Conservation Service, Penobscot County	General letter requesting comments	No response received
U. S. Department of the Interior, Office of Environmental Policy & Compliance	General letter requesting comments	No response received
U.S. Environmental Protection Agency	General letter requesting comments	No response received
National Marine Fisheries Service	General letter requesting comments	No response received
State Agencies		
Maine Department of Inland Fisheries Wildlife	State listed or proposed, threatened or endangered species, known critical habitats, and other sensitive features and concerns	Map of significant and essential wildlife habitats
Maine Department of Environmental Protection, Air Quality	Previous studies of air quality in the region	No response received
Maine Department of Environmental Protection, Land and Water Quality Control	General letter requesting comments	A permit from the MDEP would be required if the proposed solution alters protected natural resources
Maine Geologic Survey	Location of groundwater wells and groundwater quality; wellhead-protection areas and intake-protection areas	List and map of known bedrock wells in the study area
Maine Department of Conservation, Forest Service	General letter requesting comments	No response received
Maine Department of Conservation, Bureau of State Parks and Lands	Identification of parks, recreation areas, or lands using funds from the LWCF	No response received
Maine State Planning Office	General letter requesting comments	No response received
Maine Natural Areas Program	State listed or proposed, threatened or endangered species, critical habitats, and other sensitive features and concerns	Two rare plant species are known to exist in the study area: American shoregrass and water stargrass
State Floodplain Management Coordinator	General letter requesting comments	Executive Order 11988 applies; use the 100-year flood standard

Exhibit 4.1 – *Summary of Scoping and Early Coordination Letters during Preparation of the EA (continued)*

Agency or Organization	Information Requested	Information Received
Maine Department of Economic and Community Development, Office of Business Development	General letter requesting comments	No response received
Maine Department of Conservation, Grants and Community Recreation	General letter requesting comments	Three properties in the study area received funding from the LWCF
Maine Department of Agriculture, Soil and Water Conservation Commission	General letter requesting comments	No response received
Maine Department of Marine Resources	General letter requesting comments	No response received
Maine Drinking Water Program	Groundwater wells, surface-water intakes, wellhead-protection areas, intake-protection areas	Maps of public water supplies in the study area
Local Agencies		
City of Brewer	General letter requesting comments	Offer of assistance from the Director of Environmental and Public Works
Town of Holden	General letter requesting comments	Requested that proposed solutions be consistent with the town's comprehensive plan
Town of Eddington	General letter requesting comments	No response received
Regional or Other		
Eastern Maine Development Corporation	General letter requesting comments	No response received
Maine Citizens for Increased Jobs and Safety	General letter requesting comments	Comments supporting the need for the study

is needed, the resources and features in the study area, the range of reasonable alternatives, opportunities to learn more about the study and participate in it, results achieved to date, and issues identification. About 30 people attended the meeting most of which was spent in questions and answers about the time required to complete the study, sources of funding for the study, and subsequent phases, including construction.

Following the decision to begin preparation of an EIS, in October 2008, the MaineDOT and the FHWA mailed scoping and early-coordination letters to federal and state regulatory and resource agencies, the city and towns in the study area, and regional and special-interest groups. The letters directed recipients to the study website (www.i395-rt9-study.com) for additional information about the study to be conducted.

Several letters requested specific information to be used in the study (exhibit 4.2). There were no key resources or issues of primary concern identified.

Exhibit 4.2 – *Summary of Scoping and Early Coordination Letters during Preparation of the EIS*

Agency or Organization	*Information Requested*	*Information Received*
Federal Agencies		
U.S. Army Corps of Engineers	General letter requesting comments	No response received
U.S. Fish & Wildlife Service	Federally listed or proposed threatened or endangered species or known critical habitats in the study area	No response received
U. S. Department of Agriculture, Natural Resources Conservation Service, Penobscot County	General letter requesting comments	No response received
U.S. Environmental Protection Agency, Region I	General letter requesting comments	No response received
U.S. Geological Survey	General letter requesting comments	No response received
Federal Emergency Regulation Commission	General letter requesting comments	No response received
Federal Railroad Administration	General letter requesting comments	No response received
Federal Transit Administration	General letter requesting comments	No response received
National Oceanographic Atmospheric Administration Fisheries	General letter requesting comments	No response received
National Marine Fisheries Service	General letter requesting comments	No response received
Tribes		
Penobscot Indian Nation	General letter requesting comments	No response received
Houlton Band of Maliseet Indians	General letter requesting comments	No response received
Aroostook Band of Micmacs	General letter requesting comments	No response received
Passamaquoddy Tribe of Indians	General letter requesting comments	No response received
Passamaquoddy Tribe Pleasant Point	General letter requesting comments	No response received

Exhibit 4.2 – *Summary of Scoping and Early Coordination Letters during Preparation of the EIS (continued)*

Agency or Organization	Information Requested	Information Received
State Agencies		
Maine Department of Inland Fisheries and Wildlife	State listed or proposed threatened or endangered species, known critical habitats, or other sensitive features or concerns	Bald eagle nest locations and proposed rules protecting Atlantic salmon
Maine Department of Environmental Protection, Air Quality	Previous studies of air quality in the region	No response received
Maine Department of Environmental Protection, Land and Water Quality Control	General letter requesting comments	No response received
Maine Historic Preservation Commission	General letter requesting comments	No response received
Maine Geologic Survey	Location of groundwater wells and groundwater quality; wellhead-protection areas and intake-protection areas	Location of groundwater wells wellhead-protection areas, and intake-protection areas
Maine Department of Conservation	General letter requesting comments	No response received
Maine Department of Conservation, Forest Service	General letter requesting comments	No response received
Maine Department of Conservation, Bureau of State Parks and Lands	Identification of parks, recreation areas, or lands purchased with funds from the LWCF	No response received
Maine Atlantic Salmon Commission	General letter requesting comments	No response received
Maine Department of Conservation, Northern Region Bureau of State Parks and Lands	General letter requesting comments	No response received
Maine State Planning Office	General letter requesting comments	Maine floodplain management program floodplain issues
Maine Natural Areas Program	State listed or proposed threatened or endangered species, critical habitats, or other sensitive features or concerns	No response received

Exhibit 4.2 – *Summary of Scoping and Early Coordination Letters during Preparation of the EIS (continued)*

Agency or Organization	Information Requested	Information Received
State Floodplain Management Coordinator	General letter requesting comments	No response received
Maine Department of Economic and Community Development, Office of Community Development	General letter requesting comments	No response received
Maine Department of Agriculture Soil and Water Conservation Commission	General letter requesting comments	No response received
Maine Department of Marine Resources	General letter requesting comments	Species of diadromous fish
Maine Drinking Water Program	Groundwater wells, surface-water intakes, wellhead-protection areas, intake-protection areas	No response received
Maine Emergency Management Agency	General letter requesting comments	No response received
Maine Department of Conservation, Off-Road Vehicles Division	General letter requesting comments	No response received
Maine Tree Committee	General letter requesting comments	No response received
Local		
City of Brewer	General letter requesting comments	No response received
Town of Holden	General letter requesting comments	No response received
Town of Eddington	General letter requesting comments	No response received
Town of Clifton	General letter requesting comments	No response received
BACTS	General letter requesting comments	No response received
Regional or Other		
Eastern Maine Development Corporation	General letter requesting comments	No response received
Boy Scouts of America	General letter requesting comments	No response received
East – West Highway Association	General letter requesting comments	No response received
Maine Motor Transport Association	General letter requesting comments	Letter stating support for the study
Maine Snowmobile Association	General letter requesting comments	No response received

4.2 Federal and State Agency Interagency Coordination Meetings

This study was presented to the federal and state regulatory and resource agencies that attended the MaineDOT monthly interagency coordination meetings on eight occasions during preparation of the EA (exhibit 4.3). The federal and state regulatory and resource agencies that regularly attend these meetings are the USACE, USEPA, USFWS, NMFS, MDEP, MDIFW, MHPC, MDMR, and MDOC. Other federal and state regulatory and resource agencies attend these meetings as needed.

This study was presented to the federal and state regulatory and resource agencies that attended the MaineDOT monthly interagency coordination meetings on three occasions during preparation of the EIS (exhibit 4.4). The major issues addressed were the potential impacts to wetlands, streams, vernal pools, unfragmented habitat, the potential mitigation for those impacts, and the development and refinement of the build alternatives to further avoid and minimize impacts to the natural and social environment features in the study area. The cooperating agencies concurred with the range of reasonable alternatives to be retained for detailed analysis in the EIS in January 2008 (Appendix C).

4.3 Public Involvement

Public participation was initiated early in the study to incorporate public comments and concerns into the development and analysis of the study needs, purpose, range of reasonable alternatives, potential resultant environmental impacts, and development of conceptual mitigation measures. Public participation continued throughout the study. The public-involvement program included the scoping meetings, meetings of the PAC, two public meetings, a website, information posters, and newsletters.

4.3.1 Public Advisory Committee

At the beginning of the study, a PAC consisting of local officials, business owners, the MPO, and private citizens from Bangor, Holden, Brewer, Eddington, Clifton, Bucksport, and Calais was formed. The purpose of the PAC and its meetings was to provide a forum and support the overall public-involvement program. The PAC participated in the study by meeting periodically with the MaineDOT and the FHWA and providing guidance on local issues and concerns. The PAC meetings were working sessions open to the public and included time for questions and answers (exhibit 4.5). Seventeen PAC meetings were held during the preparation of the EA.

Following the decision to begin the preparation of the EIS, a new PAC was formed. This PAC consisted of

Exhibit 4.3 – *Summary of Interagency Coordination Meetings and Results during Preparation of the EA*

Interagency Meeting	Discussion and Results
November 14, 2000	The study was introduced and an overview of activities was provided.
February 13, 2001	The needs for the study, its purpose, and the natural resource and social environmental features in the study area were presented. The agencies in attendance concurred with the information presented.
October 9, 2001	The alternatives-analysis information to date was presented. The agencies in attendance concurred with the range of reasonable alternatives considered and the preliminary screening of alternatives to date. **Attended by:** USACE, USEPA, USFWS, NMFS, MDEP, MDIFW, MASC, and MDMR
March 12, 2002	An update to the alternatives analysis was presented. The agencies in attendance concurred with the range of alternatives considered but stated that Alternative 2B was practicable. The agencies requested that additional impacts to people living along Route 9 be quantified. **Attended by:** USACE, USFWS, and MDEP
October 8, 2002	An update to the alternatives analysis and the direction of the study were presented. The agencies in attendance concurred with the range of alternatives considered and the direction of the study. **Attended by:** USACE, USFWS, NMFS, and MASC
March 11, 2003	The agencies in attendance concurred with dismissing Alternative 2C-2 due to its greater impacts to farmlands and farming operations than other alternatives. **Attended by:** USACE, USEPA, USFWS, MDEP, MDIFW, and MASC
May 13, 2003	The agencies in attendance concurred with dismissing the remaining build alternatives except Alternative 3EIK-2, pending review of the "Transportation Improvement Strategies and Alternatives Analysis Technical Memorandum and U.S. Army Corps of Engineers Highway Methodology Phase I Submission"–a document that summarizes and presents results of the alternatives-analysis process. **Attended by:** USACE, USEPA, USFWS, MDEP, MDIFW, MASC, and MHPC
November 14, 2003	A modification of Alternative 2B-1 was discussed. It was agreed by the agencies in attendance that this modification should be dismissed from further consideration. **Attended by:** USACE, USFWS, MDEP, and MDOC

many of the same individuals who had participated in the study to date and several others with knowledge of the area and potential issues and concerns (Appendix B). These PAC meetings were working sessions open to the public and included time for questions and answers (exhibit 4.6). Three PAC meetings were held during the preparation of the EIS.

4.3.2 Public Informational Meetings

Two public meetings were held during the preparation of the EA. The first meeting was the public scoping and informational meeting held on April 11, 2001 (section 4.1).

The second public meeting was held on September 19, 2001. The purpose of the meeting was to provide an update on the progress of the study since the public scoping and informational meeting in April 2001.

Exhibit 4.4 – *Summary of Interagency Coordination Meetings and Results during Preparation of the EIS*

Interagency Meeting	Discussion and Results
October 9, 2007	An update to the study was provided. The update consisted of changes in land use in the study area since 2003 and the current range of reasonable alternatives being considered and analyzed for obtaining the USACE Phase I approval. **Attended by:** USACE, USEPA, USFWS, FHWA, MDMR, MDEP, and MNAP
December 9, 2008	An update to the alternatives analysis was presented. The update consisted of results of the six "connectors" between the three westernmost alternatives. The agencies in attendance concurred in continuing to study: • 5A2E3K to 2B-2 connector 1 and/or 5A2E3K to 2B-2 connector 2 • 5A2E3K to 2B-2 connector 1 to 2B-2 to 5A2E3K to 2B-2 connector 2 and/or • 5A2E3K to 2B-2 via connector 1 to 2B-2 to 5A2E3K via connector 3 The first two Alternatives beginning with 5A were chosen and named 5A2E3K-1 and 5A2E3K-2, respectively. Alternative 5B2E3K was modified to avoid the Dirigo Drive Business Park and named Alternative 5B2E3K-1. **Attended by:** USACE, USFWS, NMFS, FHWA, and MDIFW
May 12, 2009	An update to the alternatives analysis and the resultant impacts was presented. The agencies in attendance concurred with dismissing Alternatives 1 and 3A-3EIK-1 from further consideration. The agencies requested a new alternative to be considered: 2B-2 plus improvements to Route 9 to East Eddington with a section on new alignment to the north of the intersection of Routes 9 and 46. Two other changes to alternatives were requested: (1) for the alternatives that begin with 5A, develop a partial cloverleaf interchange with Route 1A; and (2) for Alternative 3EIK-2, move a portion of the alternative closer to Clark Hill Road. **Attended by:** USACE, USEPA, USFWS, NMFS, FHWA, MDEP, and MDOC
January 12, 2010	The alternatives in the Family of 5s was presented and discussed. Alternative 2B-2 is proximate to the family of 5s and shares partial alignment with one of the 5s. In light of the EO on floodplains, the MaineDOT suggested that Alternative 5B2E3K-1 could be dismissed from further consideration because of its potential impacts to floodplains; according to the EPA, the potential impacts to floodplains are not a sufficient reason to dismiss an alternative from further consideration because lost flood storage area can be replaced. Alternative 5B2E3K-1 should be retained for further consideration because of part of its alignment is adjacent to a Bangor Hydro-Electric utility easement. The Bangor Hydro-electric utility easements are disturbed and the resources within them are of lesser value than those in undisturbed locations. The Bangor Hydro-Electric utility easements are used for recreation and portions of them beneath the electrical lines are periodically mowed. **Attended by:**
October 11, 2011	An update to the design criteria and conceptual design of the build alternatives retained for further consideration and the alternatives analysis and the resultant impacts was presented. The agencies concurred with identifying Alternative 2B-2 as the Preferred Alternative for satisfying the study purpose and need and satisfying the USACE's overall and basic project purpose with the least adverse impact to the environment. It was agreed that Route 9 has sufficient capacity and would operate at comparable speeds in the design year and no improvements to Route 9 would be considered reasonably foreseeable. The MaineDOT would update the list of opportunities for compensatory wetland mitigation and include it in the DEIS that is circulated for public review to allow an opportunity to comment on mitigation. **Attended by:** USACE, USEPA, USFWS, NMFS, FHWA, MDMR, MDEP, MDIFW
December 13, 2011	The administrative DEIS/Section 404 permit application supporting information was distributed to the Federal Cooperating Agencies for review and comment. The Federal Cooperating Agencies present provided a synopsis of their review of the administrative DEIS/Section 404 permit application supporting information so far. The USACE and the USFWS reported that their review of the administrative DEIS/Section 404 permit application supporting information was almost complete and no major gaps in material were found. Moving forward, the joint lead agencies – the FHWA and MaineDOT – discussed circulating the DEIS/Section 404 permit application supporting information and holding a joint public hearing with the USACE. **Attended by:** FHWA, USACE, USFWS, MDMR, MNAP

Exhibit 4.5 – *Summary of PAC Meetings during Preparation of the EA*

PAC Meeting	Discussion and Results
September 11, 2000	Introduced the study-team participants and reviewed the scope of studies to be conducted, NEPA process, role of the PAC, and scope of the public-involvement and agency-coordination programs.
October 2, 2000	Discussions consisted of the purpose and needs for the study and how they are used in decision making. Three needs were discussed: system linkage, traffic congestion, and safety.
November 15, 2000	Discussions consisted of the study needs, goals, and objectives; study-area boundary; and important natural and social features in the study area.
January 17, 2001	Discussions consisted of the study needs, development of the study purpose and needs statement, and further identification of natural and social features.
February 28, 2001	Results of the interagency coordination, crash data, and traffic forecasts were discussed. Performance measures for developing alternatives were developed.
May 2, 2001	Results of the informational and scoping meeting held in April 2001 were discussed. Other items discussed were travel-demand forecasting, natural and social features, and preliminary alternatives identification and development. To develop alternatives, the study team, with the PAC, created 1,000-foot-wide corridors for alternatives that satisfy the needs and purpose of the study with the least adverse environmental impacts. The corridors were drawn on the mapping of features and were subsequently refined and developed into 46 alternatives.
June 27, 2001	The range of reasonable alternatives, their overall feasibility, and preliminary impacts were presented. Results of the preliminary alternatives screening were explained. Changes were suggested to avoid and minimize impacts. Four additional alternatives were suggested.
July 18, 2001	The preliminary impacts for the additional alternatives developed were presented. A summary of traffic forecasting and analysis was presented.
October 23, 2001	Discussions consisted of results of the public and interagency coordination meetings in September and October 2001, a summary of regional transportation improvements and connected actions, traffic forecasting and analysis of alternatives, and a summary of the MaineDOT right-of-way and appraisal process. Alternative 1-4B was suggested for development and analysis.
December 19, 2001	Discussions consisted of impacts of Alternative 1-4B, range of alternatives, decision-making framework, and a summary of traffic forecasting and LOS analysis for the alternatives. The rationale for dismissing Alternatives 3E-2C and 3E-2C-2E was also discussed.
February 20, 2002	Comprehensive plans for the Bangor area, the city of Brewer, and the towns of Holden and Eddington were reviewed. Alternatives were discussed and identified for dismissal from further consideration.

Exhibit 4.5 – *Summary of PAC Meetings during Preparation of the EA (continued)*

PAC Meeting	Discussion and Results
May 22, 2002	Discussions consisted of results of the interagency coordination meeting in March 2002, the range of reasonable alternatives retained for continued study, and conceptual interchange and intersection designs. Nine new alternatives were developed.
July 24, 2002	Discussions consisted of a resolution from Holden, the alternatives retained for continued study, the reasons for dismissing alternatives, and the traffic operational characteristics of the alternatives. Eight new alternatives were suggested.
September 18, 2002	Discussions consisted of review of the alternatives retained for continued study and their potential impacts.
November 20, 2002	Discussions consisted of the range of reasonable alternatives, results of the interagency coordination meeting in October 2002, a summary of the MaineDOT right-of-way acquisition and relocation assistance programs, a summary of traffic forecasting, measures of effectiveness, and the rationale for dismissing a number of alternatives from further consideration. The town of Holden presented the results of its town meetings and an alternative that parallels existing utility corridors. Following this meeting, three alternatives – 2C-1, 2C-2, and 2C-1/2B-1 – were developed.
January 15, 2003	Discussions consisted of the results of two town of Holden and a town of Eddington sponsored meetings and specific facets of Alternatives 2C-1, 2C-2, and 2C-1/2B-1. Alternatives 2C-2 and 3A-3EIK-1 were dismissed from further consideration. Alternative 4B and suggestions for improving it were reviewed.
April 30, 2003	Discussions consisted of dismissing Alternatives 2B-1 and 3A-3EIK-1 from further consideration, modifications to Alternative 3EIK-2 to further reduce impacts, the results of the March 11, 2003, interagency meeting and the March 28, 2003, meeting with the USACE and the USEPA, and retaining the No-Build Alternative, Alternative 3EIK-2, and, potentially, Alternative 2C-1/2B-1 for further consideration.

Exhibit 4.6 – *Summary of PAC Meetings during Preparation of the EIS*

PAC Meeting	Discussion and Results
August 20, 2008	Introduced the study-team participants and reviewed the process for preparing an EIS and how the study would be performed, an overview of the PAC and its function and ground rules, results of the public and agency scoping meetings, the public-involvement and agency-coordination programs, and the schedule for the study moving forward.
November 19, 2008	The PAC process and meeting ground rules were reviewed, followed by a review and discussion of the town of Holden's October 2008 resolution, traffic data, conceptual design of the range of reasonable alternatives including the "connectors," ways to further avoid and minimize impacts, and short-term activities to be performed.
April 15, 2009	An update to the alternatives analysis, the resultant impacts, and next steps were presented. The PAC was informed that Alternatives 5B2E3K and Alternative 2B-2 with connectors to 5A2E3K were dismissed from further consideration in favor of retaining variations of these alternatives with less adverse impact to the environment. The PAC suggested that the MaineDOT and the FHWA further reduce the range of alternatives being considered to only those that the MaineDOT and the FHWA are most seriously considering and rename those alternatives using simpler names.

The study purpose and needs, range of alternatives considered for satisfying needs and purpose, preliminary alternatives screening, the range of alternatives retained for further consideration, and next steps were presented. The concerns and suggestions for improving the study were to look for more immediate ways to ease congestion on I-395 and Route 1A, give consideration to the No-Build Alternative, consider the cost effectiveness of alternatives as part of the evaluation, seek ways to minimize impacts to individual properties, enforce the no-passing regulation on Route 46, reinstitute freight and passenger rail on the former Calais branch, consider wildlife mortality in the evaluation of alternatives, and consider actions to improve the safety on Route 46. There were no key resources or issues of primary concern identified.

4.3.3 Website

A study-specific website (www.i395-rt9-study.com or the MaineDOT website: www.maine.gov/mdot/major-planning-studies/major-planning-stds.php) was developed early in the study and updated frequently. The website consists of a home page, a study overview, frequently asked questions, a "Stay Informed" page, resources (i.e., maps and publications), a glossary, and a links page. Shortly after each meeting, materials in support of the public-involvement program, including meeting agendas, handouts, maps, presentations, displays, and minutes, were placed on the website on the "Stay Informed" page.

4.3.4 Public Information

In support of the public-involvement program, circulation of public information was an important part of the study. Public information was released throughout the study in the forms of newspaper articles, press releases, newsletters, and posters on display in city and town offices.

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Federal Highway Administration

Mark Hasselmann

Qualifications:

- B.S. Environmental Science, Eastern Connecticut State University, 1984
- 20 years experience in procedural and technical guidance to assure compliance of the environmental analysis with federal requirements

Responsibilities:

Procedural guidance and document review

Cheryl Martin

Qualifications:

- B.S. Civil Engineering, University of Maine, 1985
- 26 years experience in transportation project development, including 15 years in procedural and technical guidance to assure compliance of the environmental analysis with federal requirements

Responsibilities:

Procedural guidance and document review

Peter Kleskovic, PE

Qualifications:

- B.S. Civil Engineering, Newark College of Engineering, 1974
- M.S. Civil Engineering, New Jersey Institute of Technology, 1977
- 30 years experience in transportation project development

Responsibilities:

Procedural guidance and document review

Gerald Varney, PE

Qualifications:

- B.S. Civil Engineering, West Virginia University, 1993
- M.S. Civil Engineering, West Virginia University, 1995
- 11 years experience in highway design and engineering

Responsibilities:

Procedural guidance and document review

Maine Department of Transportation

Russell D. Charette P.E.

Qualifications:

- A.S. Civil Engineering Technology, University of Maine, 1974
- B.S. Civil Engineering, University of Maine, 1977
- M.B.A. University Of Southern Maine, 1987
- 34 year's experience in multi-modal transportation planning, design and development.

Responsibilities:

Project Management

Richard Bostwick, PWS

Qualifications:

- B.Sc. Biology, Mount Allison University, 1978
- 28 years experience identifying natural resources and assessing impacts from transportation projects

Responsibilities:

Natural environment analysis

Eric Ham

Qualifications:

- University of Maine at Orono, BS in Biology, 2006
- 4 years of experience with environmental field assessments

Responsibilities:

Endangered Species Act Review and Compliance

Edward W. Hanscom

Qualifications:

- B.S. Civil Engineering, University of Maine, 1977
- M.S. Civil Engineering, Purdue University, 1979
- 32 year's experience in transportation planning and traffic engineering

Responsibilities:

Transportation review

Nathan Howard

Qualifications:

- Bachelor of Fine Arts (BFA) in Creative Writing, Environmental Planning, and Geography, University of Maine at Farmington, 2000
- Master of Public Administration (MPA), University of Maine, 2008
- 11 years experience in transportation planning and air quality and noise analysis

Responsibilities:

Air and noise analysis review

Judith Lindsey

Qualifications:

- B.S. Environmental Planning, Unity College, 1979
- 27 years experience in compliance with NEPA regulations, policies, and documentation requirements; community impact assessment; and social impact assessment methodologies and analysis

Responsibilities:

Study manager document review

Michael Morgan

Qualifications:

- AS Civil Engineering, University of Maine, Orono, Maine,1970
- 42 years of experience in transportation analysis

Responsibilities:

Traffic analysis and forecasting

Dan Tierny

Qualifications:

- He has 8 years experience in natural resource review and GIS analysis.
- BS in Wildlife Ecology, University of Maine at Orono, 1999
- MS in Biodiversity, Conservation, and Policy, State University of New York at Albany, 2001.

Responsibilities:

Natural resource (vernal pools , stream and wetland review) survey and identification.

Cooperating Agencies

U.S. Environmental Protection Agency

Mark Kern

Qualifications:

- B. A. 1975 Philosophy Rider University
- M.S. 1984 Environmental Science Yale University
- At EPA for 25 years. Over 20 years in the wetlands program.

Responsibilities:

Wetlands and wildlife review.

U.S. Fish & Wildlife Service

Wende S. Mahaney

Qualifications:

- M.S. Wildlife Science, New Mexico State University, 1987
- 23 years experience in wildlife science

Responsibilities:

Endangered Species Act, NEPA reviews, CWA permitting

U.S. Army Corps of Engineers

Jay Clement

Qualifications:

- B.A. Zoology, The University of Maine, 1982
- 28 years experience in Corps permitting and enforcement

Responsibilities:

Administering Corps permit program within the State of Maine, Senior Project Manager for Corps Maine Project Office

Maine Historic Preservation Commission

Leon Crammer

Qualifications:

- M.A. Historic Archaeology, The University of Maine, 1988
- 20 years experience in archeological resources

Responsibilities:

Archaeological resources

Michael Johnson

Qualifications:

-
-

Responsibilities:

Historic resources

John P. Mosher

Qualifications:

- MA New England Studies (historic archaeology focus), University of Southern Maine 1991
- 12 years experience with Maine Historic Preservation as archaeologist

Responsibilities:

Archaeological resources

Arthur Spiess

Qualifications:

- PhD in Anthropology (archaeology focus), Harvard University, 1978.
- 33 years as SHPO archaeologist, Maine Historic Preservation Commission.

Responsibilities:

Archaeological resources

Gannett Fleming, Inc.

William M. Plumpton, CEP

Qualifications:

- B.S. Environmental Resource Management, The Pennsylvania State University, 1984
- 25 years experience in environmental impact assessment and NEPA compliance

Responsibilities:

Study manager

Scott W. Duncanson, AICP

Qualifications:

- B.A. Political Science, University of New Hampshire, 1984
- M.U.A. Urban Affairs/Planning, Boston University, 1991
- 23 years experience in environmental planning, land use and socioeconomics, transportation planning, and NEPA compliance

Responsibilities:

Social environmental studies

Katherine E. Sharpe

Qualifications:

- B.A. English, Minor in Environmental Economics, Minor in Business, The Pennsylvania State University, 1999
- M.P.S. Environmental Management, Cornell University, 2003
- 9 years experience in environmental planning, socioeconomic analysis, and NEPA compliance

Responsibilities:

Social environmental studies

Craig Shirk, AICP

Qualifications:

- B.A. Geoenvironmental Studies, Shippensburg University, 1989
- M.S. Environmental Science, State University of New York, College of Environmental Science and Forestry, 1994
- 17 years experience in environmental planning, transportation planning, and NEPA compliance

Responsibilities:

Natural environment studies

Danielle Stemrich

Qualifications:

- B.A. Environmental Studies, Kings College, 2006
- M.S. Geoenvironmental Studies, Shippensburg University, 2008
- 2 years experience in NEPA compliance

Responsibilities:

Document preparation

Harvey S. Knauer, PE, PLS

Qualifications:

- B.S. Civil Engineering, University of Miami, 1967
- M.C.E. Villanova University, 1974
- 39 years engineering and environmental experience

Responsibilities:

Air quality and noise

Ahmed El-Aassar, EI

Qualifications:

- B.Sc., Civil Engineering, Cairo University, Egypt, 1995
- M.Sc., Water Resources Management, The University of Birmingham, United Kingdom, 1997
- M.Sc., Environmental Engineering, The University of Central Florida, 2002
- Ph.D., Environmental Engineering (noise and air pollution related), The University of Central Florida, 2006
- 13 years experience in noise and air quality analysis

Responsibilities:

Air quality and noise

Daniel W. Farber

Qualifications:

- A.S. Electrical and Electronics Technology, The Pennsylvania State University, 1969
- 33 years experience in noise analysis

Responsibilities:

Noise

Debra L. Plumpton, PG

Qualifications:

- B.S. Geology, Slippery Rock State College, 1978
- M.S. Geological Engineering, University of Missouri-Rolla, 1980
- 28 years experience in geology and groundwater analysis

Responsibilities:

Geology and groundwater

David A. Hamlet, PE

Qualifications:

- B.S. Civil Engineering, Rensselaer Polytechnic Institute, 1992
- M.E. Engineering Science, The Pennsylvania State University, 1995
- 16 years experience in preliminary and final highway design and construction services

Responsibilities:

Preliminary design

Nathaniel S. Kirchner, PE

Qualifications:

- B.S. Civil Engineering, The Pennsylvania State University, 1999
- Open Plan Basics – Project Management, Productivity Point, 2001
- 10 years experience in preliminary and final highway design and construction services

Responsibilities:

Preliminary design

Aaron K. Holt

Qualifications:

- A.S. Specialized Technology, The Art Institute of Philadelphia, 2002
- 10 years experience in graphic design

Responsibilities:

Graphic design and document layout

A.K. Environmental

Patricia Riley

Qualifications:

- B.S. Biology/Environmental Science, East Stroudsburg University, 1983
- M.S. Ecology, Rutgers University, 1986
- 24 years experience with environmental studies and permits

Responsibilities:

Right-of-way impact analysis

Doug Avelino

Qualifications:

- A.A.S. Forest Science, Pennsylvania State University, 2006
- 6 years experience with environmental studies

Responsibilities:

Right-of-way data analysis

Julie Cormier

Qualifications:

- B.F.A., Printmaking, University of Iowa, 1977
- Associate of Science, Health Information Technology, University of Maine, 1992
- 7 years experience with real estate research

Responsibilities:

Right-of-way field data collection

TechEdit Services

Constance G. Burt

Qualifications:

- B.S. Social Work, Florida State University, 1972
- 30 years experience as a technical editor

Responsibilities:

Technical editing

Chapter 6
Distribution List

This EIS was distributed to federal, state, and local agencies with jurisdiction by law or special expertise and to agencies, tribes, and local entities that may be interested in the study.

Elected Officials

U.S. Senator Susan Collins
68 Sewall Street, Room 507
Augusta, ME 04330

U.S. Senator Olympia Snowe
Edmund S. Muskie Federal Building
40 Western Avenue, Room 408C
Augusta, ME 04330

U.S. Representative Chellie Pingree
57 Exchange Street
Suite 302
Portland, ME 04101

U.S. Representative Michael Michaud
25 Water Street, Suite 205
Bangor, ME 04401

State Senator Richard W. Rosen
3 State House Station
Augusta, ME 04333

State Representative David D. Johnson
107 Rooks Road
Eddington, ME 04428

U.S. Federal Government

Federal Energy Regulatory Commission
Environmental Evaluation Branch
825 North Capital Street, Room 7102
Washington, DC 20426
Federal Highway Administration

Attn: Corrie Veenstra, HEPE
1200 New Jersey Avenue, SE Room E72-214
Washington, DC 20590

Federal Highway Administration
Mark Hasselmann
Edmund S. Muskie Building
40 Western Avenue
Augusta, ME 04330

Federal Highway Administration
Cheryl Martin
Edmund S. Muskie Building
40 Western Avenue
Augusta, ME 04330

Federal Emergency Management Agency
Region 1 Office
99 High Street, 6th Floor
Boston, MA 02110

Federal Aviation Administration
Director, New England Region
12 New England Executive Park
Burlington, MA 01803

Federal Railroad Administration
Region 1 Office
55 Broadway, Room 1077
Cambridge, MA 02142

Federal Transit Administration
Region 1 Office Transportation Systems Center
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093

NOAA Fisheries Maine Field Station
Attn: Jeff Murphy
17 Godfrey Drive, Suite 1
Orono, ME 04473

National Marine Fisheries Service
Northeast Regional Office
Attn: Mary Colligan
One Blackburn Drive
Gloucester, MA 01930

U.S. Army Corps of Engineers
Environmental Analysis Branch
New England Division
696 Virginia Road
Concord, MA 01742-2751

U.S. Army Corps of Engineers
Maine Project Office
Attn: Jay Clement
675 Western Avenue
Manchester, ME 04351

U.S. Coast Guard
1st Coast Guard District
Attn: Gary Kassof
Battery Park Building
1 South Street
New York, NY 10004-1466

U.S. Department of Housing and Urban Development
Margaret Chase Smith Federal Building
202 Harlow Street, Suite 101
Bangor, ME 04401-4919

U.S. Department of the Interior
Attn: Willie R. Taylor
Office of Environmental Policy & Compliance
MS2340 M1B
1849 C Street, NW
Washington, DC 20240

U.S. Environmental Protection Agency
Office of Federal Activities
EIS Filing Section
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington, DC 20004

U.S. Environmental Protection Agency
New England Region 1
Attn: Tim Timmerman
5 Post Office Square, Suite 100
Mail Code ORA17-1
Boston, MA 02109-3912

U.S. Fish & Wildlife Service
Maine Field Office, Ecological Services
Attn: Wende Mahaney
17 Godfrey Drive, Suite 2
Orono, ME 04473

U.S. Department of Agriculture
Natural Resources Conservation Service
Penobscot County Office
1423 Broadway
Bangor, ME 04401

U.S. Geological Survey
Maine District
Attn: Robert Dudley
196 Whitten Road
Augusta, ME 04330

Tribal Government

Penobscot Indian Nation
Attn: Chief Kirk Francis
12 Wabanaki Way
Indian Island, ME 04468

Houlton Band of Maliseet Indians
Attn: Chief Brenda Commander
88 Bell Road
Littleton, ME 04730

Aroostook Band of Micmacs
Attn: Chief William W. Phillips
7 Northern Road
Presque Isle, ME 04769

Passamaquoddy Tribe of Indians
William Nicholas, Tribal Governor
Passamaquoddy Tribe Indian Township
P.O. Box 301
Princeton, ME 04668

Richard Doyle, Tribal Governor
Passamaquoddy Tribe Pleasant Point
P.O. Box 343
Perry, Maine 04667

Maine State Government

Maine Historic Preservation Commission
Attn: Earle Shettleworth
65 State House Station
Augusta, ME 04333-0065

Maine Department of Conservation
Attn: Eliza Townsend, Acting Commissioner
East Side Campus, 18 Elkins Lane
Augusta, ME 04330

Maine Bureau of Parks and Lands
Attn: Will Harris, Director
22 State House Station
Augusta, ME 04333-0022

Maine Forest Service
Attn: R. Doug Denico, Director
22 State House Station
Augusta, ME 04333-0022

Maine Geological Survey
Attn: Robert Marvinney, Director
22 State House Station
Augusta, ME 04333-0022

Maine Department of Agriculture
Attn: Seth Bradstreet III, Commissioner
28 State House Station/Deering Building – AMHI Campus
Augusta, ME 04333-0028

Maine State Planning Office
Attn: Richard M. Swanson, CMA, Director
38 State House Station
Augusta, ME 04333-0038

Maine Department of Inland Fisheries and Wildlife
Attn: Steve Timpano
41 State House Station
Augusta, ME 04333-0041

Maine Department of Economic and Community Development
Attn: John Richardson, Commissioner
59 State House Station
Augusta, ME 04333-0059

Maine Natural Areas Program
Attn: Molly Docherty, Director
93 State House Station
Augusta, ME 04333-0093

Maine Department of Marine Resources
Attn: Norman R. Dube, Fisheries Scientist
Bureau of Sea Run Fisheries and Habitat
650 State Street
Bangor, ME 04401

Maine Department of Environmental Protection
Bureau of Land and Water Quality
Attn: Andy Fiske
17 State House Station
Augusta, ME 04333-0017

Maine Department of Inland Fisheries and Wildlife
Gregory Burr, Regional Biologist
P.O. Box 220
Jonesboro, ME 04648

Maine Department of Inland Fisheries and Wildlife
James Hall, Regional Biologist
P.O. Box 220
Jonesboro, ME 04648

Maine Department of Inland Fisheries and Wildlife
Attn: Chandler E. Woodcock, Commissioner
41 State House Station
Augusta, ME 04333-0041

Local Government

Mayor Arthur Verow
City of Brewer
80 North Main Street
Brewer, ME 04412
Stephen Bost, City Manager
City of Brewer
80 North Main Street
Brewer, ME 04412-2010

Linda Johns, City Planner
City of Brewer
80 North Main Street
Brewer, ME 04412-2010

John Bryant, Chairman Town Council
Town of Holden
570 Main Road
Holden, ME 04429

Robert Harvey, Councilor
Town of Holden
570 Main Road
Holden, ME 04429

Stephen Condon, Town Planner
Town of Holden
570 Main Road
Holden, ME 04429

Russell Smith, Town Manager
Town of Eddington
906 Main Road
Eddington, ME 04428

Tom Vanchieri, Eddington Planning Board Chair
906 Main Road
Eddington, ME 04428
Joan Brooks, Eddington Selectman
906 Main Road
Eddington, ME 04428

Audrey Fox, Clifton Town Administrator
135 Airline Road
Clifton, ME 04425

Alfred Jellison, Selectman
2073 Main Road, Suite A
Dedham, ME 04429

Bangor Area Comprehensive Transportation System
Attn: Rob Kenerson, Director
40 Harlow Street
Bangor, ME 04401

Other Interested Parties

Alan Bromley
46 Fisher Road
Holden, ME 04412

Rodney Buswell Sr.
Peavey Manufacturing
P.O. Box 129
Eddington, ME 04428

Manley DeBeck Jr.
25 Goupee Street
Brewer, ME 04412

Charles Plummer
66 Monument Drive
Eddington, ME 04428

Bangor Engineering Department
Attn: City Engineer
City Hall
73 Harlow Street
Bangor, ME 04401

Rick Bronson, Fire Chief
P.O. Box 788
Brewer, ME 04412

Rodney Lane
The Lane Construction Corporation
P. O. Box 103
Bangor, ME 04402-0103

Town Manager
P.O. Drawer X
Bucksport, ME 04416

Libraries

Maine State Library
Attn: Sarah Stanton
230 State Street
Augusta, ME 04330

Brewer Public Library
Attn: Donna Rasche
100 South Main Road
Brewer, ME 04412

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BREWER EDDINGTON
8483.20

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF
Regulatory Division
CENAE-R-51

OCT 12 2001

David Gardner
Office of Environmental Services
Maine Dept. of Transportation
16 State House Station
Augusta, Maine 04333

Dear Mr. Gardner:

This is in reference to your proposal develop improved vehicular access between Route 9 and Route 1A at Holden, Maine.

Based on presentations at several monthly interagency meetings with your staff and Federal and State regulatory and resource agencies, we have determined that the basic project purpose of the project is to provide for the safe and efficient flow of east-west traffic and shipment of goods from Brewer (I-395) to Eddington (Route 9), Maine for current and projected traffic volumes. This will be used as the "basic project purpose" in determining compliance with the 404(b)(1) guidelines.

If you have any questions concerning this matter, please contact Jay Clement at 207-623-8367 at our Manchester, Maine Project Office.

Sincerely,

Christine Godfrey

Christine A. Godfrey
Chief, Regulatory Division

Copies Furnished:
Stephen Silva – EPA
Wende Mahaney – USFWS
Monica Daniels – NMFS
James Linker – FHWA
Stacie Beyer – Maine DEP

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Public Advisory Committee Members

Name	Telephone Number	Email Address
Alan Bromley *Holden*	947-4511	*albromley@roadrunner.com*
Joan Brooks *Eddington*	843-6389	*NA*
John Bryant *Holden*	827-3700 ext. 113	*john.bryant@amforem.biz*
Rodney Buswell, Sr. *Eddington*	843-7861	*rodneysr_peaveymfg@ roadrunner.com*
John Butts *Holden*	843-5151	*john@holdenmaine.com*
Linda Johns, City Planner *Brewer*	989-7790	*ljohns@brewerme.org*
Rob Kenerson *BACTS*	942-6389	*rkenerson@emdc.org*
Rodney Lane, Lane Construction	945-0873	*RPLane@laneconstruct.com*
Charles Plummer *Eddington*	989-5258	*NA*
Roger Raymond, Bucksport Town Manager *Bucksport*	469-7368	*bucksport@acadia.net*

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Appendix C

Alternatives Considered and Dismissed from Further Study

Initial Development

The first step in the alternatives development process was to establish the study purpose and needs (i.e., the transportation problems warranting identification of reasonable alternatives). Concurrently, the MaineDOT and the FHWA compiled an inventory of the natural, socioeconomic, and cultural resources of the study area (MaineDOT, 2003). Using this information, the MaineDOT and the FHWA, with assistance from the PAC and the public, identified a wide range of potential 1,000-foot-wide corridors for alternatives that appeared to satisfy the purpose and needs of the study and were practicable while avoiding and minimizing impacts to people and resources. The logical termini of the build alternatives were identified and defined to consist of (1) I-395 near Route 1A and (2) the portion of Route 9 in the study area.

In May 2001, the MaineDOT and the FHWA, with public and PAC assistance, identified potential corridors for alternatives using low-level, high-resolution aerial photography and mapping of the land use, social features, and natural resources of the study area.

> Details of the alternatives identification, development, analysis, and screening process are available in the MaineDOT's *Transportation Improvement Strategies and Alternatives Analysis Technical Memorandum and U.S. Army Corps of Engineers Highway Methodology Phase I Submission,* October 2003. This publication is available on the MaineDOT website (www.maine.gov/mdot/major-planning-studies/major-planning-stds.php) and the study website on the "Stay Informed" page (www.i395-rt9-study.com).

The MaineDOT and the FHWA compiled and refined the suggested corridors into 45 alternatives. These initial 45 alternatives fit into the following four broad "families":

- **Family 1: The Upgrade Alternatives.** Widening and other improvements to Route 1A (from I-395 to Route 46) and Route 46 (from Route 1A to Route 9) approximately 10 miles long. Although one upgrade alternative was initially

The preliminary alternatives analysis and screening were performed in accordance with the USACE, New England Division's "The Highway Methodology Workbook" to identify and document potential impacts generated by construction of those alternatives (USACE, 1995). Potential impacts were based on the limits of cut and fill necessary to construct, operate, and maintain a four-lane highway with two travel lanes in each direction and a divided median within an approximate 250-foot-wide right-of-way. The preliminary alternatives analysis quantified impacts to the following:

- wetlands
- hydric soils (for the purposes of this analysis, hydric soils were assumed to be wetlands)
- surface waters and water crossings with the potential to support anadromous fish (i.e., saltwater fish that return to freshwater streams and rivers to spawn)
- wildlife habitat
- notable wildlife habitat (i.e., threatened and endangered species habitat, deer-wintering areas, Maine Natural Areas Program data, inland waterfowl and wading-bird habitat)
- surface impacts over significant groundwater aquifers
- surface impacts over high-yield aquifers
- floodplains
- community wells
- active farmland, prime farmland soils, and soils of statewide importance
- areas of potential hazardous waste
- commercial and residential areas
- other land (e.g., transportation, recreation, education)
- residential and commercial displacements
- residences within 500 and 1,000 feet
- archaeological areas
- historic resources listed on or potentially eligible for listing on the NRHP

considered, six upgrade and five partial-upgrade alternatives ultimately were considered.

- **Family 2: The Northern Alternatives.** Alternatives that began at the I-395/Route 1A interchange and generally proceeded in a northerly direction to connect with Route 9. These alternatives were five to 10 miles in length, depending on the distance on Route 9 used as part of the alternative. Twelve alternatives in this family were ultimately studied.
- **Family 3: The Central Alternatives.** Alternatives that began at or near the I-395/Route 1A interchange and generally proceeded north and east through the study area to Route 9 east of Route 46. These alternatives were seven to 11 miles in length, depending on the distance on Route 9 used as part of the alternative. Due to natural resources and an attempt to minimize the impact to them, these "central" alternatives merged in a common area in the center of the study area north of Mann Hill Road. The MaineDOT created a "match line" at that point, with the central alternatives branching to the east and west of it, creating components 3A through 3K; the components were then combined to form alternatives. The six components on the west side of the match line (i.e., 3A through 3F) matched the four components on the east side (i.e., 3G through 3J), which in turn connected to Route 9. One component, 3K, extended the central alternatives bypassing East Eddington to the north and connecting to Route 9 east of Route 46. Using

all possible combinations of the six western components, the four eastern components, and component 3K, 36 possible central alternatives were initially created. Five other alternatives (for a total of 41) in this family were ultimately developed by modifying some of the initial 36 alternatives.

- **Family 4: The Southern Alternatives.** Alternatives that began near the I-395/Route 1A interchange and that were south of Route 1A and east of Route 46. These alternatives paralleled Routes 1A and 46 and intersected Route 9 in East Eddington. These alternatives were approximately 11 miles in length. Four alternatives were identified and considered: 4A, 4B, 4C, and 4D.

The MaineDOT conceptually designed and refined alternatives within the 1,000-foot-wide corridors.

To reduce the number of alternatives identified and conceptually designed to a reasonable range, the MaineDOT and the FHWA sought to identify one alternative from each family to be studied in detail. The decision of whether to dismiss or retain alternatives for further analysis was based on their ability to satisfy the study purpose and needs, results of the preliminary impacts analysis, and consideration of overall engineering feasibility. If more than one alternative in

> The engineering feasibility of each alternative was considered as part of the preliminary alternatives analysis. In addition to the ability to satisfy the design criteria, the following were quantified for each alternative:
>
> - length
> - bridges (the number and total length of bridges)
> - amount of cut, fill, and total earthwork required (in millions of cubic yards)
> - deepest cut (in feet)
> - deepest fill (in feet)
> - number of roadway and railway crossings
> - average grade (in percent)
> - average curvature (in degrees)

each family fully satisfied the study purpose and needs and was practicable, the alternative was selected based on potential impacts to the features and resources Alternatives that were more environmentally damaging than others were dismissed from further consideration. Alternatives that were the least environmentally damaging were retained for further consideration.

In June 2001, the MaineDOT and the FHWA, using results of the preliminary impacts analysis, dismissed from further consideration 37 of the initial 45 alternatives. The MaineDOT and the FHWA retained the alternative from each family that was the least environmentally damaging to features and resources. In Family 3, the central alternatives, no single alternative clearly emerged as having the least impacts; therefore, the MaineDOT and the FHWA chose four that were least environmentally damaging relative to the other central alternatives.

The MaineDOT and the FHWA presented the results of the initial alternatives development and screening to attendees at their interagency coordination meetings on six occasions (section 4.1.2).

The following eight alternatives were retained after the initial screening (exhibit 2.2):

- No-Build Alternative
- Alternative 1-1
- Alternative 2B
- Alternative 3AI
- Alternative 3AIK
- Alternative 3EI
- Alternative 3EIK
- Alternative 4B

Continued Development and Screening

Following the initial screening from June 2001 through September 2003, members of the PAC, the city of Brewer, the towns of Holden and Eddington, and the public suggested potential additional alternatives and modifications of other alternatives. The MaineDOT and the FHWA continued to develop and screen the suggested alternatives along with the eight alternatives retained for further consideration. They presented screening results to the PAC and the public at 13 PAC meetings, one public meeting, and meetings with representatives of the city of Brewer and the towns of Holden and Eddington (section 4.3.1).

In June 2004, alternatives were identified and developed parallel to the utility easements with the Bangor Hydro-Electric Company transmission lines. This family of alternatives, which start with the number 5, began at or near the I-395/Route 1A interchange and largely paralleled the electric transmission lines in the city of Brewer and the towns of Holden and Eddington. This family of alternatives consisted of four alternatives approximately 11 miles long. These alternatives were believed to have fewer impacts to wetlands than Family 3 alternatives because the land use had already been disturbed through the construction of power lines.

The process of identifying, developing, and screening alternatives or modifying alternatives continued. In January 2008, the following seven alternatives were preliminarily identified for further consideration and development and detailed study (exhibit 2.3):

- No-Build Alternative
- Alternative 1-1
- Alternative 2B-2
- Alternative 3A-3EIK-1
- Alternative 3EIK-2
- Alternative 5A2E3K
- Alternative 5B2E3K

In 2008, the MaineDOT and the FHWA updated the inventory of natural, socioeconomic, and cultural resources in the study area (MaineDOT, 2008); revised the conceptual designs of the build alternatives; and performed additional scoping with the public and with federal and state regulatory and resource agencies (Chapter 4).

In a continuing effort to avoid and minimize adverse impacts, the conceptual design of the build alternatives retained at the conclusion of the preliminary development and screening process was reconsidered in light of the updated inventory of natural, socioeconomic, and cultural resources in the study area. Refinements to the locations and conceptual design of the build alternatives were made using information from the updated inventory of features.

Additional scoping with the public and with federal and state regulatory and resource agencies was performed in June 2008. Six "connectors" (i.e., a highway connecting to another highway) were identified, developed, and analyzed between the three westernmost build alternatives retained at the end of the preliminary development and screening process, resulting in three additional alternatives to be considered in detail.

Analysis of Connectors

In a continued effort to avoid and minimize adverse impacts in December 2008, six connectors between the three westernmost build alternatives were identified, conceptually designed, and analyzed at the beginning of the phase of considering alternatives in detail (exhibit 2.4). One connector for Alternative 5B2E3K was identified, conceptually designed, and analyzed. Five connectors between Alternatives 2B-2 and 5A2E3K were identified, conceptually designed, and analyzed, resulting in 12 additional alternatives that were considered. The connectors and the resultant alternatives were conceptually designed and analyzed to the same level of detail as the other build alternatives (exhibit 2.5).

For Alternative 5B2E3K, one connector was considered. It used the existing I-395 interchange with Route 1A and replaced the section of Alternative 5B2E3K between I-395 and Eastern Avenue. This connector would reduce impacts to wetlands and result in fewer displacements of commercial businesses and residences. After considering this connector, Alternative 5B2E3K was modified to create Alternative 5B2E3K-1. Alternative 5B2E3K was dismissed from further consideration because it was substantially more environmentally damaging to wetlands and more displacements of commercial businesses and residences than Alternative 5B2E3K-1.

Five connectors between Alternatives 2B-2 and 5A2E3K were identified and developed, resulting in 12 additional alternatives for consideration. Six of those alternatives resulted from connecting Alternative 2B-2 to Alternative 5A2E3K near I-395; the six others resulted from connecting Alternative 5A2E3K to Alternative 2B-2 near Route 9. The alternatives that resulted from connecting Alternative 2B-2 to Alternative 5A2E3K were more environmentally damaging to wetlands and more residential displacements than Alternatives 2B-2 and 5A2E3K and were dismissed from further consideration.

Of the six alternatives that resulted from connecting Alternative 5A2E3K to Alternative 2B-2, two were retained for further consideration because they resulted in comparable or less impact to wetlands and fewer residential displacements than Alternatives 2B-2 and 5A2E3K. These alternatives were named Alternative 5A2B-2 and Alternative 5A2E3K-2.

In May 2009, a meeting took place with the federal and state regulatory and resource agencies to review the range of alternatives being considered. It was agreed that Alternatives 1-1 and 3A-3EIK-1 should be dismissed from further consideration. Alternative 1-1 was dismissed from further consideration because it would not further the study's purpose related to the NHS or satisfy the system linkage need because it would not provide a high-speed, controlled-access connection between I-395 and Route 9. Alternative 1-1 would satisfy the USACE's basic purpose statement. Alternative 3A-3EIK-1 was dismissed from further consideration because it was more environmentally damaging than Alternative 3EIK-2.

Evaluation of Route 9

In December 2009, the system-linkage need and Route 9 were reexamined in greater detail. Specifically, Route 9 was reexamined to understand more fully if it could reasonably accommodate the future traffic volumes that were foreseeable within the next 20 years. The following factors were considered in examining Route 9 in greater detail:

- study purpose and the need for improved regional system linkage
- the geometry and capacity of Route 9
- existing and future traffic congestion (measured in terms of operating speeds and the volume of existing and future traffic compared to the capacity of the highway) and safety
- expectations and concerns of community leaders and the public
- origins and destinations of motorists
- areas of congestion
- system continuity

- land use and community features
- growth trends
- natural resources

After careful consideration of those factors, the MaineDOT determined that Route 9, with the exception of the sections approaching the intersection of Routes 9 and 46 where the posted speed limit is lower than other portions of Route 9, could reasonably accommodate future traffic volumes for the next 20 years without additional improvements beyond the existing right-of-way (exhibit 2.6).

Two alternatives – 2B-2 and 5A2B-2 – connect to Route 9 near the Eddington School approximately 4.2 miles to the west of Route 46. When these two alternatives were considered with a bypass of the intersection of Routes 9 and 46 similar to the other build alternatives, two additional build alternatives were created: 2B-2-K and 5A2B-2-K.

Continued Coordination with the Federal Cooperating Agencies

In September and December 2010, meetings with the federal cooperating agencies took place, the purpose of which was to solidify the range of alternatives to be considered in detail.

The MaineDOT continued its analysis of the Route 9/46 intersection and concluded that 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. For these reasons, the MaineDOT and the FHWA dismissed alternatives that bypassed the intersection of Route 9/46 to the north in favor of further consideration of alternatives that use Route 9.

The MaineDOT, the FHWA, and the federal cooperating agencies further considered the remaining build alternatives and concluded that although available and practicable, Alternatives 3EIK-2, 5A2E3K, 5A2E3K-2, and 5B2E3k-1 were more environmentally damaging than other build alternatives. Alternative 5B2B-2 was created.

Alternatives Retained for Further Consideration and Detailed Study

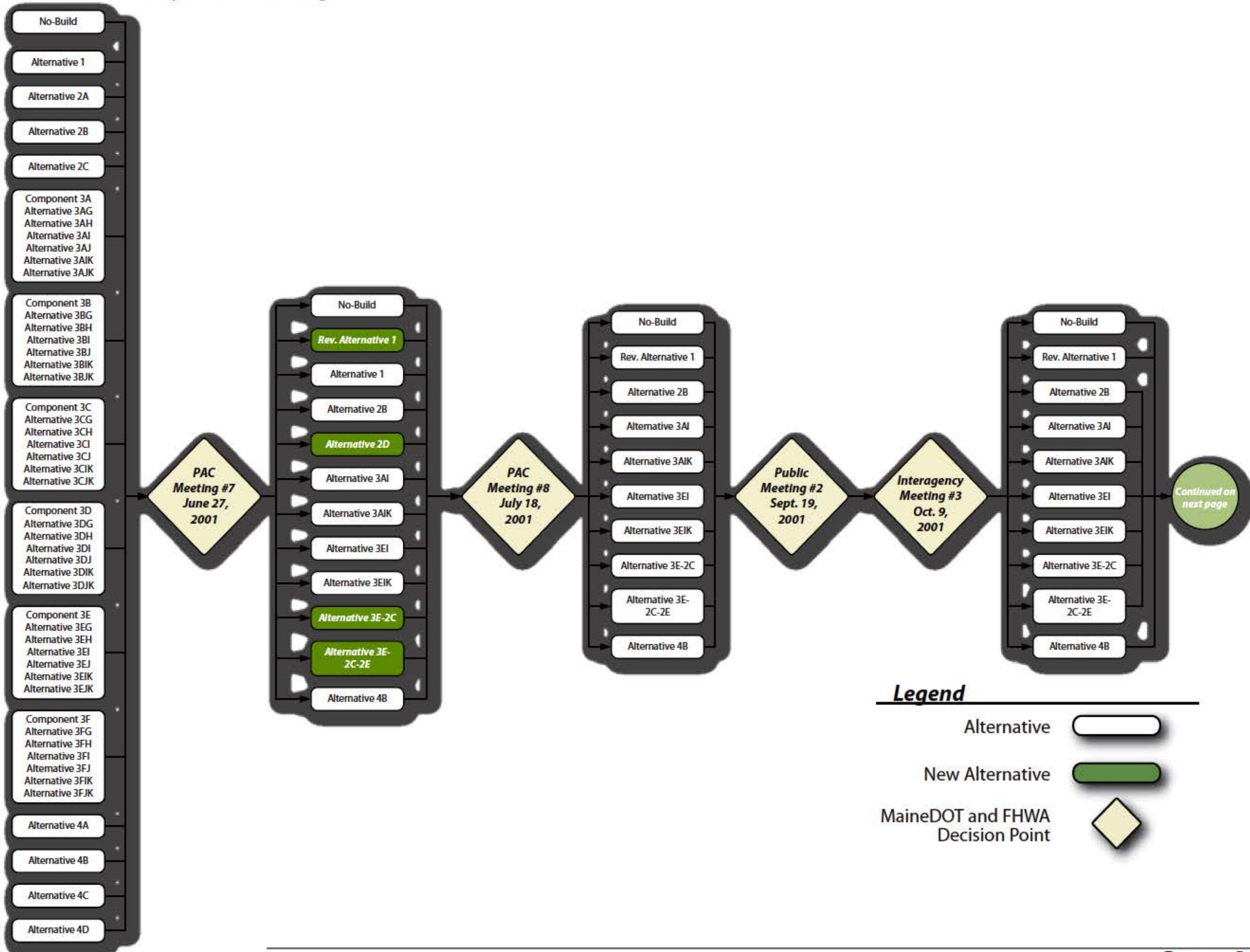
The following four alternatives were retained for further consideration and detailed study:

- No-Build Alternative
- Alternative 2B-2

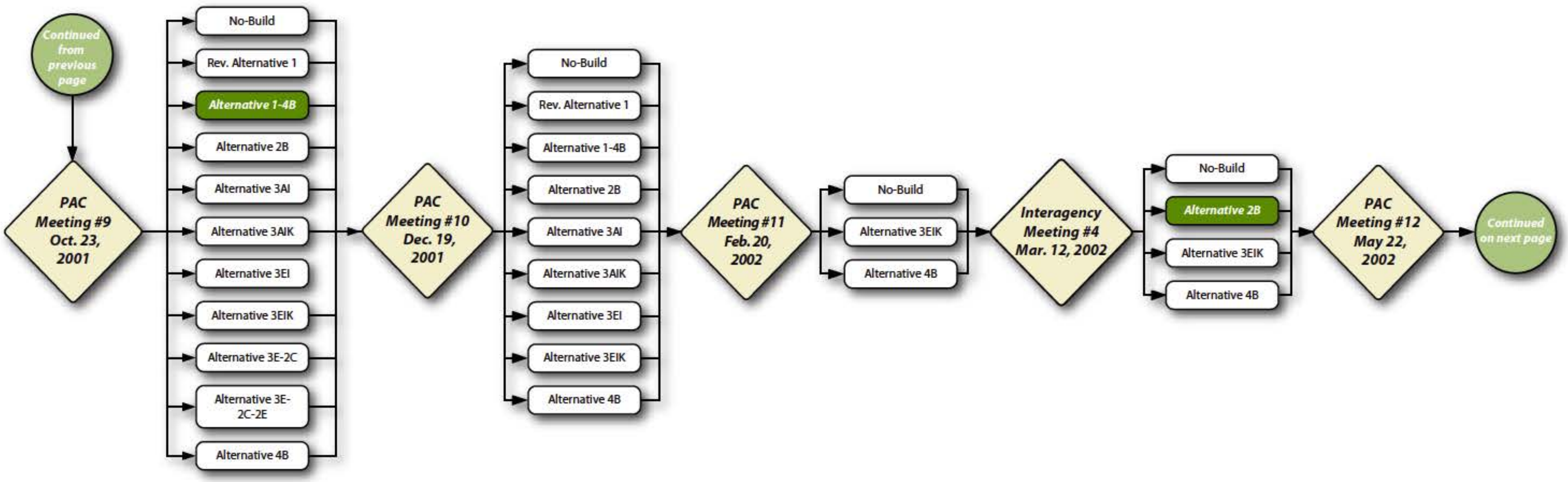
- Alternative 5A2B-2
- Alternative 5B2B-2

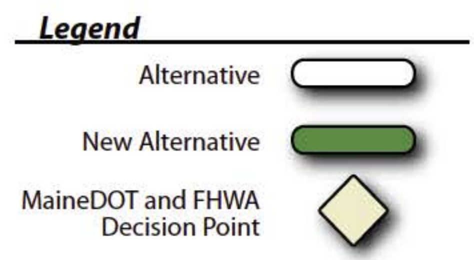
The cooperating agencies concurred with this range of alternatives to be retained for detailed analysis.

Alternatives Analysis Flow Diagram

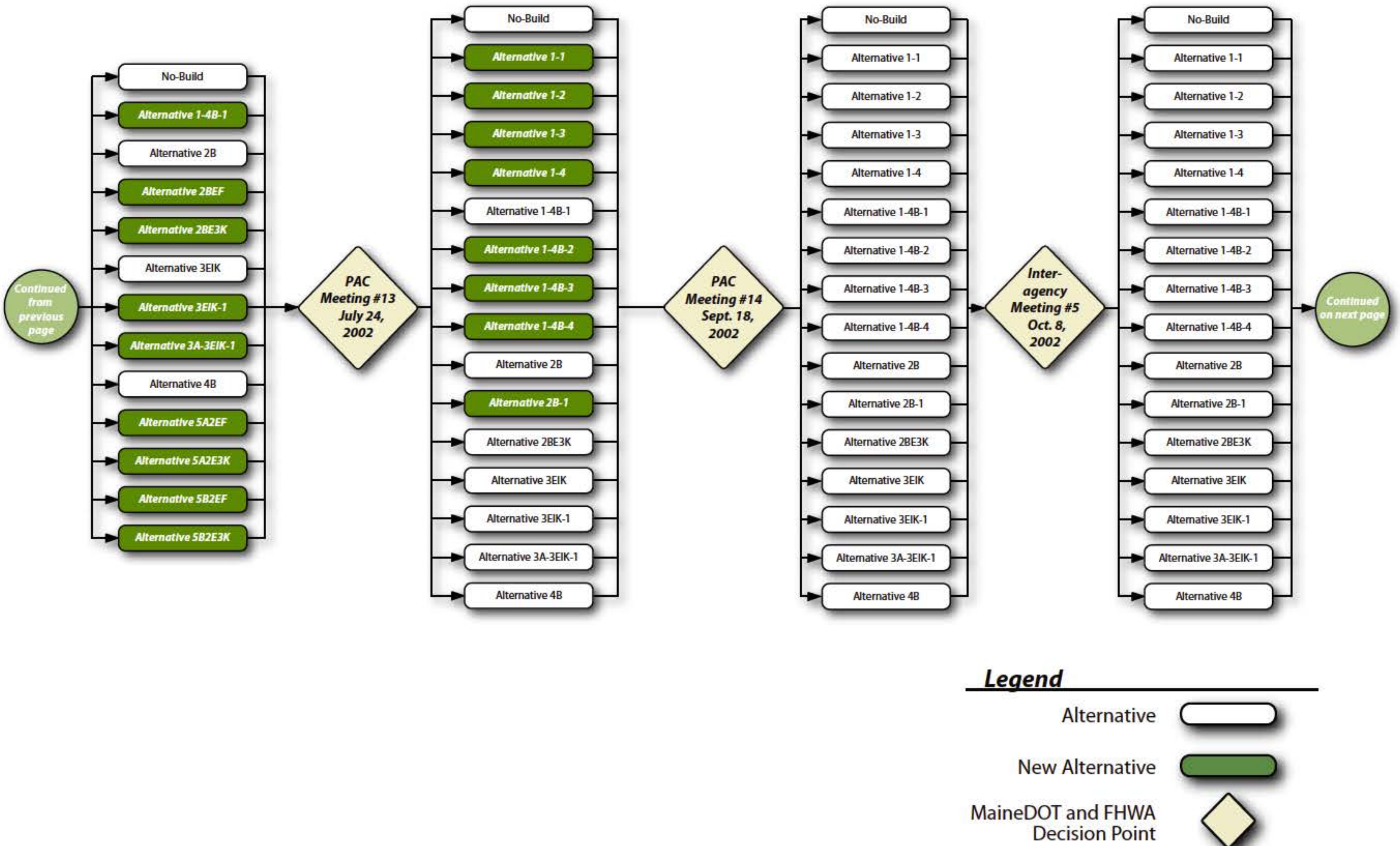


Alternatives Analysis Flow Diagram (continued)

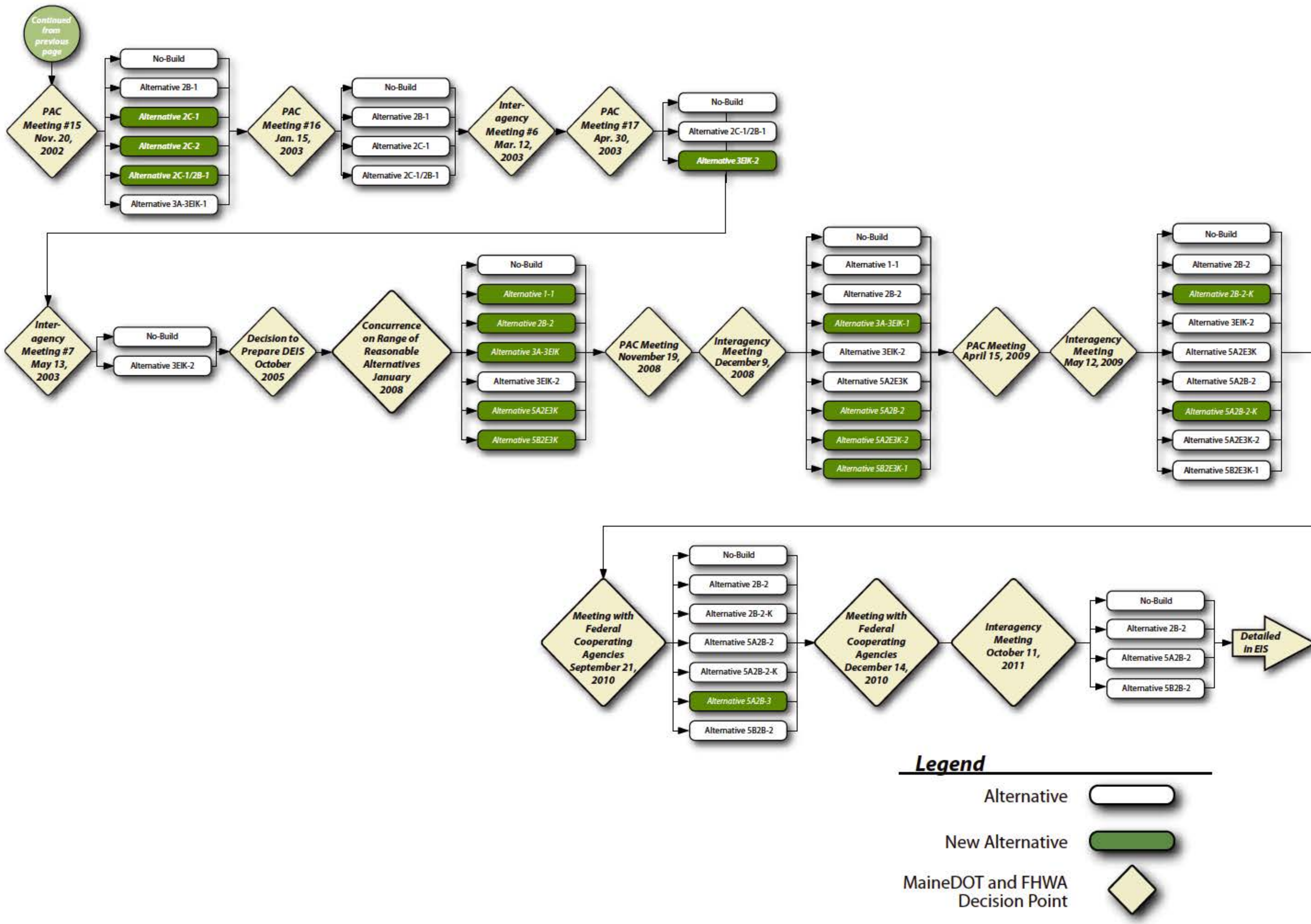




Alternatives Analysis Flow Diagram (continued)



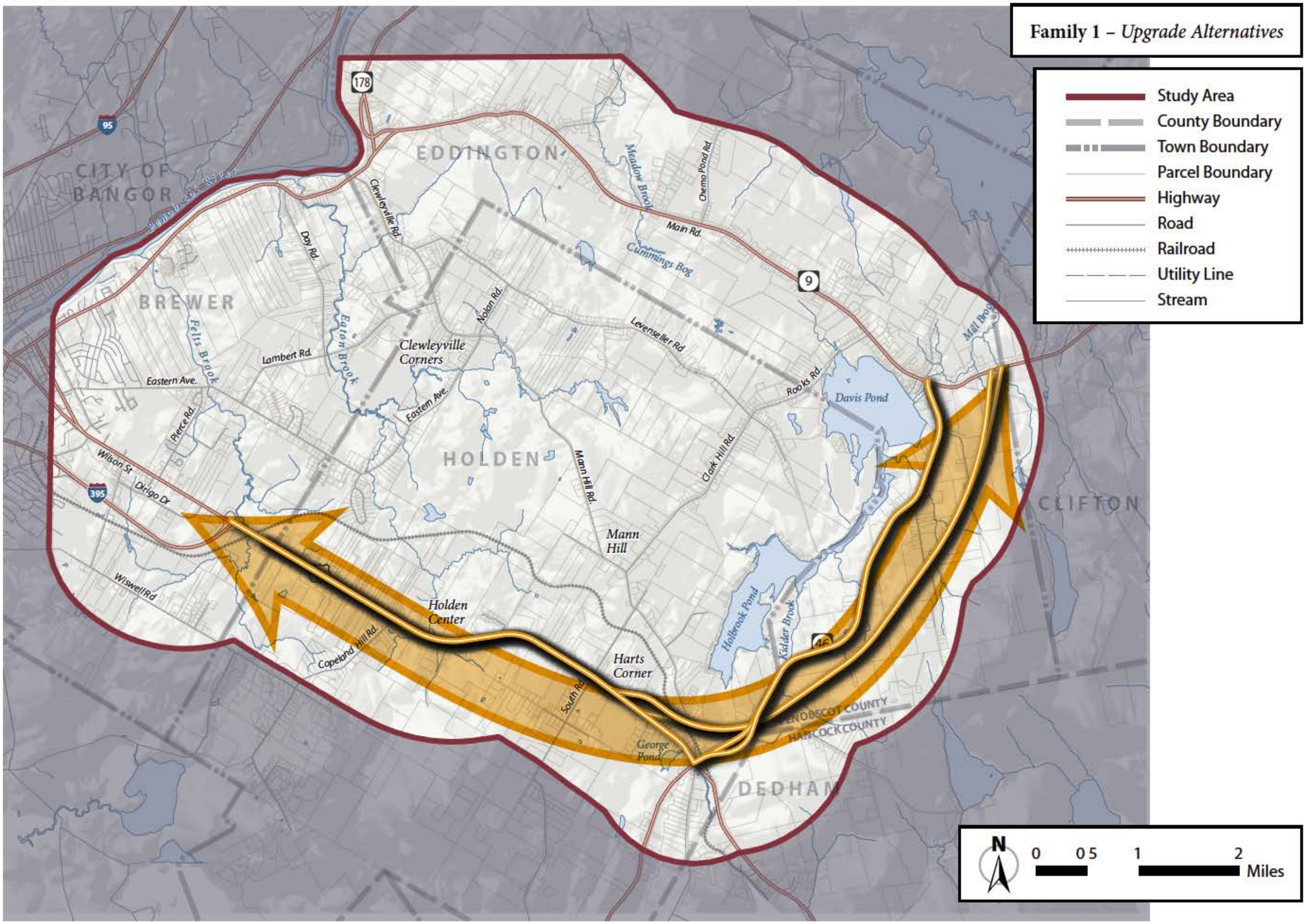
Alternatives Analysis Flow Diagram (continued)



No-Build Alternative

Alternatives	Description	Meets Purpose: Study Purpose	Meets Purpose: USACE Purpose	Meets Needs: System Linkage	Meets Needs: Safety Concerns	Meets Needs: Traffic Congestion	Practicable	Results
No-Build	• Does not satisfy design criteria • No construction or other measures to increase capacity or decrease demand	No	No	No	No	No	Yes	• **Retained for detailed study** • Although the No-Build Alternative satisfies neither the study purpose and needs nor the USACE's basic project purpose, it was retained for further consideration. The No-Build Alternative and its consequences, when fully developed, allow equal comparison to the build alternatives and help decision makers understand the consequences of taking no action.

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.


Family 1 – *Upgrade Alternatives*
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
0 0.5 1 2 Miles
N
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
Clewleyville Corners
Holden Center
Harts Corner
Mann Hill
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
Main Rd.
Eastern Ave.
Lambert Rd.
Levenseller Rd
Rooks Rd.
Clark Hill Rd.
Mann Hill Rd.
Nolan Rd.
Day Rd.
Clewleyville Rd.
Copeland Hill Rd.
South Rd
Wilson St
Dirigo Dr
Wiswell Rd
Pierce Rd.
Felts Brook
Eaton Brook
Meadow Brook
Kidder Brook
Mill Brook
Chemo Pond Rd
PENOBSCOT COUNTY
HANCOCK COUNTY

Family 1 – Upgrade Alternatives								
Alternatives	*Description*	*Meets Purpose*		*Meets Needs*			*Practicable*	*Results and Impacts*
		Study Purpose	*USACE Purpose*	*System Linkage*	*Safety Concerns*	*Traffic Congestion*		
Alternative 1	• Does not satisfy design criteria • Length: 10.2 mi. of upgrading and widening Route 1A to create five through-lanes and Route 46 to create four through-lanes • Dual center left-turn lane on Route 1A • Bridge length: 1,300 ft. • Earthwork: 1.0 million cubic yards (mcy) (0.7 mcy cut, 0.3 mcy fill)	No	Yes	No	No	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 30 ac. • Stream crossings: 5 • Floodplain impacts: 1.5 ac. • Notable wildlife habitat: 0 ac. • Undeveloped habitat: 53 ac. • Prime farmland: 54.7 ac. • Residential displacements: 19
Revised Alternative 1	• Does not satisfy design criteria • Length: 10.2 mi. of upgrades and widening Route 1A and Route 46 to four through-lanes • No dual center left-turn lane on Route 1A • Bridge length: 1,313 ft. • Earthwork: 1.0 mcy (0.7 mcy cut, 0.3 mcy fill)	No	Yes	No	No	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 29 ac. • Stream crossings: 5 • Floodplain impacts: 1.4 ac. • Notable wildlife habitat: 0 ac. • Undeveloped habitat: 53 ac. • Prime farmland: 51.4 ac. • Residential displacements: 17
Alternative 1-1	• Does not satisfy design criteria • Length: 1.5 mi. of new alignment, 8.7 mi. of widening Route 1A and Route 46 to four lanes with eight at-grade intersections and pacer light system • Local roads created: 4.9 mi. of service roads for commercial/residential access • Bridge length: 685 ft. • Earthwork: 1.9 mcy (0.8 mcy cut, 1.1 mcy fill)	No	Yes	No	Yes	No	No	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 29 ac. • Stream crossings: 4 • Notable wildlife habitat: 0 ac. • Floodplain impacts: 1.0 ac. • Undeveloped habitat: 194 ac. • Prime farmland: 60.6 ac. • Residential displacements: 17 • Pacer light system determined to be ineffective tool for study-area climate and topography; town of Holden asked that its suggestion be removed from further consideration

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results and Impacts
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 1-2	• Does not satisfy design criteria • Length: 1.5 mi. of new alignment, 8.7 mi. of widening Route 1A and Route 46 to four lanes with four diamond interchanges • Local road created: 5.3 mi. of service roads for commercial/residential access • Bridge length: 1,210 ft. • Earthwork: 1.9 mcy (0.8 mcy cut, 1.1 mcy fill)	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 30 ac. • Stream crossings: 4 • Floodplain impacts: 1.0 ac. • Notable wildlife habitat: 2.2 ac. • Undeveloped habitat: 271 ac. • Prime farmland: 60.8 ac. • Residential displacements: 15
Alternative 1-3	• Does not satisfy design criteria • Length: 1.5 mi. of new alignment, 8.7 mi. of widening Route 1A and Route 46 to four lanes with seven right-in/right-out connections to local roads • Local road created: 3.4 mi. of service roads for commercial/residential access • Bridge length: 2,178 ft. • Earthwork: 1.9 mcy (0.8 mcy cut, 1.1 mcy fill)	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 29 ac. • Stream crossings: 4 • Floodplain impacts: 1.0 ac. • Notable wildlife habitat: 2.2 ac. • Undeveloped habitat: 255 ac. • Prime farmland: 57.4 ac. • Residential displacements: 15
Alternative 1-4	• Does not satisfy design criteria • Length: 1.5 mi. of new alignment, 8.7 mi. of widening Route 1A and Route 46 to four lanes with center median barrier, collector/distributor lanes along Route 1A • Local road created: 6.7 mi. of service roads for commercial/residential access • Bridge length: 1,571 ft. • Earthwork: 1.9 mcy (0.8 mcy cut, 1.1 mcy fill)	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 32 ac. • Stream crossings: 4 • Floodplain impacts: 1.0 ac. • Notable wildlife habitat: 1.8 ac. • Undeveloped habitat: 0 ac. • Prime farmland: 0 ac. • Residential displacements: 21

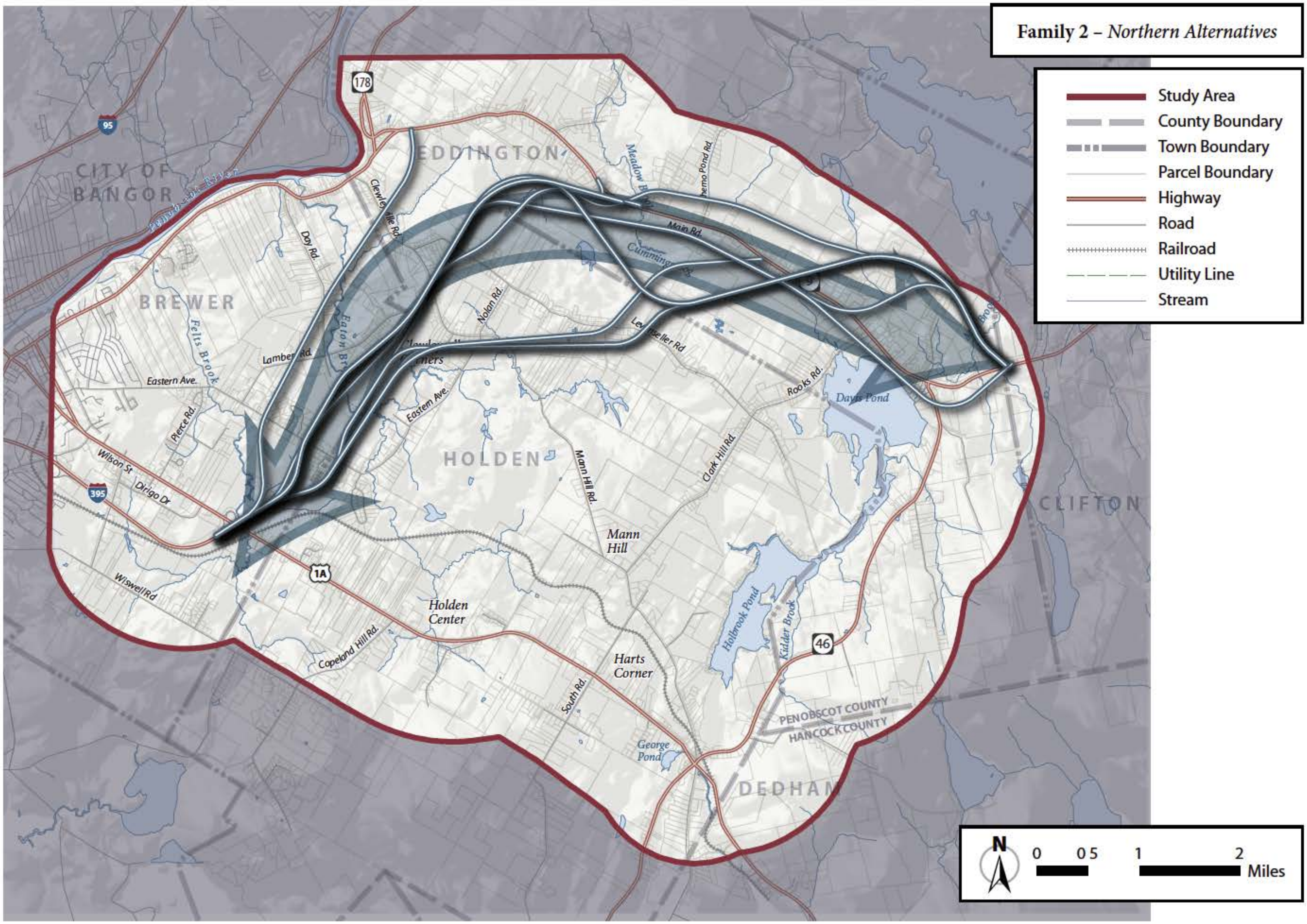
Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results and Impacts
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 1-4B	• Does not satisfy design criteria • Length: 4.1 mi. of widening Route 1A to four lanes, 6.1 mi. of new alignment using Alternative 4B • Bridge length: 1,845 ft. • Earthwork: 6.0 mcy (3.0 mcy cut, 3.0 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 31 ac. • Stream crossings: 8 • Floodplain impacts: 1.1 ac. • Notable wildlife habitat: 0 ac. • Undeveloped habitat: 0 ac. • Prime farmland: 0 ac. • Residential displacements: 9
Alternative 1-4B-1	• Does not satisfy design criteria • Length: 4.1 mi. of widening Route 1A to four lanes (using Alternative 1-1), 6.1 mi. of new alignment using Alternative 4B • Local road created: 4.9 mi. of service roads for commercial/residential access • Bridge length: 2,572 ft. • Earthwork: 5.5 mcy (3.0 mcy cut, 2.5 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 41 ac. • Stream crossings: 7 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 2.3 ac. • Undeveloped habitat: 675 ac. • Prime farmland: 42.2 ac. • Residential displacements: 13
Alternative 1-4B-2	• Does not satisfy design criteria • Length: 4.1 mi. of widening Route 1A to four lanes (using Alternative 1-2), 6.1 mi. of new alignment using Alternative 4B • Local road created: 6.8 mi. of service roads for commercial/residential access • Bridge length: 3,097 ft. • Earthwork: 5.5 mcy (3.0 mcy cut, 2.5 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 42 ac. • Stream crossings: 7 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 2.3 ac. • Undeveloped habitat: 747ac. • Prime farmland: 41.1 ac. • Residential displacements: 11

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results and Impacts
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 1-4B-3	• Does not satisfy design criteria • Length: 4.1 mi. of widening Route 1A to four lanes (using Alternative 1-3), 6.1 mi. of new alignment using Alternative 4B • Local road created: 4.9 mi. of service roads for commercial/residential access • Bridge length: 4,065 ft. • Earthwork: 5.5 mcy (3.0 mcy cut, 2.5 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 41 ac. • Stream crossings: 7 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 2.3 ac. • Undeveloped habitat: 737ac. • Prime farmland: 39.0 ac. • Residential displacements: 8
Alternative 1-4B-4	• Does not satisfy design criteria • Length: 4.1 mi. of widening Route 1A to four lanes (using Alternative 1-4), 6.1 mi. of new alignment using Alternative 4B • Local road created: 8.2 mi. of service roads for commercial/residential access • Bridge length: 3,458 ft. • Earthwork: 5.5 mcy (3.0 mcy cut, 2.5 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	No	Yes	No	Yes	No	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 44 ac. • Stream crossings: 7 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 1.9 ac. • Undeveloped habitat: 647 ac. • Prime farmland: 23.3 ac. • Residential displacements: 17

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.



Family 2 – Northern Alternatives
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Mann Hill
Holden Center
Harts Corner
Davis Pond
Holbrook Pond
George Pond
0 0.5 1 2 Miles
N

Family 2 – Northern Alternatives

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 2A	• Satisfies design criteria • Length: 4.6 mi. of new alignment, 4.5 mi. of Route 9 without additional improvement • Bridge length: 5,200 ft. • Earthwork: 1.0 mcy (0.2 mcy cut, 0.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 26 ac. • Stream crossings: 3 (2 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 4.4 ac. • Undeveloped habitat: 248 ac. • Prime farmland: 30.0 ac. • Residential displacements: 8
Alternative 2B	• Satisfies design criteria • Length: 5.8 mi. of new alignment, 4.2 mi. of Route 9 without additional improvement • Bridge length: 4,354 ft. • Earthwork: 1.8 mcy (0.9 mcy cut, 0.9 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 28 ac. • Stream crossings: 6 (2 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 4.4 ac. • Undeveloped habitat: 647 ac. • Prime farmland: 23.3 ac. • Residential displacements: 2
Alternative 2B-1	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 2,232 ft. • Earthwork: 3.5 mcy (1.7 mcy cut, 1.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 35 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 1,362 ac. • Prime farmland: 37.0 ac. • Residential displacements: 9
Alternative 2B-2	• Satisfies design criteria • Length: 6.1 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements • Bridge length: 2,232 ft. • Earthwork: 2.2 mcy (1.2 mcy cut, 1.0 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Retained for detailed study** • Wetlands impacts: 34 ac. • Stream crossings: 3 (2 with anadromous fish) • Floodplain impacts: 15 ac. • Notable wildlife habitat: 11.0 • Undeveloped habitat: 784 ac. • Prime farmland: 20.0 ac. • Residential displacements: 8

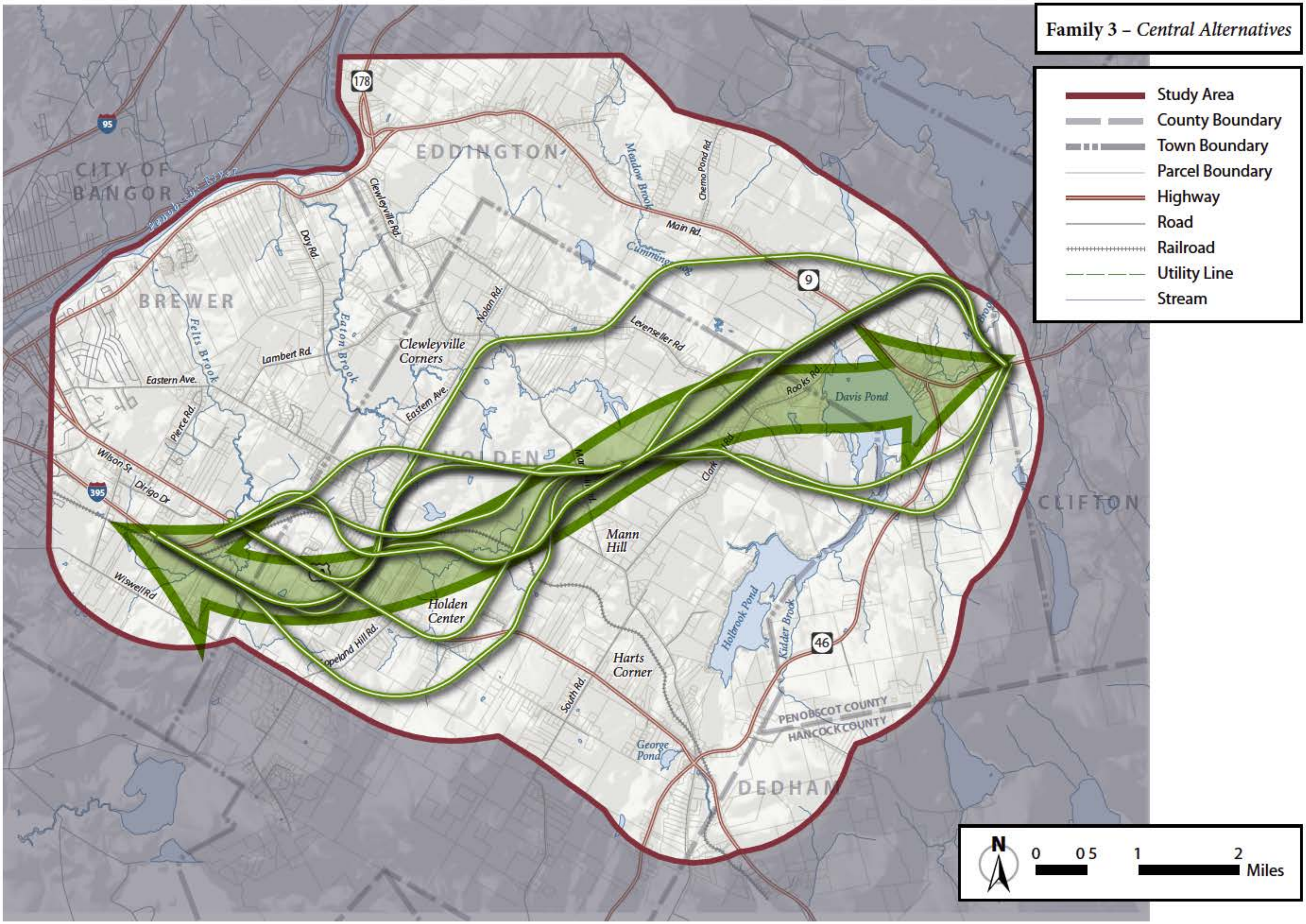
Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 2B-2 -K	• Satisfies design criteria • Length: 5.8 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements, 2.1 mi. of new alignment • Bridge length: 2,232 ft. • Earthwork: 3.3 mcy (1.9 mcy cut, 1.4 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 45 ac. • Stream crossings: 4 (2 with anadromous fish) • Floodplain impacts: 15 ac. • Notable wildlife habitat: 13.0 • Undeveloped habitat: 1,038 ac. • Prime farmland: 24.0 ac. • Residential displacements: 8
Alternative 2BEF	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 3,820 ft. • Earthwork: 3.5 mcy (1.7 mcy cut, 1.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 66 ac. • Stream crossings: 11 (2 with anadromous fish) • Floodplain impacts: 1.6 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 572 ac. • Prime farmland: 37.8 ac. • Residential displacements: 7
Alternative 2BE3K	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 3,021 ft. • Earthwork: 3.2 mcy (1.6 mcy cut, 1.6 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 54 ac. • Stream crossings: 11 (1 with anadromous fish) • Floodplain impacts: 15 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 744 ac. • Prime farmland: 39.3 ac. • Residential displacements: 8
Alternative 2C	• Satisfies design criteria • Length: 9.4 mi. of new alignment, uses 4.2 mi. of Route 9 without additional improvement • Bridge length: 6,723 ft. • Earthwork: 2.8 mcy (1.4 mcy cut, 1.4 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 30 ac. • Stream crossings: 5 (2 with anadromous fish) • Notable wildlife habitat: 0 • Undeveloped habitat: 491 ac. • Prime farmland: 30.7 ac. • Residential displacements: 3 • Floodplain impacts: 15 ac.

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 2C-1	• Satisfies design criteria • Length: 9.3 mi. of new alignment • Bridge length: 2,469 ft. • Earthwork: 3.8 mcy (1.9 mcy cut, 1.9 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** Wetlands impacts: 35 ac. • Stream crossings: 5 (1 with anadromous fish) • Notable wildlife habitat: 0 • Undeveloped habitat: 893 ac. • Prime farmland: 47.6 ac. • Floodplain impacts: 12 ac. • Residential displacements: 8
Alternative 2C-2	• Satisfies design criteria • Length: 9.2 mi. of new alignment • Bridge length: 2,469 ft. • Earthwork: 3.8 mcy (1.9 mcy cut, 1. mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 35 ac. • Stream crossings: 5 (1 with anadromous fish) • Floodplain impacts: 14 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 839 ac. • Prime farmland: 45.8 ac. • Residential displacements: 8
Alternative 2C-1/2B-1	• Satisfies design criteria • Length: 10.7 mi. of new alignment • Bridge length: 2,232 ft. • Earthwork: 3.8 mcy (1.9 mcy cut, 1.9 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 38 ac. • Stream crossings: 9 (1 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 1,251 ac. • Prime farmland: 43.0 ac. • Residential displacements: 10
Alternative 2D	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 6,192 ft. • Earthwork: 6.2 mcy (3.1 mcy cut, 3.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 66 ac. • Stream crossings: 11 (1 with anadromous fish) • Floodplain impacts: 13 ac. • Notable wildlife habitat: 0 • Undeveloped habitat: 1,255 ac. • Prime farmland: 35.6 ac. • Residential displacements: 2

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.


Family 3 – Central Alternatives
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
Holbrook Pond
George Pond
PENOBSCOT COUNTY
HANCOCK COUNTY
Main Rd.
Eastern Ave.
Lambert Rd.
Wilson St
Drigo Dr
Wiswell Rd
Day Rd.
Clewleyville Rd.
Nolan Rd.
Rooks Rd.
South Rd.
0 0.5 1 2 Miles

Family 3 – Central Alternatives

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3AG	• Satisfies design criteria • Length: 9.3 mi. of new alignment • Bridge length: 7,495 ft. • Earthwork: 5.3 mcy (2.5 mcy cut, 2.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 76 ac. • Stream crossings: 10 (2 with anadromous fish) • Floodplain impacts: 14 ac. • Notable wildlife habitat: 8.6 ac. • Undeveloped habitat: 942 ac. • Prime farmland: 8.7 ac. • Residential displacements: 8
Alternative 3AH	• Satisfies design criteria • Length: 8.8 mi. of new alignment • Bridge length: 7,037 ft. • Earthwork: 4.3 mcy (2.0 mcy cut, 2.3 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 96 ac. • Stream crossings: 11 (2 with anadromous fish) • Floodplain impacts: 14 ac. • Notable wildlife habitat: 7.3 ac. • Undeveloped habitat: 848 ac. • Prime farmland: 12.8 ac. • Residential displacements: 5
Alternative 3AI	• Satisfies design criteria • Length: 7.0 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 4,645 ft. • Earthwork: 3.1 mcy (1.4 mcy cut, 1.7 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 43 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain impacts: 10 ac. • Notable wildlife habitat: 2.9 ac. • Undeveloped habitat: 762 ac. • Prime farmland: 10.5 ac. • Residential displacements: 4

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3AJ	• Satisfies design criteria • Length: 7.1 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 4,766 ft. • Earthwork: 3.3 mcy (1.5 mcy cut, 1.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 36 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 4.9 ac. • Undeveloped habitat: 721 ac. • Prime farmland: 10.5 ac. • Residential displacements: 6
Alternative 3AIK	• Satisfies design criteria • Length: 9.2 mi. of new alignment • Bridge length: 4,814 ft. • Earthwork: 3.9 mcy (1.8 mcy cut, 2.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 50 ac. • Stream crossings: 7 (2 with anadromous fish) • Floodplain impacts: 10 ac. • Notable wildlife habitat: 2.9 ac. • Undeveloped habitat: 972 ac. • Prime farmland: 20.7 ac. • Residential displacements: 5
Alternative 3AJK	• Satisfies design criteria • Length: 9.3 mi. of new alignment • Bridge length: 4,935 ft. • Earthwork: 4.1 mcy (1.9 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 44 ac. • Stream crossings: 7 (2 with anadromous fish) • Floodplain impacts: 11 ac. • Notable wildlife habitat: 4.9 ac. • Undeveloped habitat: 932 ac. • Prime farmland: 20.7 ac. • Residential displacements: 7
Alternative 3BG	• Satisfies design criteria • Length: 9.3 mi. of new alignment • Bridge length: 7,185 ft. • Earthwork: 4.7 mcy (2.2 mcy cut, 2.5 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 101 ac. • Stream crossings: 11 (1 with anadromous fish) • Floodplain impacts: 16 ac. • Notable wildlife habitat: 14 ac. • Undeveloped habitat: 890 ac. • Prime farmland: 9.5 ac. • Residential displacements: 5

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3BH	• Satisfies design criteria • Length: 8.9 mi. of new alignment • Bridge length: 6,726 ft. • Earthwork: 3.7 mcy (1.7 mcy cut, 2.0 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 121 ac. • Stream crossings: 12 (1 with anadromous fish) • Floodplain impacts: 16 ac. • Notable wildlife habitat: 13 ac. • Undeveloped habitat: 772 ac. • Prime farmland: 8.0 ac. • Residential displacements: 2
Alternative 3BI	• Satisfies design criteria • Length: 7.1 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 4,334 ft. • Earthwork: 2.5 mcy (1.1 mcy cut, 1.4 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 68 ac. • Stream crossings: 6 (1 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 8.7 ac. • Undeveloped habitat: 708 ac. • Prime farmland: 11.3 ac. • Residential displacements: 5
Alternative 3BJ	• Satisfies design criteria • Length: 7.2 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 4,455 ft. • Earthwork: 2.7 mcy (1.2 mcy cut, 1.5 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 62 ac. • Stream crossings: 6 (1 with anadromous fish) • Floodplain impacts: 13 ac. • Notable wildlife habitat: 11 ac. • Undeveloped habitat: 668 ac. • Prime farmland: 11.3 ac.
Alternative 3BIK	• Satisfies design criteria • Length: 9.3 mi. of new alignment • Bridge length: 4,503 ft. • Earthwork: 3.3 mcy (1.5 mcy cut, 1.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 76 ac. • Stream crossings: 8 (1 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 8.7 ac. • Undeveloped habitat: 923 ac. • Prime farmland: 22.0 ac. • Residential displacements: 2

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3BJK	• Satisfies design criteria • Length: 9.4 mi. of new alignment • Bridge length: 4,624 ft. • Earthwork: 3.5 mcy (1.6 mcy cut, 1.9 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 69 ac. • Stream crossings: 8 (1 with anadromous fish) • Floodplain impacts: 13 ac. • Notable wildlife habitat: 11 ac. • Undeveloped habitat: 881 ac. • Prime farmland: 21.5 ac. • Residential displacements: 4
Alternative 3CG	• Satisfies design criteria • Length: 9.6 mi. of new alignment • Bridge length: 6,262 ft. • Earthwork: 5.3 mcy (2.5 mcy cut, 2.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 77 ac. • Stream crossings: 10 (2 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 8.7 ac. • Undeveloped habitat: 1,017 ac. • Prime farmland: 12.2 ac. • Residential displacements: 9
Alternative 3CH	• Satisfies design criteria • Length: 9.2 mi. of new alignment • Bridge length: 5,804 ft. • Earthwork: 4.2 mcy (1.9 mcy cut, 2.3 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 97 ac. • Stream crossings: 11 (2 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 7.4 ac. • Undeveloped habitat: 897 ac. • Prime farmland: 16.3 ac. • Residential displacements: 6
Alternative 3CI	• Satisfies design criteria • Length: 7.4 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 3,411 ft. • Earthwork: 3.1 mcy (1.4 mcy cut, 1.7 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 44 ac. • Stream crossings: 5 • Floodplain impacts: 8.4 ac. • Notable wildlife habitat: 3.0 ac. • Undeveloped habitat: 915 ac. • Prime farmland: 14.0 ac. • Residential displacements: 5

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3CJ	• Satisfies design criteria • Length: 7.5 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 3,532 ft. • Earthwork: 3.2 mcy (1. 4 mcy cut, 1.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 38 ac. • Stream crossings: 5 • Floodplain impacts: 9.0 ac. • Notable wildlife habitat: 5.0 ac. • Undeveloped habitat: 875 ac. • Prime farmland: 14.0 ac. • Residential displacements: 7
Alternative 3CIK	• Satisfies design criteria • Length: 9.6 mi. of new alignment • Bridge length: 3,581 ft. • Earthwork: 3.8 mcy (1.7 mcy cut, 2.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 52 ac. • Stream crossings: 7 • Floodplain impacts: 8.4 ac. • Notable wildlife habitat: 3.0 ac. • Undeveloped habitat: 1,127 ac. • Prime farmland: 24.2 ac. • Residential displacements: 6
Alternative 3CJK	• Satisfies design criteria • Length: 9.7 mi. of new alignment • Bridge length: 3,702 ft. • Earthwork: 4.0 mcy (1.8 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 45 ac. • Stream crossings: 7 • Floodplain impacts: 9.0 ac. • Notable wildlife habitat: 5.0 ac. • Undeveloped habitat: 1,087 ac. • Prime farmland: 24.2 ac. • Residential displacements: 8
Alternative 3DG	• Satisfies design criteria • Length: 10.0 mi. of new alignment • Bridge length: 5,763 ft. • Earthwork: 5.4 mcy (2.6 mcy cut, 2.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 79 ac. • Stream crossings: 10 • Floodplain impacts: 7.9 ac. • Notable wildlife habitat: 19 ac. • Undeveloped habitat: 837ac. • Prime farmland: 23.1 ac. • Residential displacements: 11

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3DH	• Satisfies design criteria • Length: 9.6 mi. of new alignment • Bridge length: 5,305 ft. • Earthwork: 4.3 mcy (2.0 mcy cut, 2.3 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 98 ac. • Stream crossings: 11 • Floodplain impacts: 7.6 ac. • Notable wildlife habitat: 7.3 ac. • Undeveloped habitat: 719 ac. • Prime farmland: 27.1 ac. • Residential displacements: 8
Alternative 3DI	• Satisfies design criteria • Length: 7.8 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 2,913 ft. • Earthwork: 3.2 mcy (1.4 mcy cut, 1.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 46 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain impacts: 3.9 ac. • Notable wildlife habitat: 13 ac. • Undeveloped habitat: 658 ac. • Prime farmland: 24.9 ac. • Residential displacements: 7
Alternative 3DJ	• Satisfies design criteria • Length: 7.9 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 3,034 ft. • Earthwork: 3.3 mcy (1.5 mcy cut, 1.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 39 ac. • Stream crossings: 5 • Floodplain impacts: 4.5 ac. • Notable wildlife habitat: 15 ac. • Undeveloped habitat: 616 ac. • Prime farmland: 24.9 ac. • Residential displacements: 9
Alternative 3DIK	• Satisfies design criteria • Length: 10.0 mi. of new alignment • Bridge length: 3,082 ft. • Earthwork: 3.9 mcy (1.8 mcy cut, 2.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 53 ac. • Stream crossings: 7 • Floodplain impacts: 3.9 ac. • Notable wildlife habitat: 13 ac. • Undeveloped habitat: 868 ac. • Prime farmland: 35.0 ac. • Residential displacements: 8

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3DJK	• Satisfies design criteria • Length: 10.1 mi. of new alignment • Bridge length: 3,203 ft. • Earthwork: 4.1 mcy (1.9 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 46 ac. • Stream crossings: 7 • Floodplain impacts: 4.5 ac. • Notable wildlife habitat: 15 ac. • Undeveloped habitat: 829 ac. • Prime farmland: 35.0 ac. • Residential displacements: 10
Alternative 3EG	• Satisfies design criteria • Length: 10.4 mi. of new alignment • Bridge length: 6,630 ft. • Earthwork: 5.5 mcy (2.6 mcy cut, 2.9 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 73 ac. • Stream crossings: 10 • Floodplain impacts: 11 ac. • Notable wildlife habitat: 8.9 ac. • Undeveloped habitat: 1,280 ac. • Prime farmland: 8.6 ac. • Residential displacements: 5
Alternative 3EH	• Satisfies design criteria • Length: 10.0 mi. of new alignment • Bridge length: 6,171 ft. • Earthwork: 4.5 mcy (2.1 mcy cut, 2.4 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 92 ac. • Stream crossings: 11 • Floodplain impacts: 11 ac. • Undeveloped habitat: 1,163 ac. • Prime farmland: 12.6 ac. • Residential displacements: 2 • Notable wildlife habitat: 7.6 ac.
Alternative 3EI	• Satisfies design criteria • Length: 8.2 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 3,779 ft. • Earthwork: 3.3 mcy (1.5 mcy cut, 1.8 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 40 ac. • Stream crossings: 5 • Floodplain impacts: 7.4 ac. • Notable wildlife habitat: 3.2 ac. • Undeveloped habitat: 1,099 ac. • Prime farmland: 10.4 ac. • Residential displacements: 1

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3EJ	• Satisfies design criteria • Length: 8.3 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 3,900 ft. • Earthwork: 3.5 mcy (1.6 mcy cut, 1.9 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 40 ac. • Stream crossings: 5 • Floodplain impacts: 8.0 ac. • Notable wildlife habitat: 5.2 ac. • Undeveloped habitat: 1,059 ac. • Prime farmland: 10.4 ac. • Residential displacements: 3
Alternative 3EIK	• Satisfies design criteria • Length: 10.4 mi. of new alignment • Bridge length: 3,948 ft. • Earthwork: 4.1 mcy (1.9 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 47 ac. • Stream crossings: 7 • Floodplain impacts: 7.4 ac. • Notable wildlife habitat: 3.2 ac. • Undeveloped habitat: 1,312 ac. • Prime farmland: 20.5 ac. • Residential displacements: 2
Alternative 3EIK-1	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 2,797 ft. • Earthwork: 4.4 mcy (2.2 mcy cut, 2.2 mcy fill) • Developed as a modification of Alternative 3EIK. Shifts Alternative 3EIK southeast to further avoid residences on Eastern Avenue	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 48 ac. • Stream crossings: 8 • Floodplain impacts: 16 ac. • Notable wildlife habitat: 14 ac. • Undeveloped habitat: 1,395 ac. • Prime farmland: 22.7 ac. • Residential displacements: 4
Alternative 3EIK-2	• Satisfies design criteria • Length: 10.6 mi. of new alignment • Bridge length: 1,948 ft. • Earthwork: 4.2 mcy (2.1 mcy cut, 2.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 42 ac. • Stream crossings: 6 • Floodplain impacts: 7.5 ac. • Notable wildlife habitat: 0.7 ac. • Undeveloped habitat: 1,437 ac. • Prime farmland: 11 ac. • Residential displacements: 3

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Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3A-3EIK-1	• Satisfies design criteria • Length: 9.2 mi. of new alignment • Bridge length: 1,774 ft. • Earthwork: 4.2 mcy (2.1 mcy cut, 2.1 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 50 ac. • Stream crossings: 8 • Floodplain impacts: 23 ac. • Notable wildlife habitat: 13 ac. • Undeveloped habitat: 1,107 ac. • Prime farmland: 22.2 ac. • Residential displacements: 8
Alternative 3E-2C	• Satisfies design criteria • Length: 7.8 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 3,607 ft. • Earthwork: 2.4 mcy (1.2 mcy cut, 1.2 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 22 ac. • Stream crossings: 9 • Floodplain impacts: 6.0 ac. • Notable wildlife habitat: 0.1 ac. • Undeveloped habitat: 757 ac. • Prime farmland: 124.7 ac. • Residential displacements: 4
Alternative 3E-2C-2E	• Satisfies design criteria • Length: 10.7 mi. of new alignment • Bridge length: 4,440 ft. • Earthwork: 4.4 mcy (2.2 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 31 ac. • Stream crossings: 12 • Floodplain impacts: 6.0 ac. • Notable wildlife habitat: 0.1 ac. • Undeveloped habitat: 1,104 ac. • Prime farmland: 133.4 ac. • Residential displacements: 6
Alternative 3EJK	• Satisfies design criteria • Length: 10.5 mi. of new alignment • Bridge length: 4,070 ft. • Earthwork: 4.3 mcy (2.0 mcy cut, 2.3 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 40 ac. • Stream crossings: 7 • Floodplain impacts: 8.0. ac. • Notable wildlife habitat: 5.2 ac. • Undeveloped habitat: 1,272 ac. • Prime farmland: 20.5 ac. • Residential displacements: 4

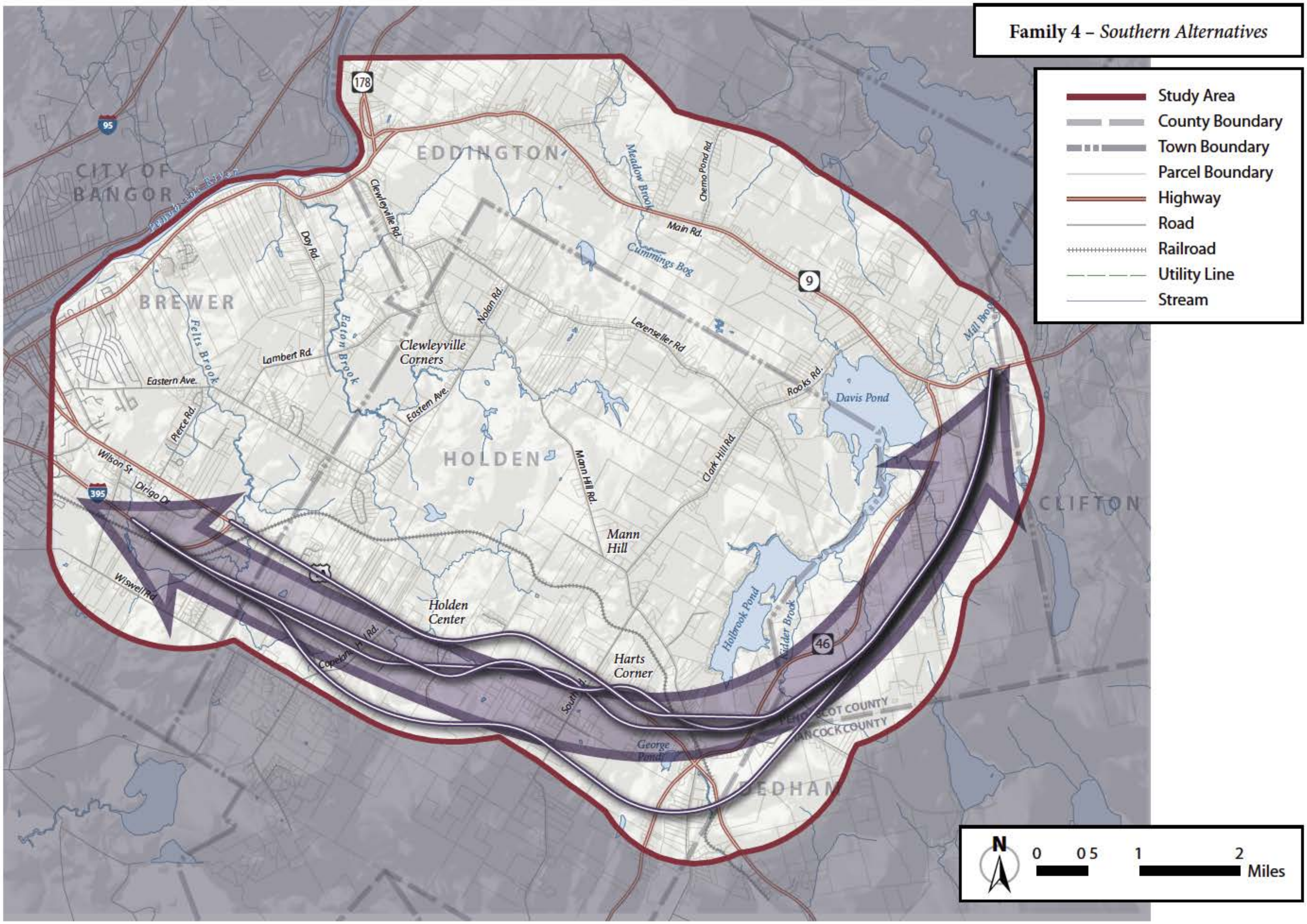
Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3FG	• Satisfies design criteria • Length: 11.4 mi. of new alignment • Bridge length: 6,742 ft. • Earthwork: 7.1 mcy (3.5 mcy cut, 3.6 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 70 ac. • Stream crossings: 11 • Floodplain impacts: 7.3 ac. • Notable wildlife habitat: 13 ac. • Undeveloped habitat: 1,262 ac. • Prime farmland: 26.4 ac. • Residential displacements: 8
Alternative 3FH	• Satisfies design criteria • Length: 10.9 mi. of new alignment • Bridge length: 6,283 ft. • Earthwork: 6.1 mcy (2.9 mcy cut, 3.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 89 ac. • Stream crossings: 12 • Floodplain impacts: 7.1 ac. • Notable wildlife habitat: 12 ac. • Undeveloped habitat: 1,113 ac. • Prime farmland: 24.8 ac. • Residential displacements: 5
Alternative 3FI	• Satisfies design criteria • Length: 9.1 mi. of new alignment, uses 2.7 mi. of Route 9 without additional improvement • Bridge length: 3,891 ft. • Earthwork: 5.0 mcy (2.4 mcy cut, 2.6 mcy fill)	Yes	Yes	in the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 36 ac. • Stream crossings: 6 • Floodplain impacts: 3 ac. • Notable wildlife habitat: 7.5 ac. • Undeveloped habitat: 1,081 ac. • Prime farmland: 28.2 ac. • Residential displacements: 4
Alternative 3FJ	• Satisfies design criteria • Length: 9.3 mi. of new alignment, uses 1.7 mi. of Route 9 without additional improvement • Bridge length: 4,012 ft. • Earthwork: 5.1 mcy (2.5 mcy cut, 2.6 mcy fill)	Yes	Yes	in the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 30 ac. • Stream crossings: 6 • Floodplain impacts: 4.0 ac. • Notable wildlife habitat: 9.4 ac. • Undeveloped habitat: 1,041 ac. • Prime farmland: 28.2 ac. • Residential displacements: 6

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 3FIK	• Satisfies design criteria • Length: 11.3 mi. of new alignment • Bridge length: 4,060 ft. • Earthwork: 5.7 mcy (2.8 mcy cut, 2.9 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 44 ac. • Stream crossings: 8 • Floodplain impacts: 3.4 ac. • Notable wildlife habitat: 7.5 ac. • Undeveloped habitat: 1,294 ac. • Prime farmland: 38.4 ac. • Residential displacements: 5
Alternative 3FJK	• Satisfies design criteria • Length: 11.4 mi. of new alignment • Bridge length: 4,181 ft. • Earthwork: 5.8 mcy (2.8 mcy cut, 3.0 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 37 ac. • Stream crossings: 8 • Floodplain impacts: 4.0 ac. • Notable wildlife habitat: 9.4 ac. • Undeveloped habitat: 1,253 ac. • Prime farmland: 38.4 ac. • Residential displacements: 17

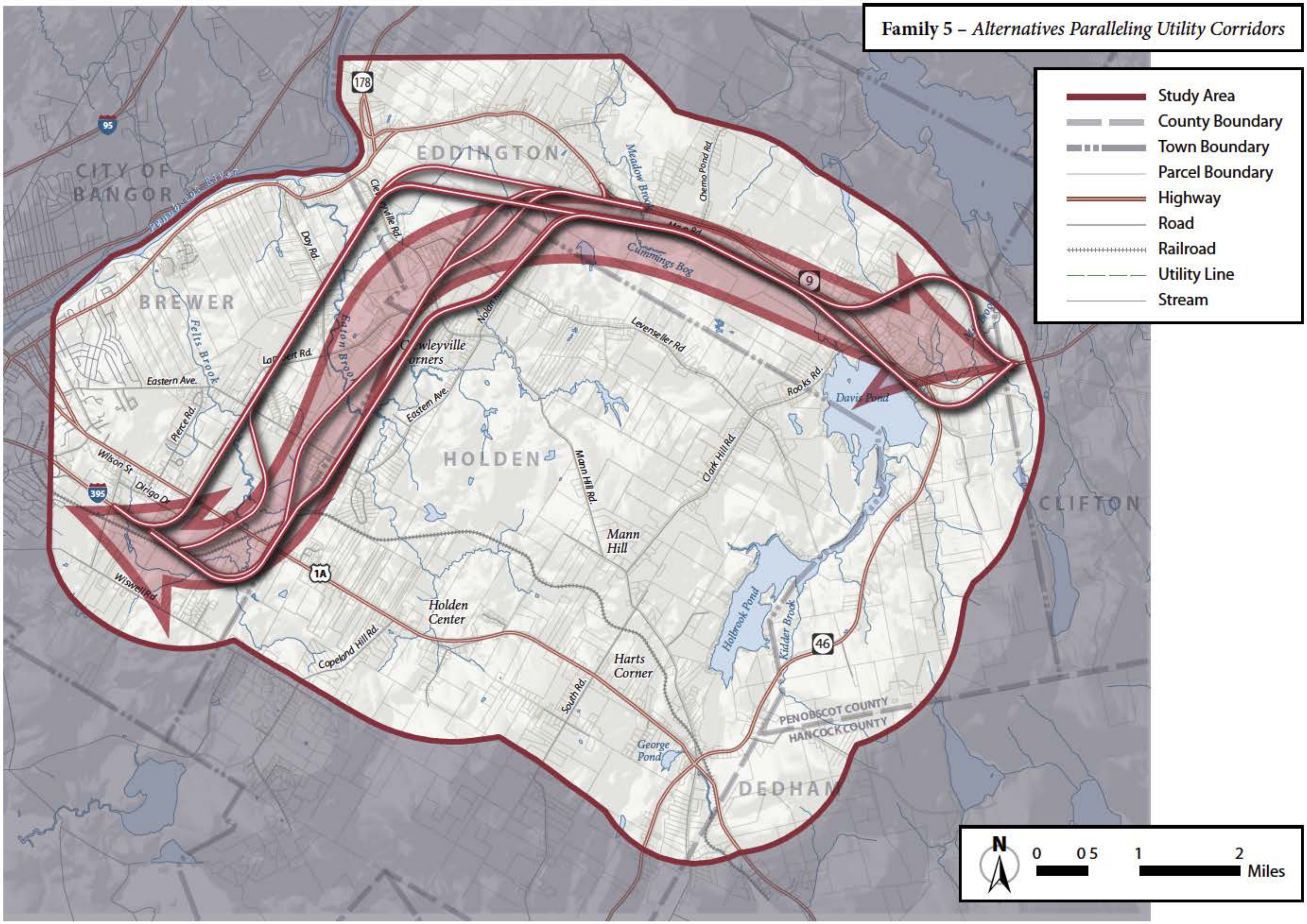
Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.


Family 4 – Southern Alternatives
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTON
DEDHAM
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
Main Rd.
Eastern Ave.
Lambert Rd.
Pierce Rd.
Wilson St
Wiswell Rd
Nolan Rd.
Mann Hill Rd.
Clark Hill Rd.
Rooks Rd.
Levenseller Rd
Clewleyville Rd.
Felts Brook
Eaton Brook
Meadow Brook
Mill Brook
PENOBSCOT COUNTY
HANCOCK COUNTY
0 0.5 1 2 Miles

Family 4 – Southern Alternatives

Alternatives	*Description*	*Meets Purpose*		*Meets Needs*			*Practicable*	*Results*
		Study Purpose	*USACE Purpose*	*System Linkage*	*Safety Concerns*	*Traffic Congestion*		
Alternative 4A	• Satisfies design criteria • Length: 10.2 mi. of new alignment • Bridge length: 2,115 ft. • Earthwork: 10.1 mcy (4.9 mcy cut, 5.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 40 ac. • Stream crossings: 5 • Floodplain impacts: 1.6 ac. • Notable wildlife habitat: 2.0 ac. • Undeveloped habitat: 795 ac. • Prime farmland: 53.6 ac. • Residential displacements: 17
Alternative 4B	• Satisfies design criteria • Length: 10.9 mi. of new alignment • Bridge length: 3,486 ft. • Earthwork: 15.1 mcy (7.7 mcy cut, 7.4 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 45 ac. • Stream crossings: 4 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 2.4 ac. • Undeveloped habitat: 1,227 ac. • Prime farmland: 24.8 ac. • Residential displacements: 5
Alternative 4C	• Satisfies design criteria • Length: 11.2 mi. of new alignment • Bridge length: 4,138 ft. • Earthwork: 13.5 mcy (6.5 mcy cut, 7.0 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 52 ac. • Stream crossings: 7 • Floodplain impacts: 0.8 ac. • Notable wildlife habitat: 1.7 ac. • Undeveloped habitat: 1,369 ac. • Prime farmland: 22.1 ac. • Residential displacements: 8
Alternative 4D	• Satisfies design criteria • Length: 11.7 mi. of new alignment • Bridge length: 6,619 ft. • Earthwork: 40.1 mcy (19.7 mcy cut, 20.4 mcy fill) • Substantial impact to Camp Roosevelt Boy Scout Reservation	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 62 ac. • Stream crossings: 10 • Floodplain impacts: 0.4 ac. • Notable wildlife habitat: 10 ac. • Undeveloped habitat: 1,600 ac. • Prime farmland: 22.1 ac. • Residential displacements: 6

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.


Family 5 – Alternatives Paralleling Utility Corridors
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Road
Railroad
Utility Line
Stream
CITY OF BANGOR
EDDINGTON
BREWER
HOLDEN
CLIFTON
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
Mann Hill
Holden Center
Harts Corner
Davis Pond
Holbrook Pond
George Pond
Cummings Bog
Felts Brook
Eastern Ave.
Pierce Rd.
Wilson St
Drigo Dr
Wiswell Rd
Copeland Hill Rd.
South Rd.
Mann Hill Rd.
Clark Hill Rd.
Rooks Rd.
Levenseller Rd
Chemo Pond Rd.
Meadow Brook
Kidder Brook
Doy Rd.
178
95
395
1A
9
46
N
0
0.5
1
2
Miles

Family 5 – Alternatives Paralleling Utility Corridors

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 5A2EF	• Satisfies design criteria • Length: 11.0 mi. of new alignment • Bridge length: 4,074 ft. • Earthwork: 5.4 mcy (2.6 mcy cut, 2.8 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 80 ac. • Stream crossings: 9 (2 with anadromous fish) • Floodplain impacts: 5.9 ac. • Notable wildlife habitat: 0 ac. • Undeveloped habitat: 607 ac. • Prime farmland: 45.6 ac. • Residential displacements: 5
Alternative 5A2E3K	• Satisfies design criteria • Length: 10.9 mi. of new alignment • Bridge length: 3,286 ft. • Earthwork: 5.1 mcy (2.5 mcy cut, 2.6 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 61 ac. • Stream crossings: 9 (2 with anadromous fish) • Floodplain impacts: 4.5 ac. • Notable wildlife habitat: 25.0 ac. • Undeveloped habitat: 813 ac. • Prime farmland: 49.9 ac. • Residential displacements: 5
Alternative 5A2B-2	• Satisfies design criteria • Length: 7.3 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements • Bridge length: 3,286 ft. • Earthwork: 3.9 mcy (1.8 cut, 2.1 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Retained for detailed study** • Wetlands impacts: 32 ac. • Stream crossings: 3 (2 with anadromous fish) • Floodplain Impacts: 5 ac. • Notable wildlife habitat: 29.0 ac. • Undeveloped habitat: 835 ac. • Prime farmland: 12.0 ac. • Residential Displacements: 15
Alternative 5A2B-3	• Satisfies design criteria • Length: 6.7 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements • Bridge length: 3,341 ft. • Earthwork: 2.6 mcy (0.8 mcy cut, 1.7 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed – other alternatives less environmentally damaging** • Wetlands impacts: 39.5 ac. • Stream crossings: 2 (2 with anadromous fish) • Floodplain impacts: 4.0 ac. • Notable wildlife habitat: 27.0 ac. • Undeveloped habitat: 594 ac. • Prime farmland: 13.0 ac. • Residential displacements: 5

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 5A2B-2-K	• Satisfies design criteria • Length: 7.1 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements, 2.1 mi. of new alignment • Bridge length: 3,286 ft. • Earthwork: 4.1 mcy (1.9 mcy cut, 2.1 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 43 ac. • Stream crossings: 4 (2 with anadromous fish) • Floodplain Impacts: 5 ac. • Notable wildlife habitat: 31.0 ac. • Undeveloped habitat: 1,089 ac. • Prime farmland: 16.0 ac. • Residential displacements: 11
Alternative 5A2E3K-2	• Satisfies design criteria • Length: 12.1 mi. of new alignment • Bridge length: 3,286 ft. • Earthwork: 5.6 mcy (3.1 mcy cut, 2.5 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 57 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain Impacts: 3.5 ac. • Notable wildlife habitat: 28.0 ac. • Undeveloped habitat: 1,017 ac. • Prime farmland: 16.0 ac. • Residential displacements: 10
Alternative 5B2B-2	• Satisfies design criteria • Length: 7.0 mi. of new alignment, 4.2 mi. of Route 9 without additional improvements • Bridge length: 3,447 ft. • Earthwork: 2.6 mcy (1.2 mcy cut, 1.4 mcy fill)	Yes	Yes	In the near-term (Year 2035)	Yes	Yes	Yes	• **Retained for detailed study** • Wetlands impacts: 31.0 ac. • Stream crossings: 2 (2 with anadromous fish) • Floodplain impacts: 12.0 ac. • Notable wildlife habitat: 6.0 ac. • Undeveloped habitat: 512 ac. • Prime farmland: 13.0 ac. • Residential displacements: 6
Alternative 5B2EF	• Satisfies design criteria • Length: 11.4 mi. of new alignment • Bridge length: 4,281 ft. • Earthwork: 4.5 mcy (2.3 mcy cut, 2.2 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 80 ac. • Stream crossings: 11 (2 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 4.6 ac. • Undeveloped habitat: 318 ac. • Prime farmland: 46.0 ac. • Residential displacements: 10

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

Alternatives	Description	Meets Purpose		Meets Needs			Practicable	Results
		Study Purpose	USACE Purpose	System Linkage	Safety Concerns	Traffic Congestion		
Alternative 5B2E3K	• Satisfies design criteria • Length: 11.3 mi. of new alignment • 3,492 ft. of new bridge construction • Earthwork: 4.1 mcy (2.2 mcy cut, 2.0 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 67 ac. • Stream crossings: 10 (2 with anadromous fish) • Floodplain impacts: 12 ac. • Notable wildlife habitat: 4.6 ac. • Residential displacements: 12 • Undeveloped habitat: 582 ac. • Prime farmland: 49.0 ac.
Alternative 5B2E3K-1	• Satisfies design criteria • Length: 11.2 mi. of new alignment • Bridge length: 2,232 ft. • Earthwork: 5.5 mcy (4.0 mcy cut, 1.4 mcy fill)	Yes	Yes	Yes	Yes	Yes	Yes	• **Dismissed - other alternatives less environmentally damaging** • Wetlands impacts: 61 ac. • Stream crossings: 5 (2 with anadromous fish) • Floodplain impacts: 19 ac. • Undeveloped habitat: 663 ac. • Prime farmland: 23.0 ac. • Residential displacements: 10

Notes: *Direct impacts are based on the conceptual design of a two-lane highway prior to identification of alternatives retained for detailed study and further avoidance and minimization of impacts.*
Undeveloped habitat impacts estimated using habitat blocks with utilities as fragmenting features.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF:

23 JAN 2008

RECEIVED
JAN 25 2008

Regulatory Division
CENAE-R-51

Matt Steele
Office of Environmental Services
Maine Dept. of Transportation
16 State House Station
Augusta, Maine 04333

Dear Mr. Steele:

This letter updates the status of the I-395 connector project according to the Corps Highway Methodology. In previous correspondence and during interagency coordination meetings, we identified the basic project purpose and a range of alternatives to be considered in Phase 1 of project planning and the development of an Environmental Assessment.

Since that time, project planning has continued and FHWA has determined that an Environmental Impact Statement (EIS) is required. This letter serves to document and confirm the completion of Phase I of the methodology and the Corps determination on which highway alternatives will be carried into Phase II and studied in more detail. The following alternatives will be carried forward for further analysis in Phase II as well as in the EIS in order for the Corps to determine the least environmentally damaging practicable alternative (LEDPA): 1, 2B-2, 3A-3EIK-1, 3EIK-2, 5A2E3K, 5B2E3K, and the no build.

Maine DOT has provided valuable new information on vernal pools and unfragmented habitat blocks which will greatly assist us in the alternatives analysis. The Corps also commends Maine DOT on the substantial amount of impact avoidance and minimization work to date in the identification of alternative alignments. However, the above referenced alternatives still represent broad study corridors and much more detailed analyses remain before a LEDPA decision can be made. For example, each of the alignments' connections at Route 9 and I-395 will have to be more fully analyzed to determine if alternative configurations are practicable and less environmentally damaging. Similarly, it remains to be seen whether combining the attributes of two or more alignments reduces the substantial environmental impact of many of the alternatives.

Although the Corps issued one public notice for this project already, we expect to issue a second one to coincide with the publication of the draft EIS. A final determination on the LEDPA will depend in part on comments received in response to our public notices.

-2-

This project could have substantial direct impact to wetlands and waterways and indirect impacts to resources like vernal pools and their surrounding habitat. Maine DOT should note that any project that would cause or contribute to significant degradation of waters of the United States may not be permittable. For any such project, it is critical that adequate compensatory mitigation be identified. Maine DOT is well aware of the direction that the Corps is headed in terms of mitigation ratios. We encourage you to continue early planning and coordination in this area. Ideally, preliminary information on mitigation opportunities should be included in the DEIS and our public notice. Although you and your consultants are aware of it, let me remind you that mitigation must be planned in accordance with the Memorandum of Agreement (MOA) between the Environmental Protection Agency and the Department of the Army. Identifying potential mitigation sites and assembling site analysis data, such as monitoring hydrology levels, should continue to be closely coordinated with the Corps and Federal agencies.

If you have any questions concerning this matter, please contact Jay Clement of my staff at 207-623-8367 at our Manchester, Maine Project Office.

Sincerely,

Robert J. DeSista
Regulatory Division

Copies Furnished:
Mark Kern – EPA
Wende Mahaney – USFWS
Marcy Scott – NMFS
Mark Hasselmann - FHWA
Robin Clukey – Maine DEP

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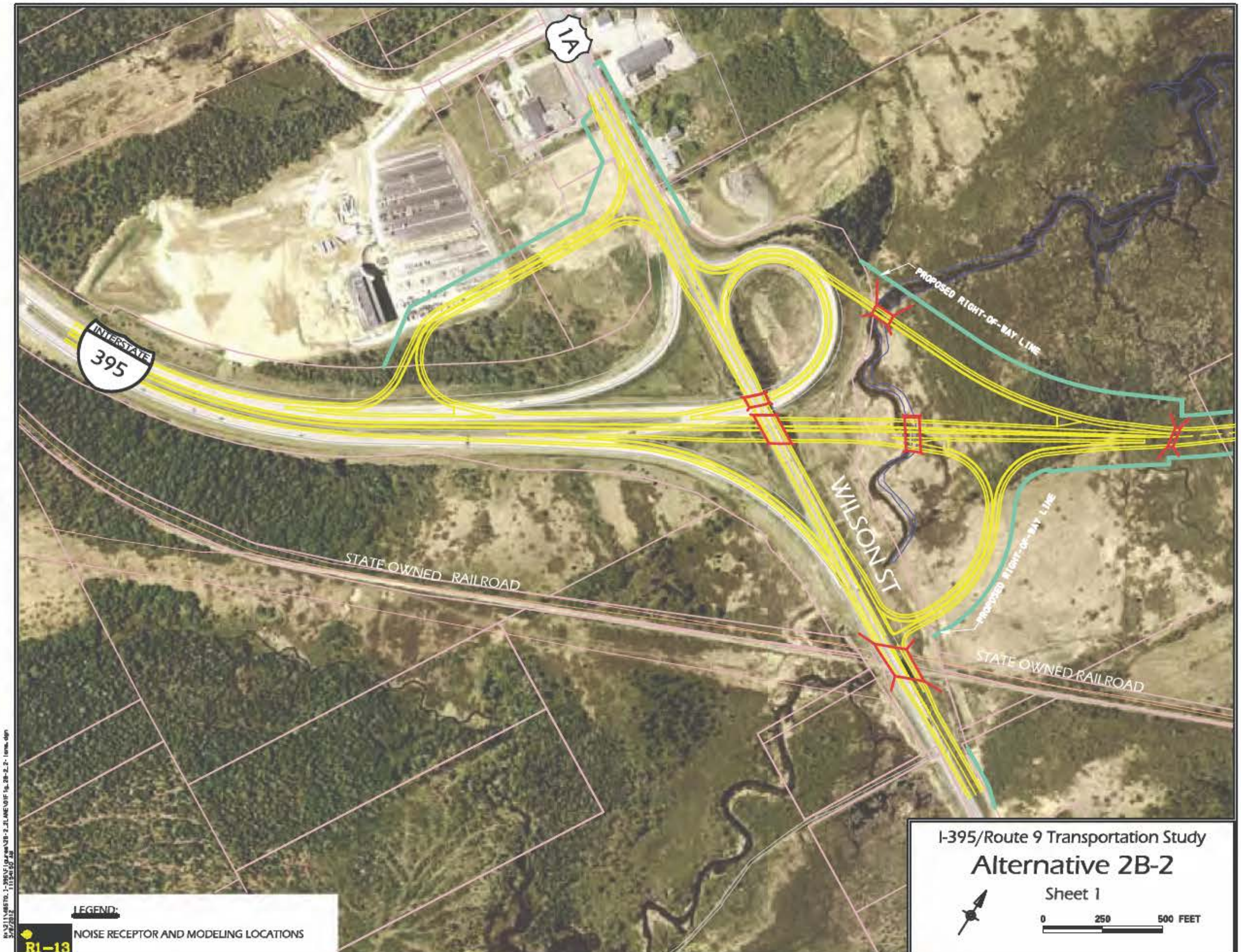
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INTERSTATE
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PROPOSED RIGHT-OF-WAY LINE
WILSON ST
PROPOSED RIGHT-OF-WAY LINE
STATE OWNED RAILROAD
STATE OWNED RAILROAD
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 2B-2
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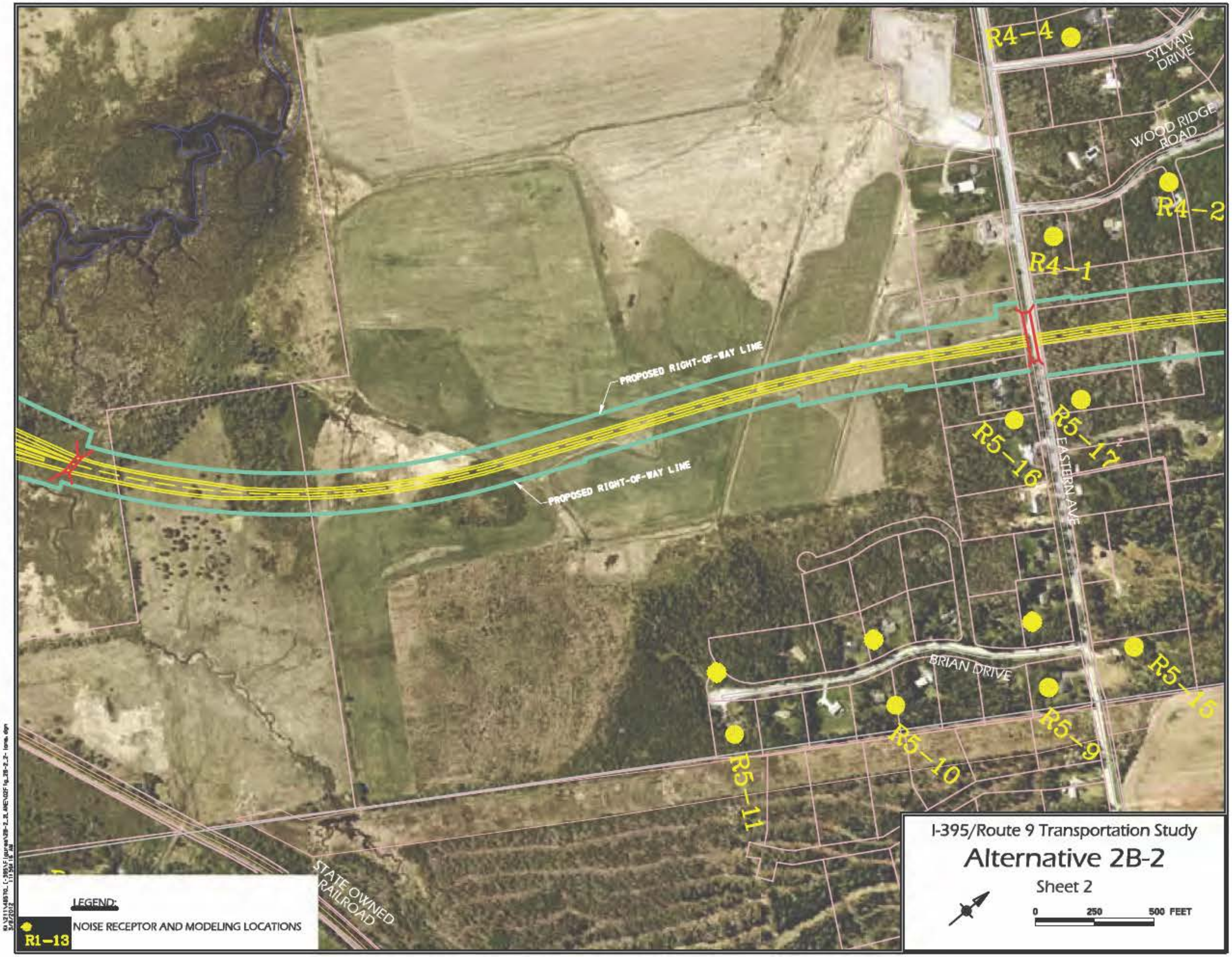
500 FEET



R4-4
SYLVAN DRIVE
WOOD RIDGE ROAD
R4-2
R4-1
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R5-17
R5-16
EASTERN AVE
BRIAN DRIVE
R5-15
R5-9
R5-10
R5-11
STATE OWNED RAILROAD
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 2B-2
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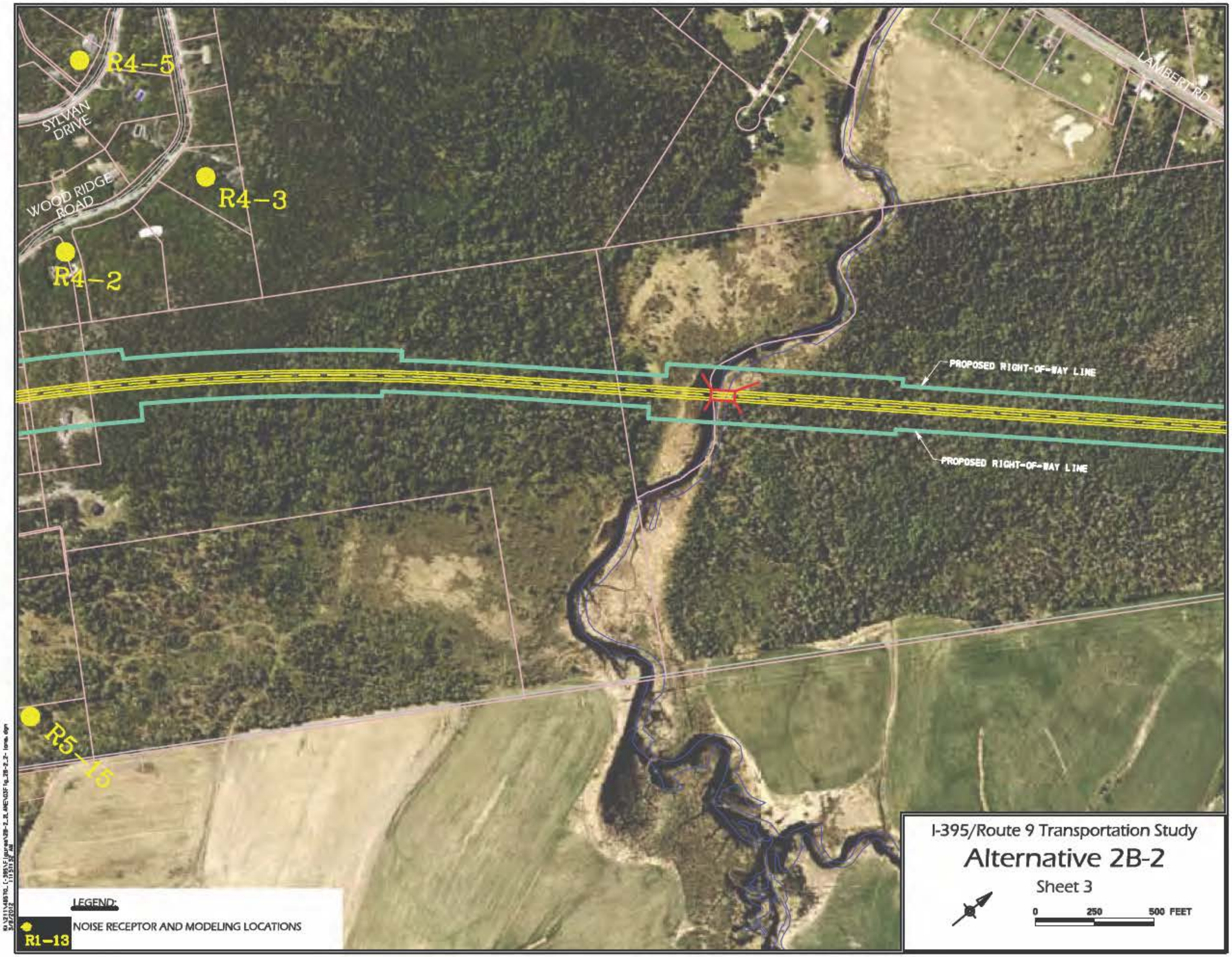
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SYLVAN DRIVE
WOOD RIDGE ROAD
R4-3
R4-2
LAMBERT RD
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R5-15
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 2B-2
Sheet 3
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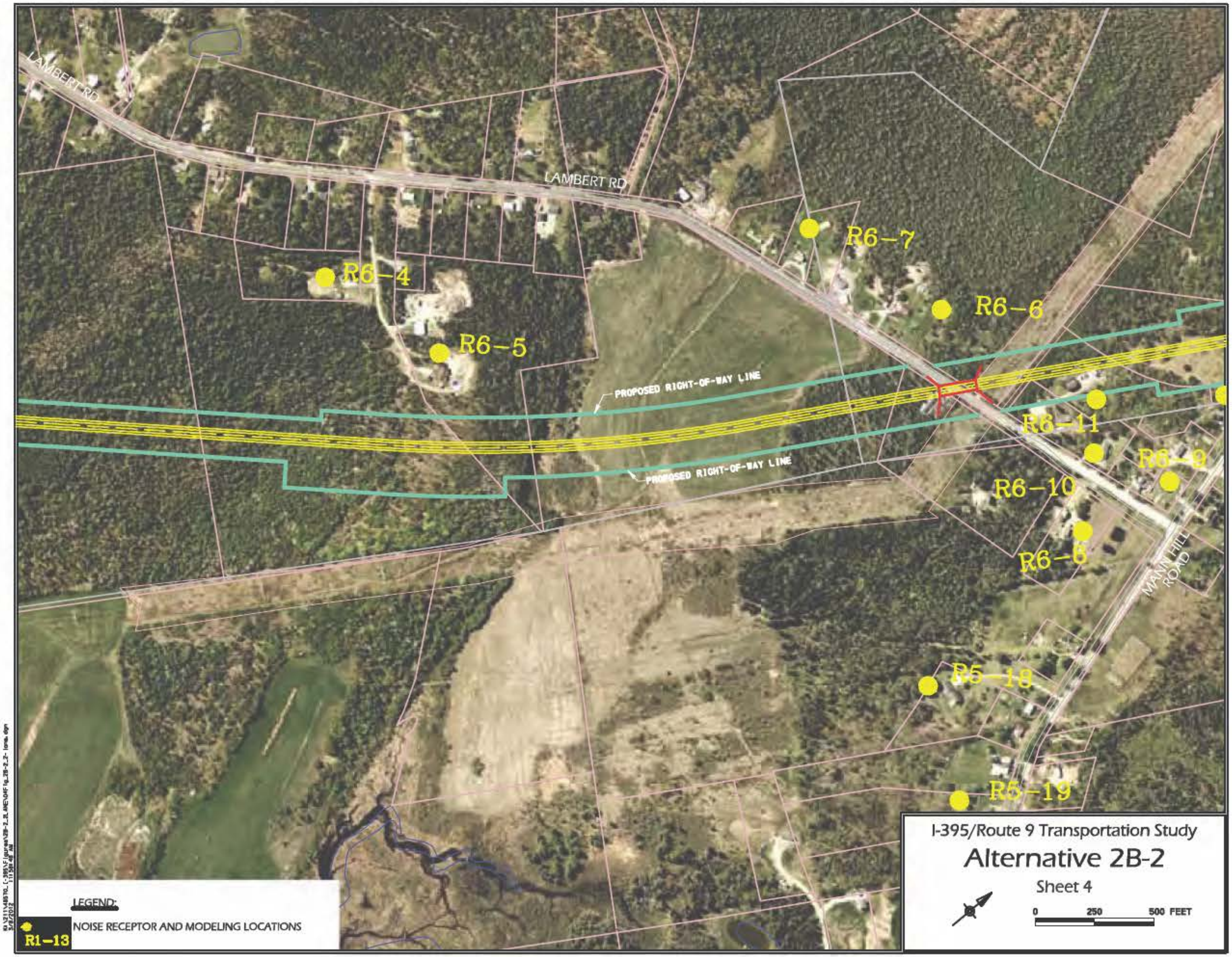

LAMBERT RD
LAMBERT RD
R6-4
R6-5
R6-7
R6-6
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R6-11
R6-9
R6-10
R6-8
MANN HILL ROAD
R5-18
R5-19
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I-395/Route 9 Transportation Study
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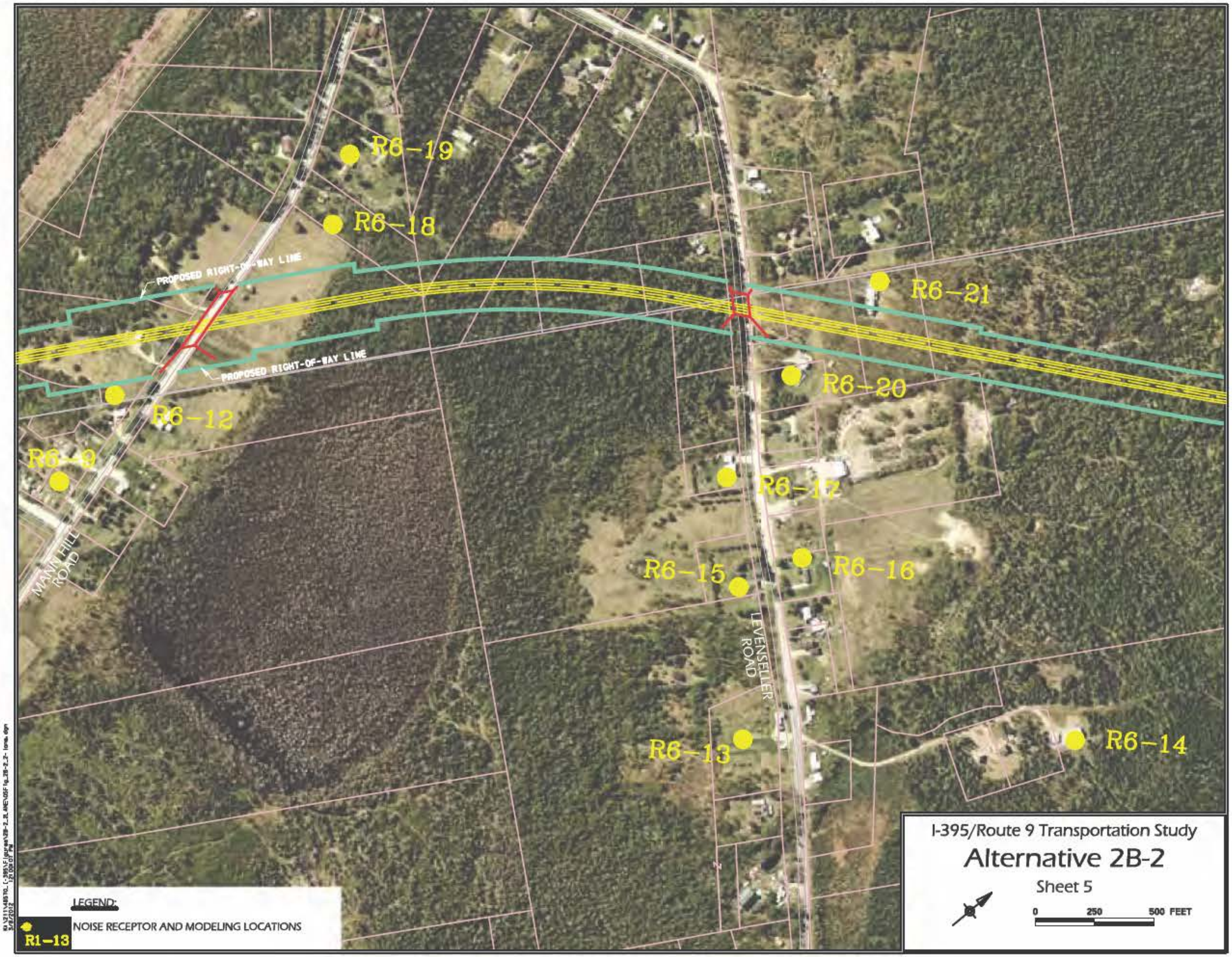
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R6-18
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PROPOSED RIGHT-OF-WAY LINE
R6-21
R6-20
R6-12
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R6-17
MANN HILL ROAD
R6-15
R6-16
LEVENSELLER ROAD
R6-13
R6-14
I-395/Route 9 Transportation Study
Alternative 2B-2
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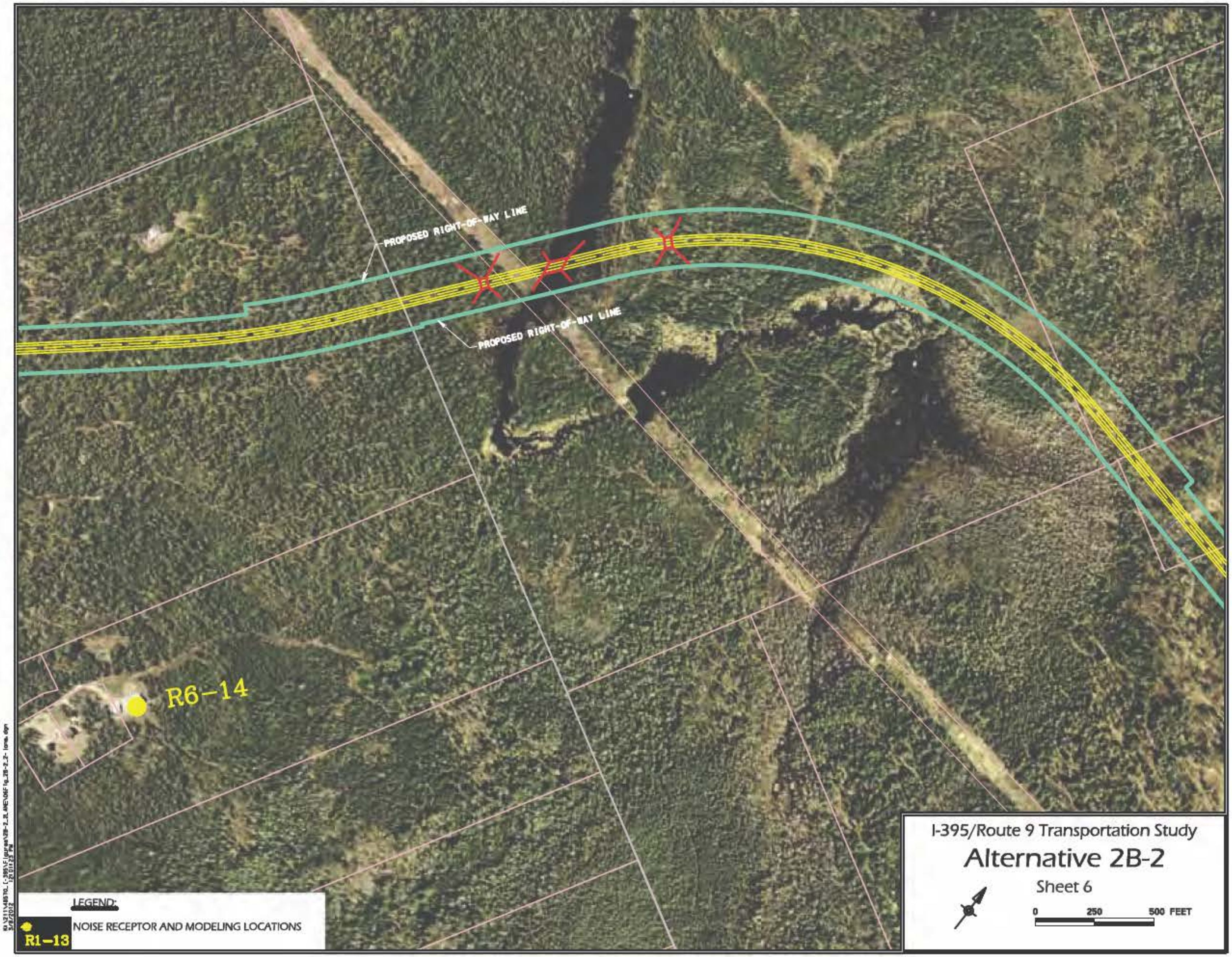
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS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R1-13
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I-395/Route 9 Transportation Study
Alternative 2B-2
Sheet 6
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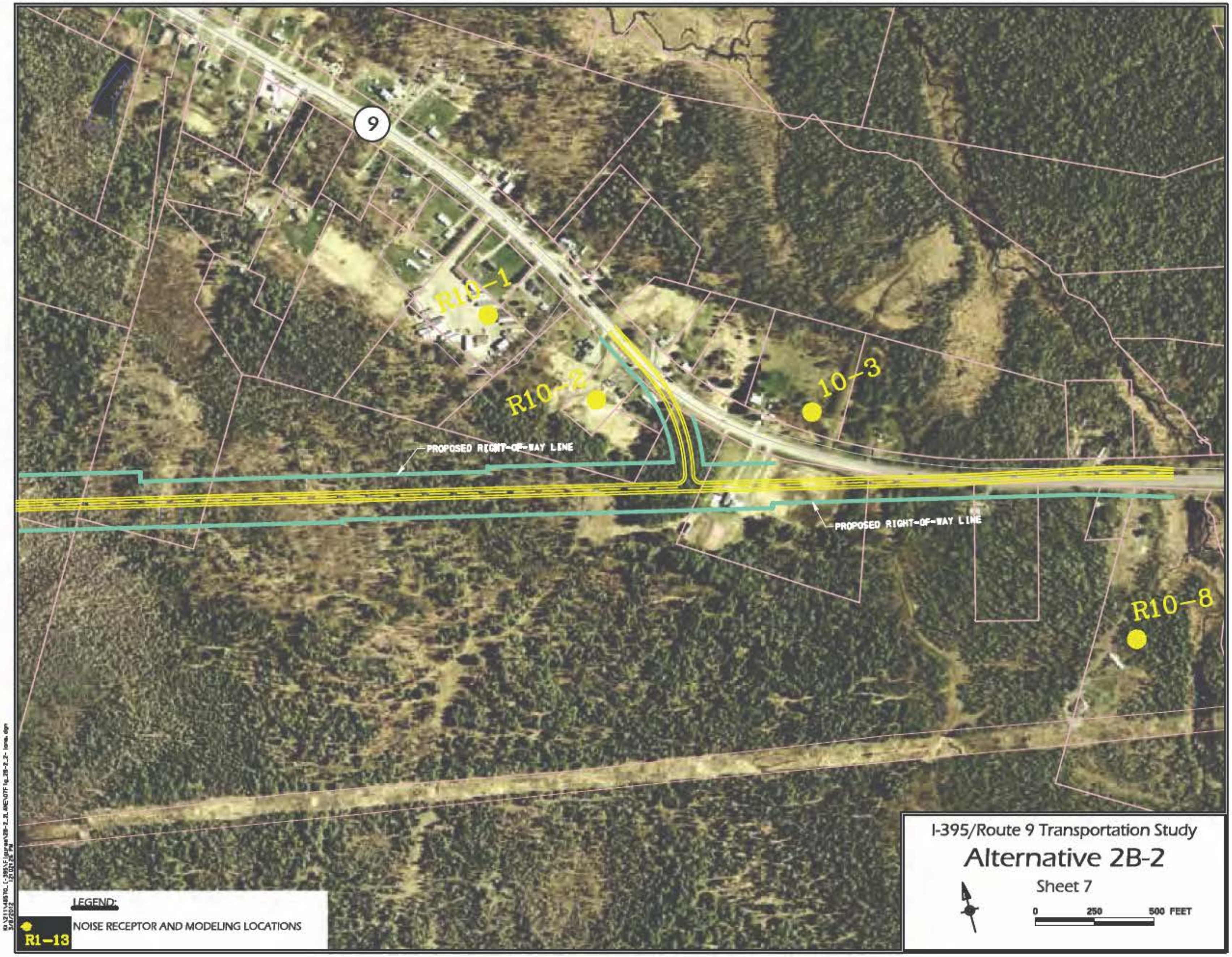
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10-3
R10-8
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PROPOSED RIGHT-OF-WAY LINE
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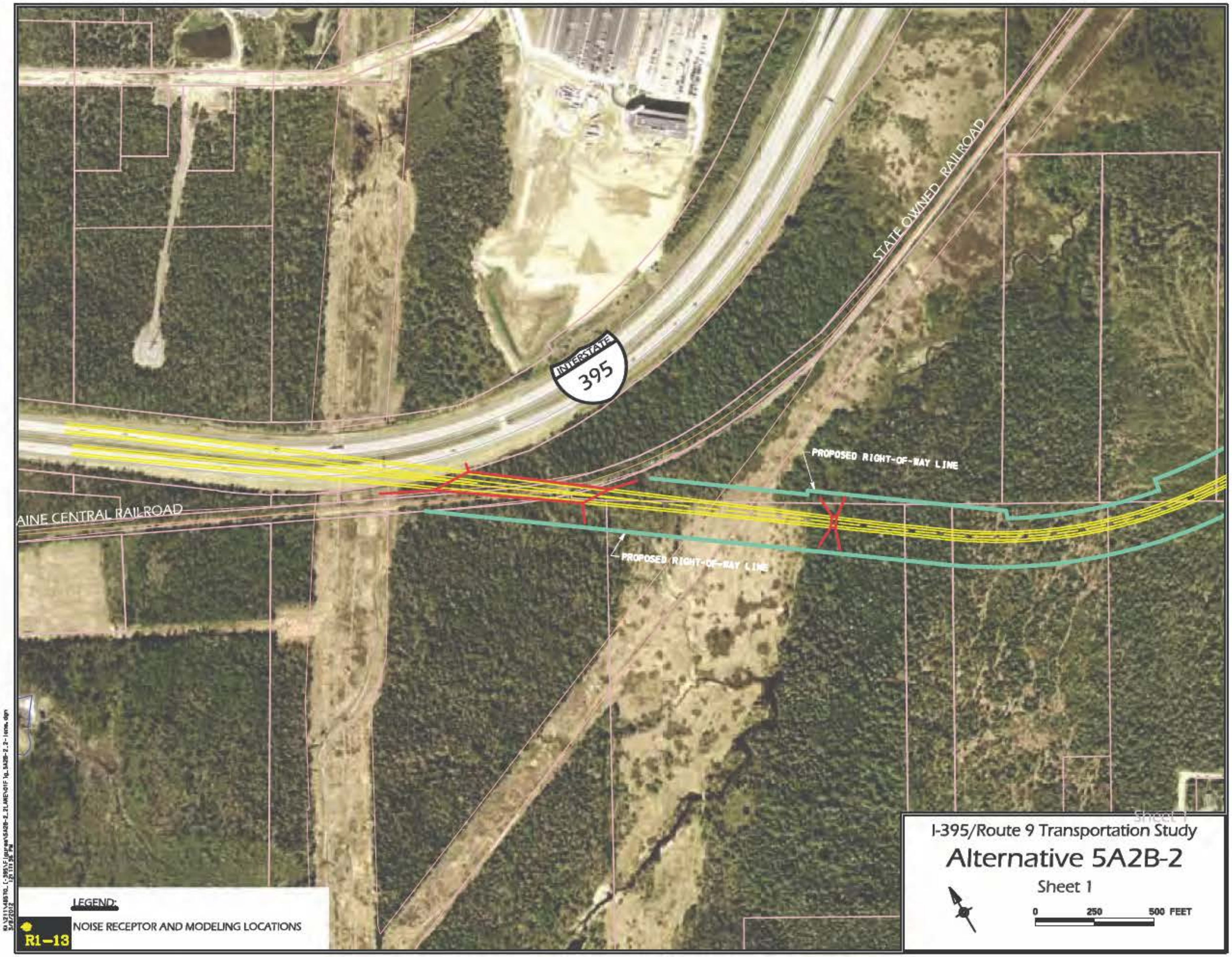

STATE OWNED RAILROAD
INTERSTATE
395
PROPOSED RIGHT-OF-WAY LINE
AINE CENTRAL RAILROAD
PROPOSED RIGHT-OF-WAY LINE
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5A2B-2
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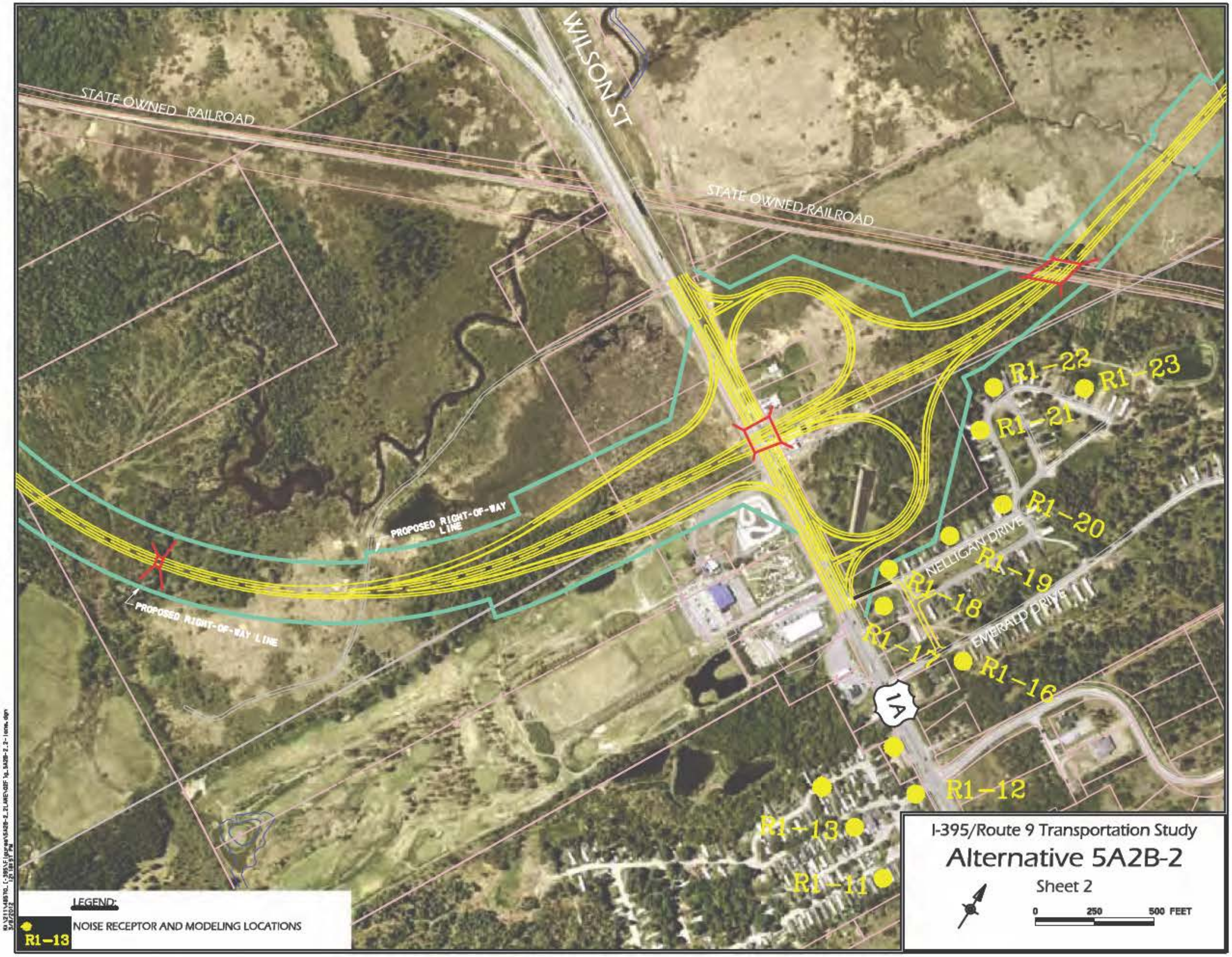
500 FEET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STATE OWNED RAILROAD
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
NELLIGAN DRIVE
EMERALD DRIVE
1A
R1-11
R1-12
R1-13
R1-16
R1-17
R1-18
R1-19
R1-20
R1-21
R1-22
R1-23
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5A2B-2
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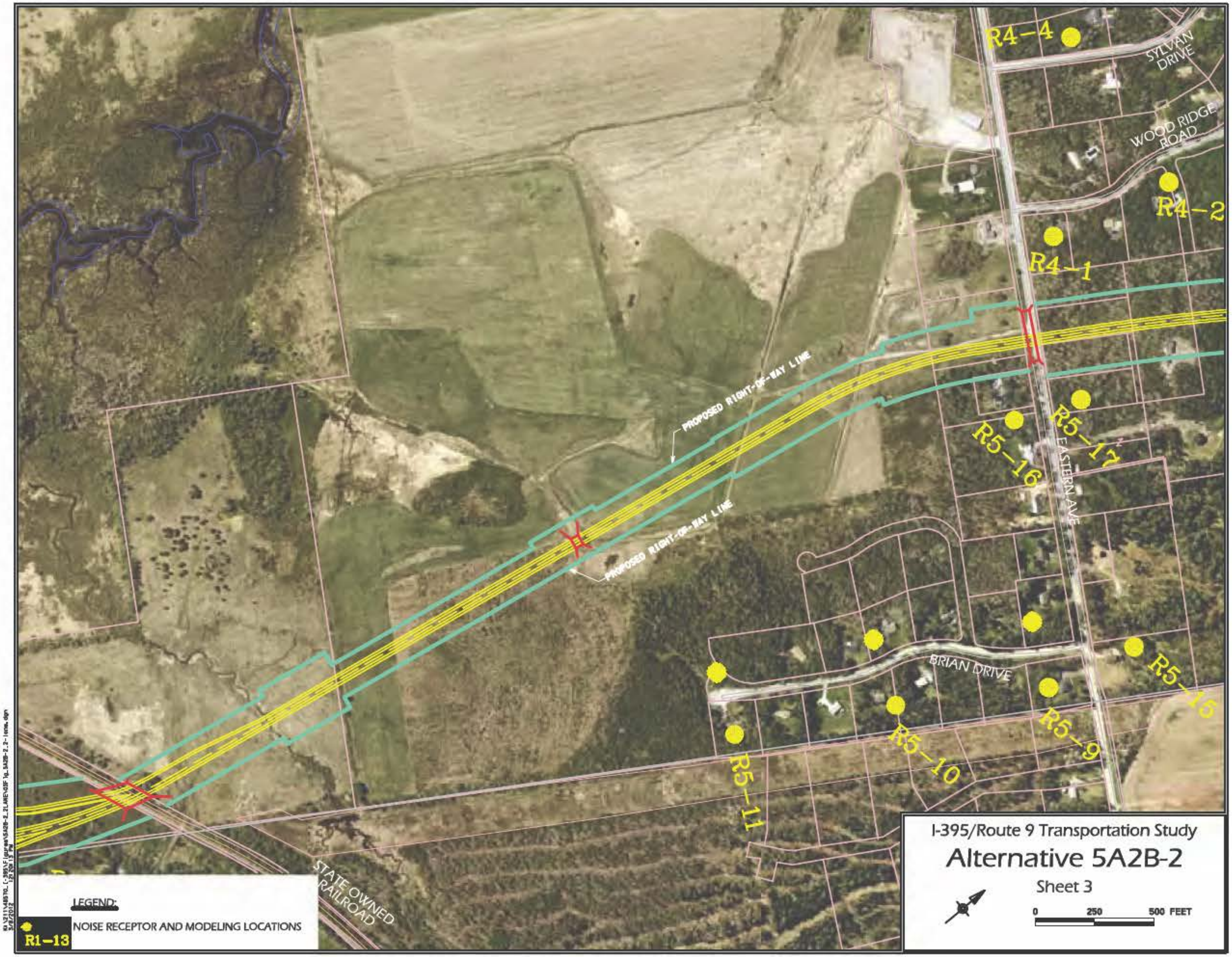
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SYLVAN DRIVE
WOOD RIDGE ROAD
R4-2
R4-1
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R5-17
R5-16
EASTERN AVE
BRIAN DRIVE
R5-15
R5-9
R5-10
R5-11
STATE OWNED RAILROAD
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5A2B-2
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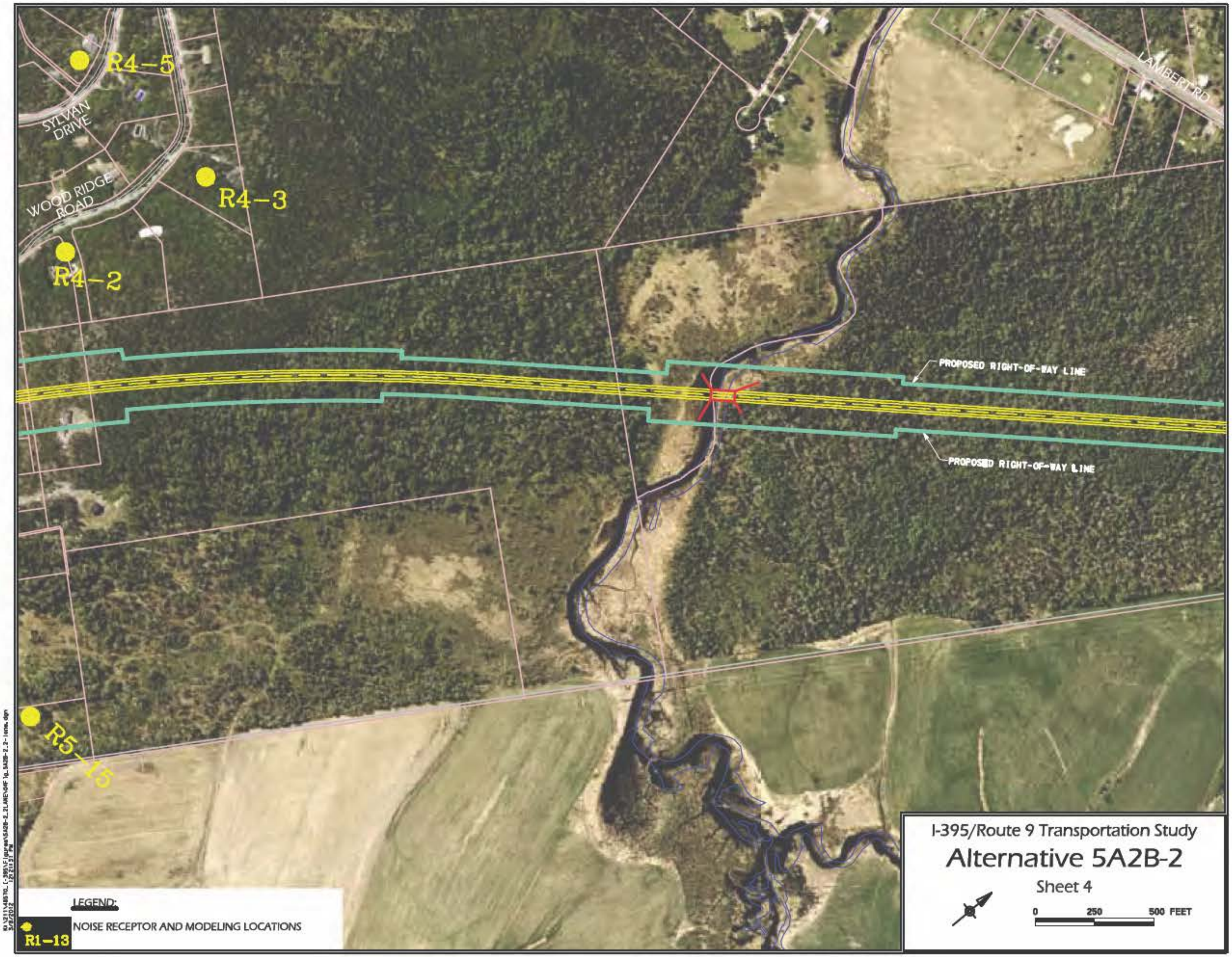
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WOOD RIDGE ROAD
R4-3
R4-2
LAMBERT RD
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R5-15
LEGEND:
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NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
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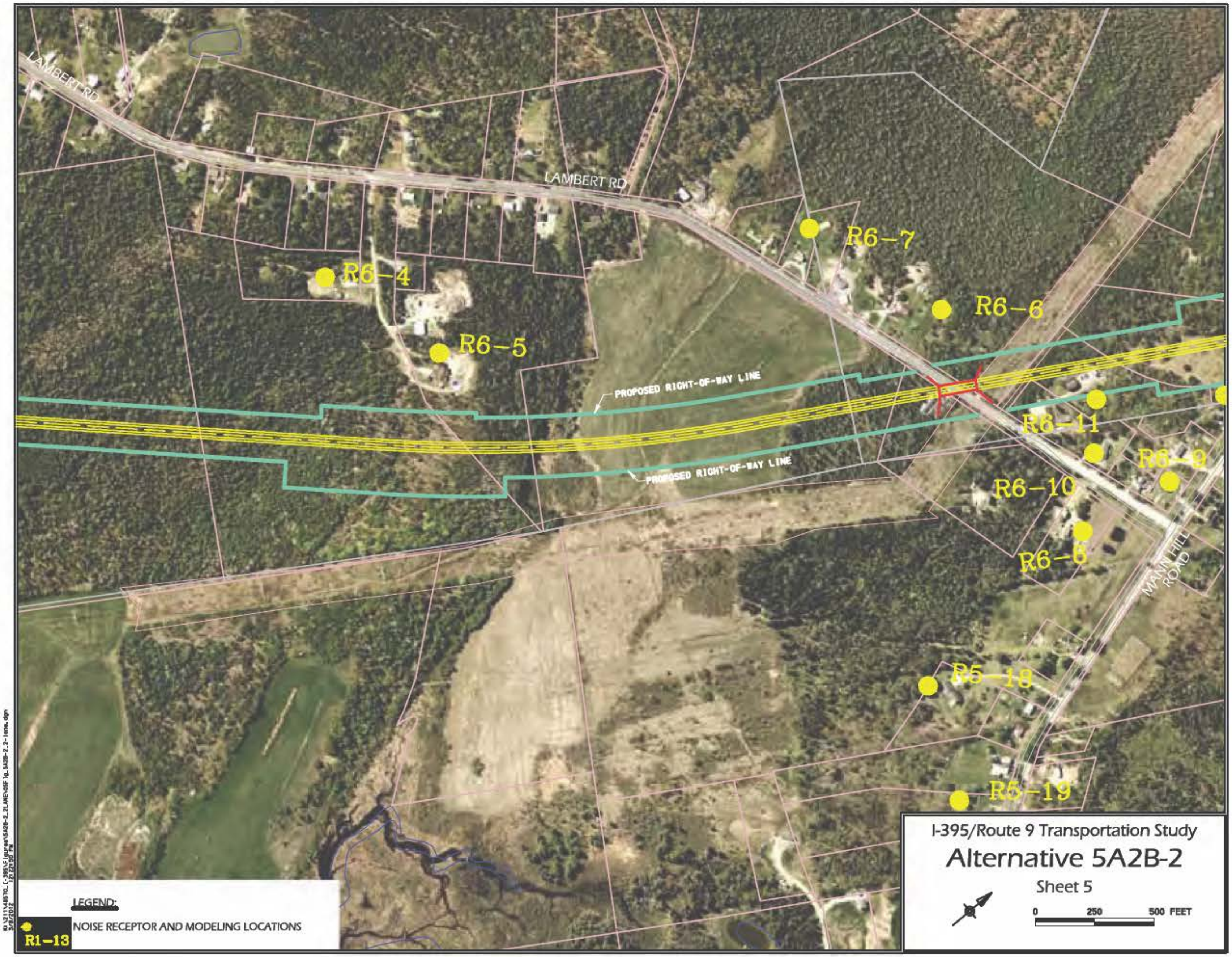
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R6-4
R6-5
R6-7
R6-6
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R6-11
R6-9
R6-10
R6-8
MANN HILL ROAD
R5-18
R5-19
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5A2B-2
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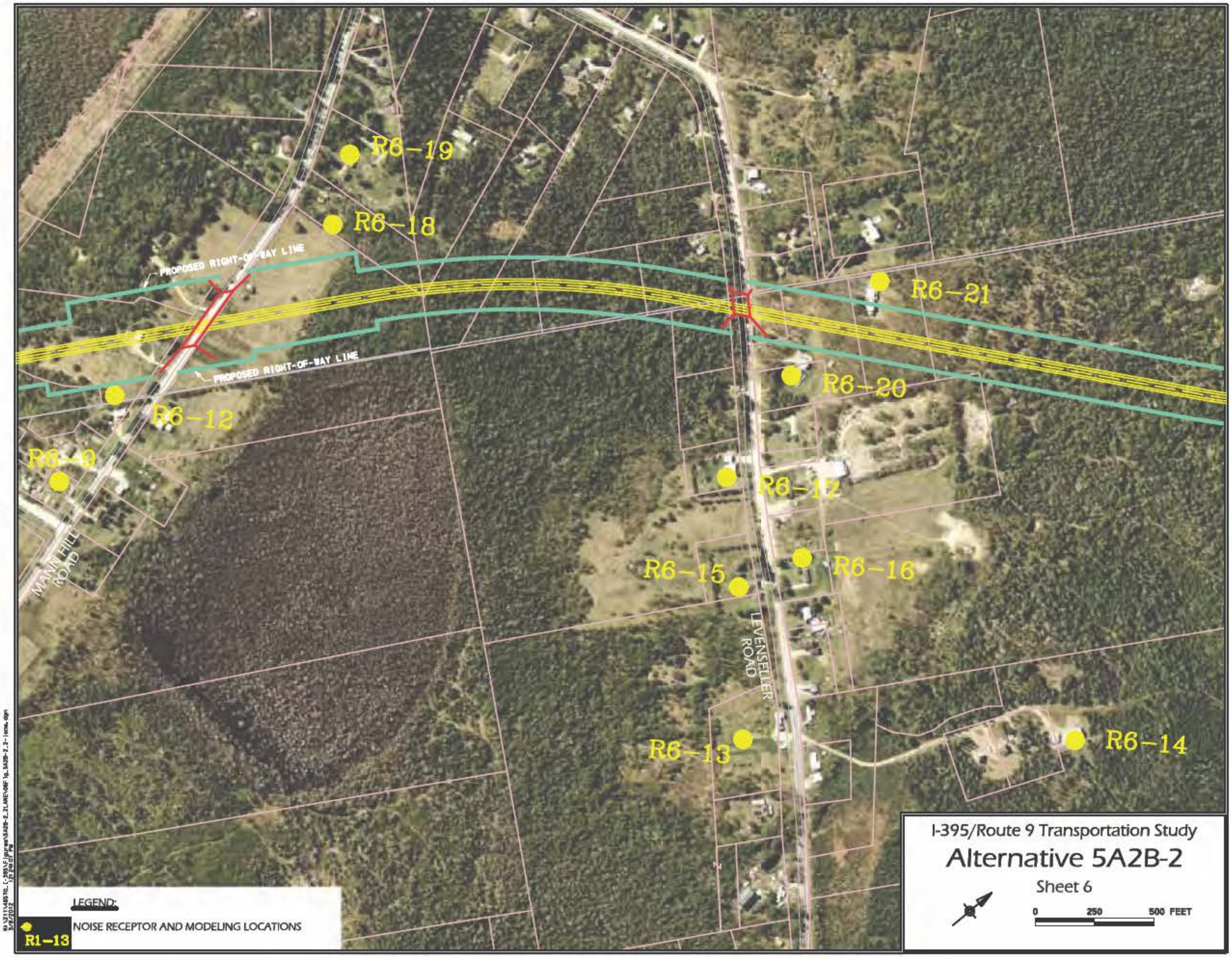

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PROPOSED RIGHT-OF-WAY LINE
R6-21
R6-20
R6-12
R6-9
R6-17
R6-16
R6-15
MANN HILL ROAD
LEVENSELLER ROAD
R6-13
R6-14
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5A2B-2
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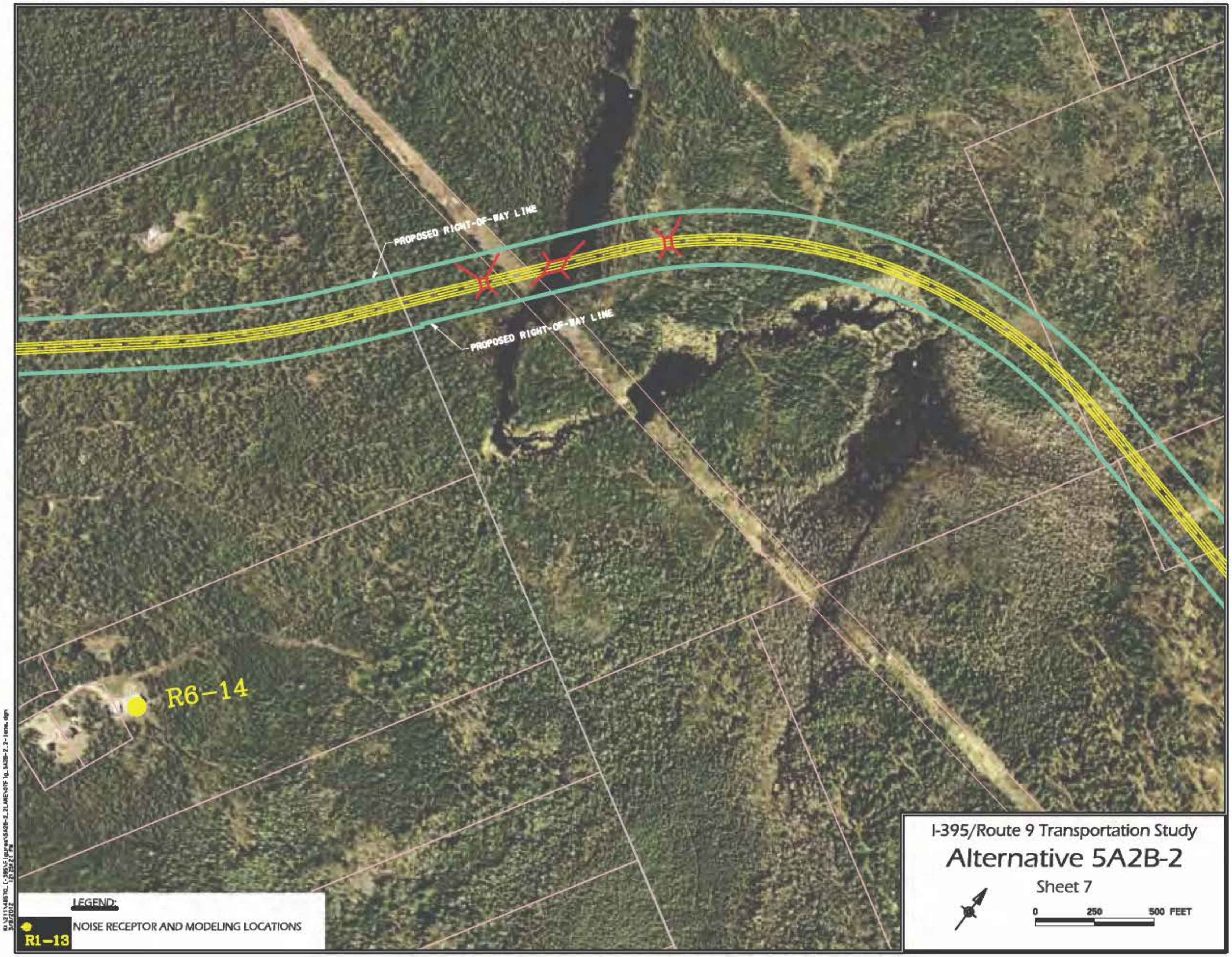
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LEGEND:
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Alternative 5A2B-2
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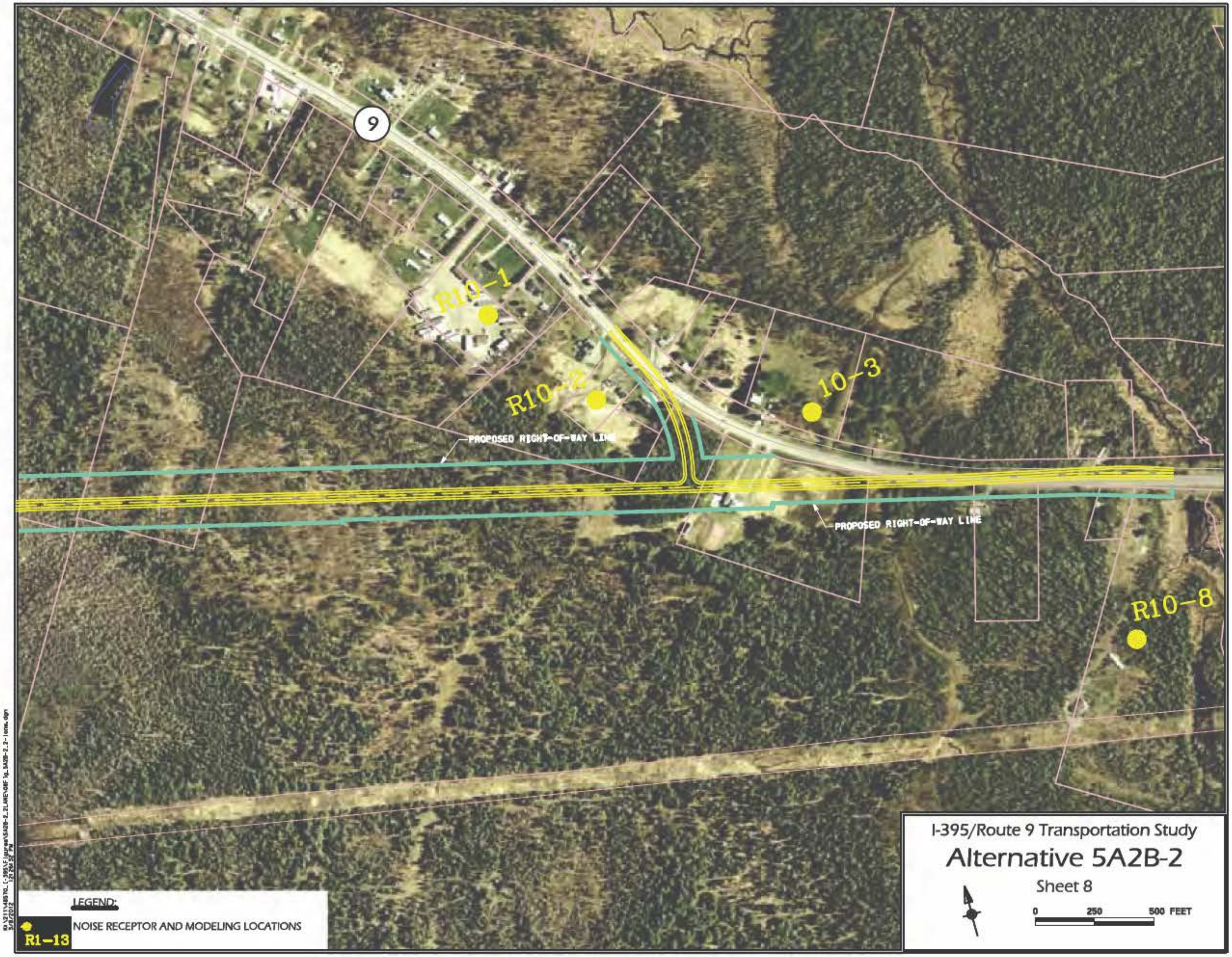
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R10-2
10-3
R10-8
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PROPOSED RIGHT-OF-WAY LINE
LEGEND:
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I-395/Route 9 Transportation Study
Alternative 5A2B-2
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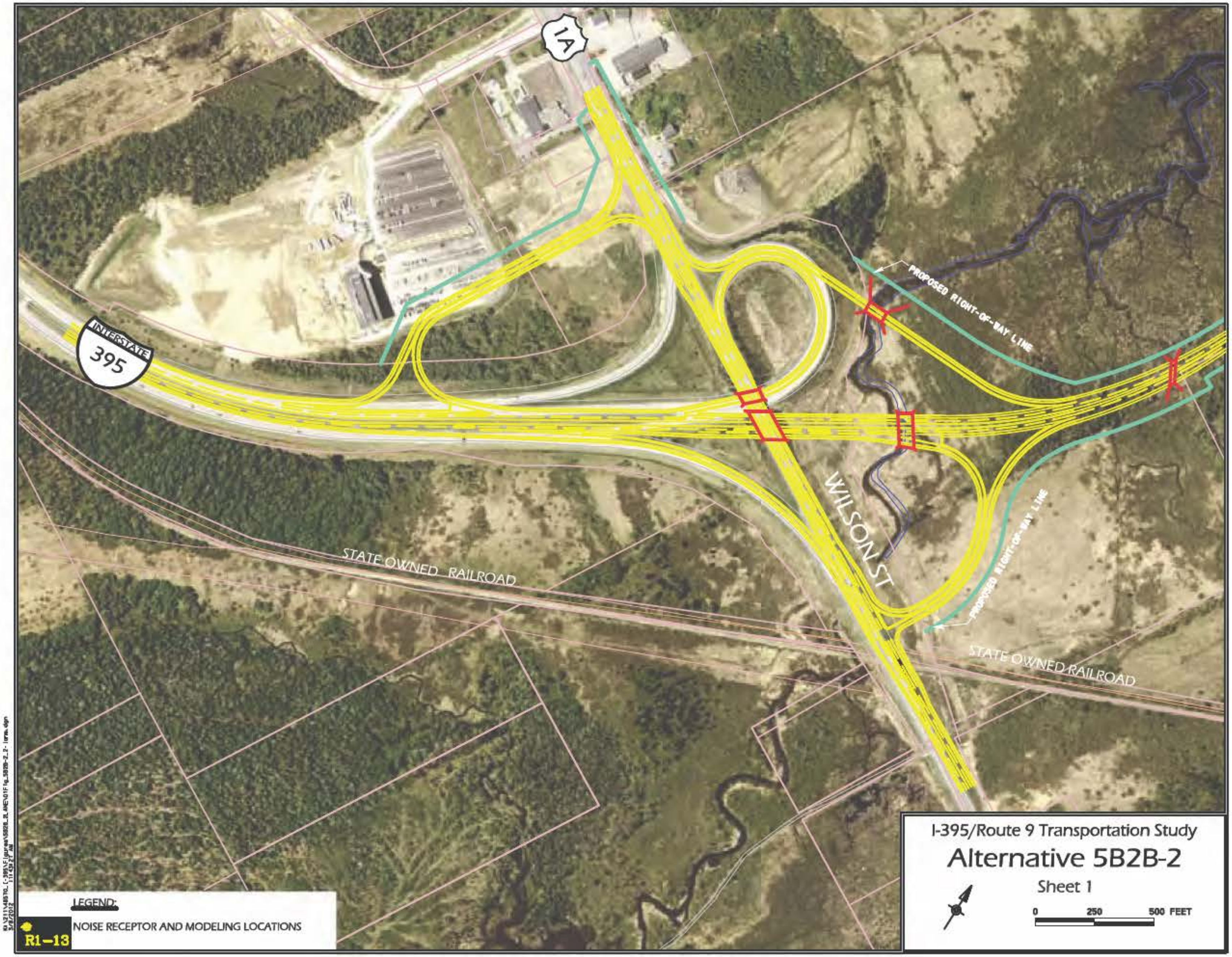
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INTERSTATE
395
PROPOSED RIGHT-OF-WAY LINE
WILSON ST
STATE OWNED RAILROAD
STATE OWNED RAILROAD
PROPOSED RIGHT-OF-WAY LINE
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
Sheet 1
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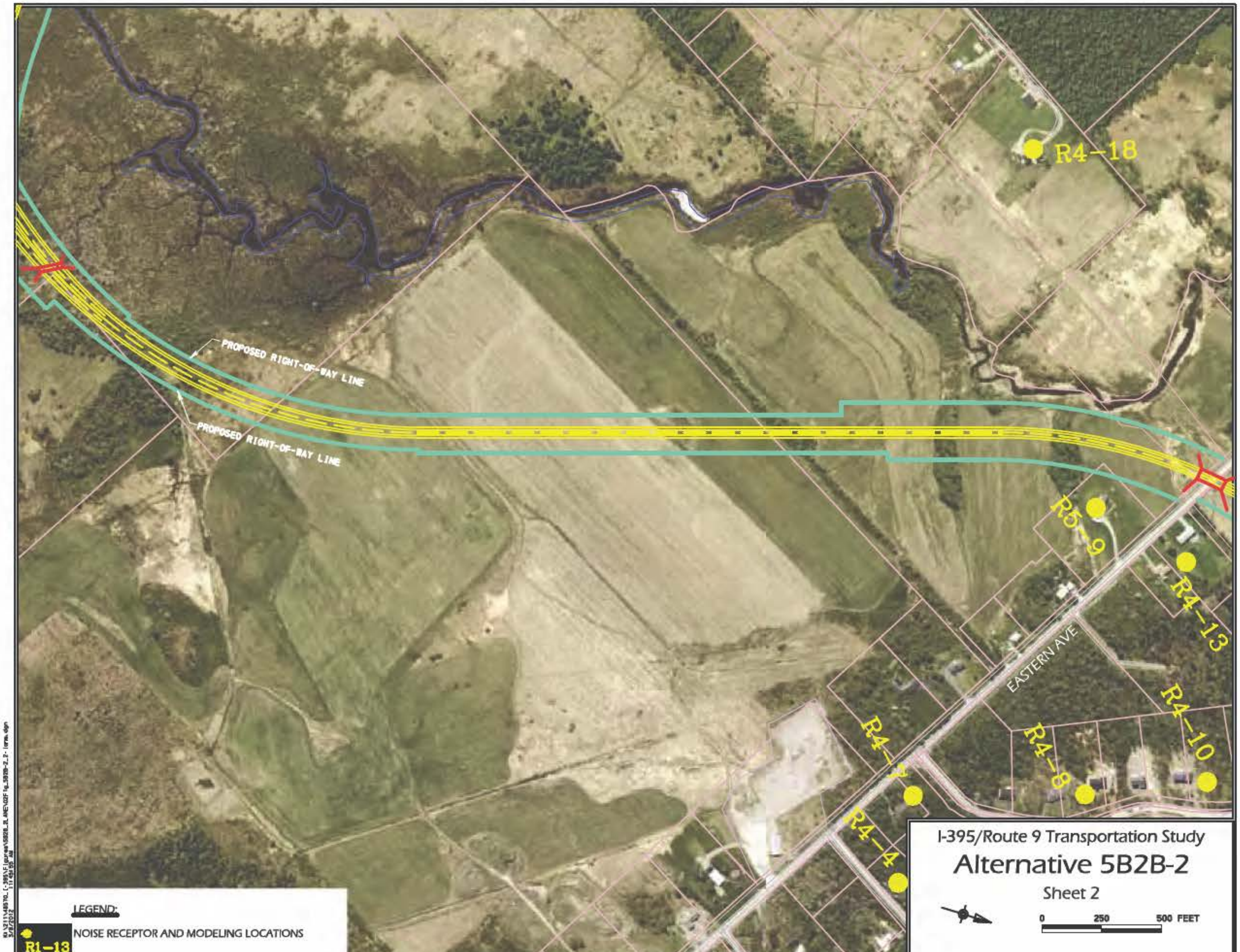

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PROPOSED RIGHT-OF-WAY LINE
R4-18
R5-9
R4-13
EASTERN AVE
R4-10
R4-8
R4-7
R4-4
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
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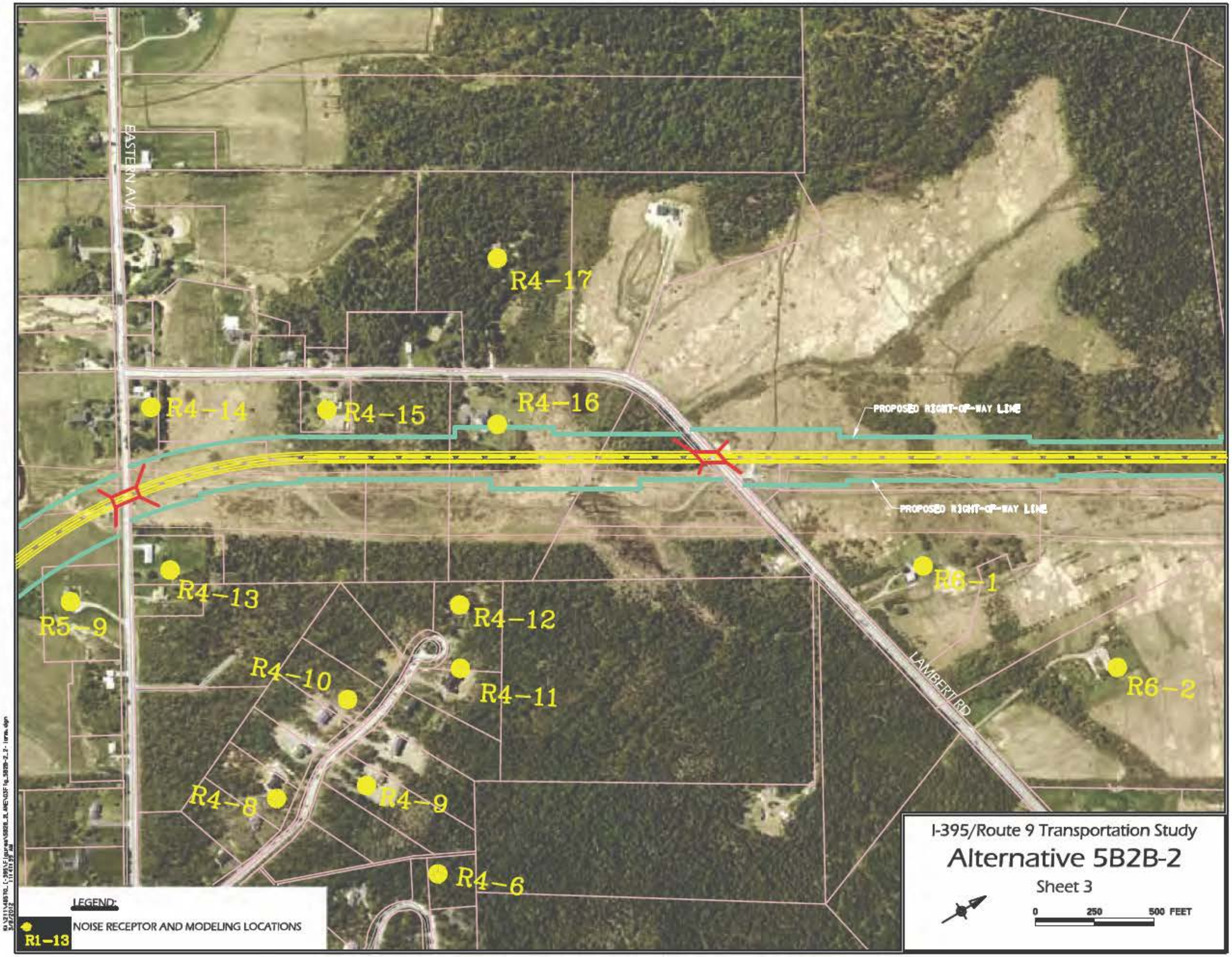
EASTERN AVE
R4-17
R4-14
R4-15
R4-16
PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
R4-13
R5-9
R4-12
R6-1
R4-10
R4-11
LAMBERT RD
R6-2
R4-8
R4-9
R4-6
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
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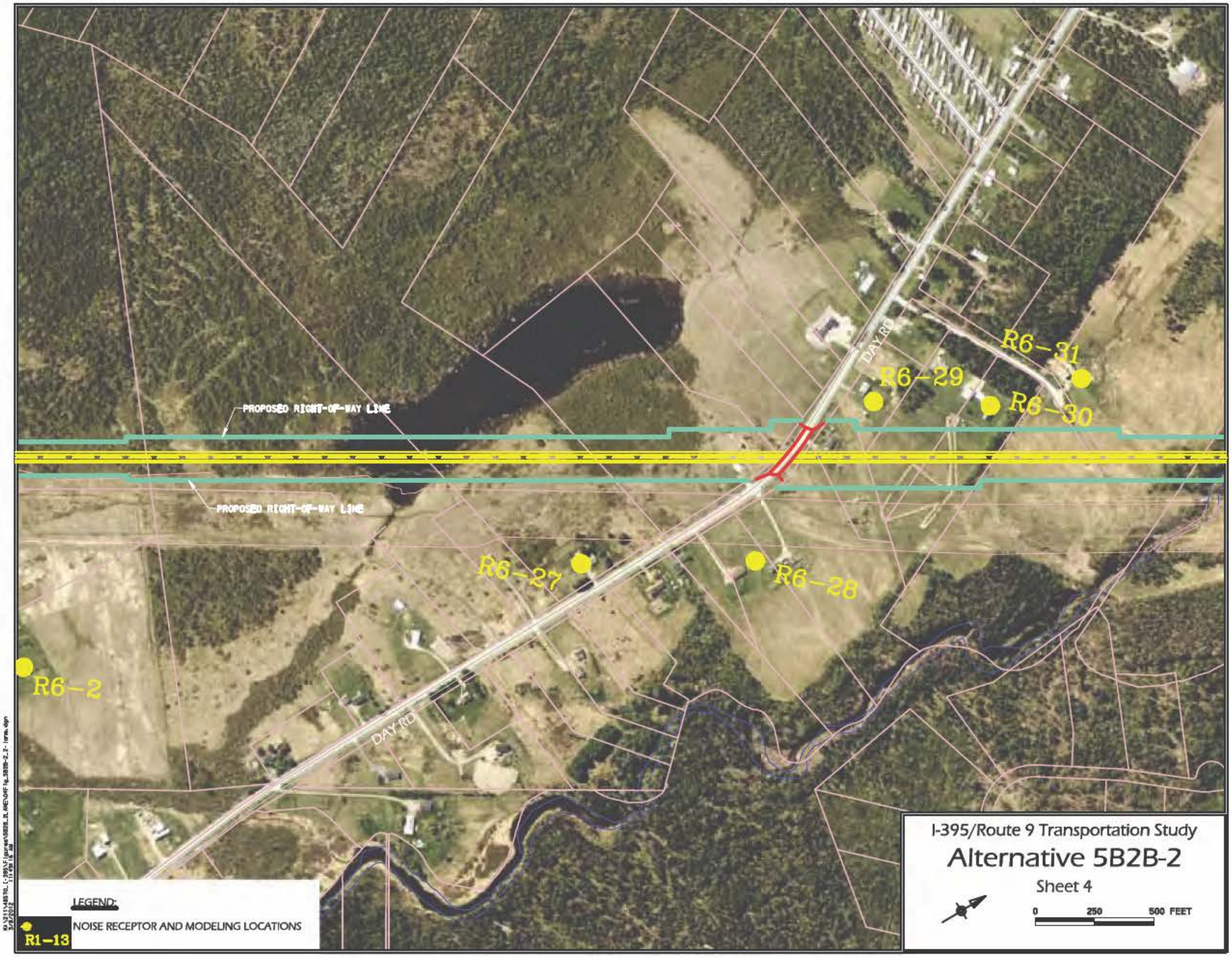
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PROPOSED RIGHT-OF-WAY LINE
DAY RD
DAY RD
R6-31
R6-29
R6-30
R6-27
R6-28
R6-2
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
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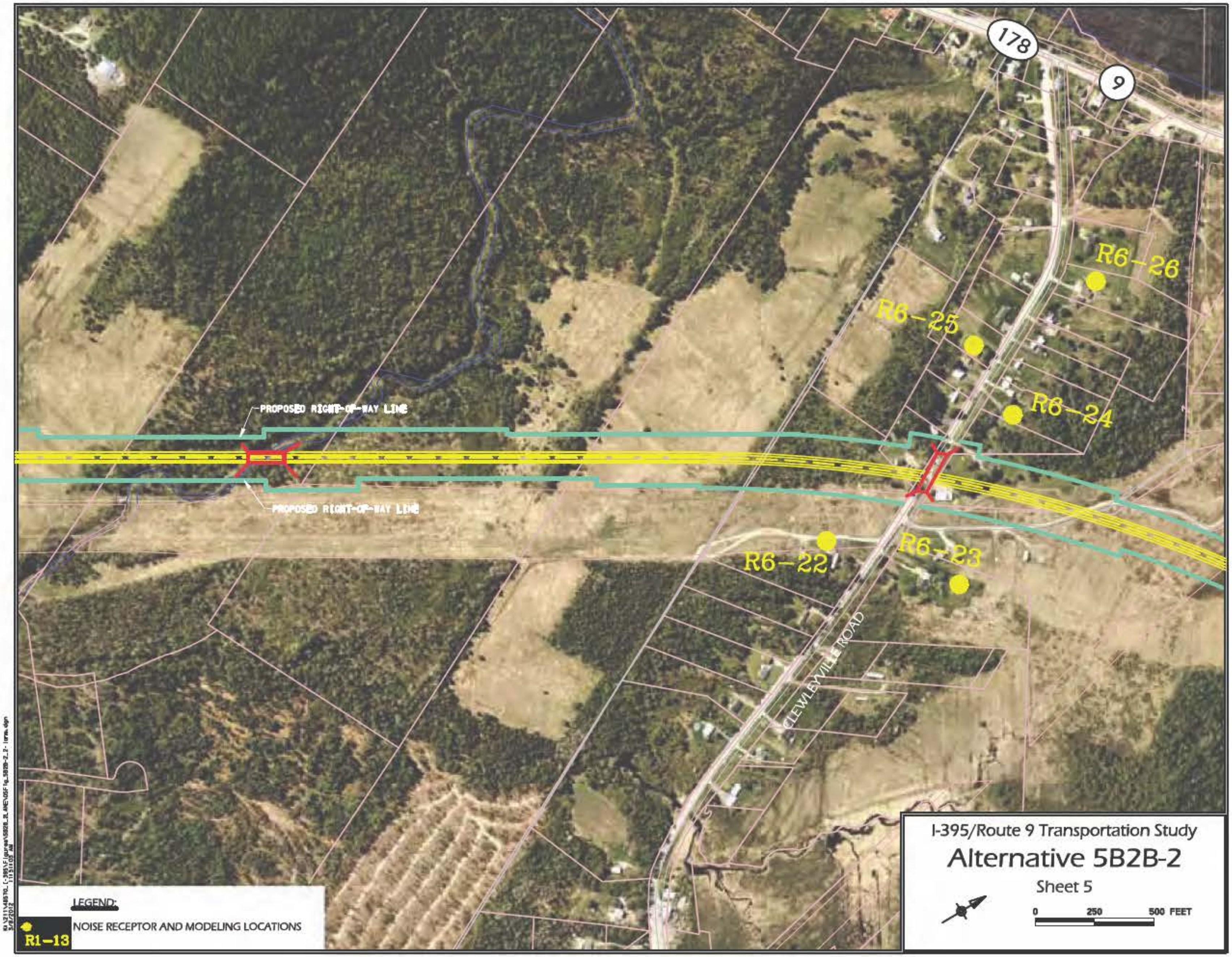
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R6-26
R6-25
R6-24
R6-23
R6-22
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PROPOSED RIGHT-OF-WAY LINE
CLEWLEYVILLE ROAD
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
Sheet 5
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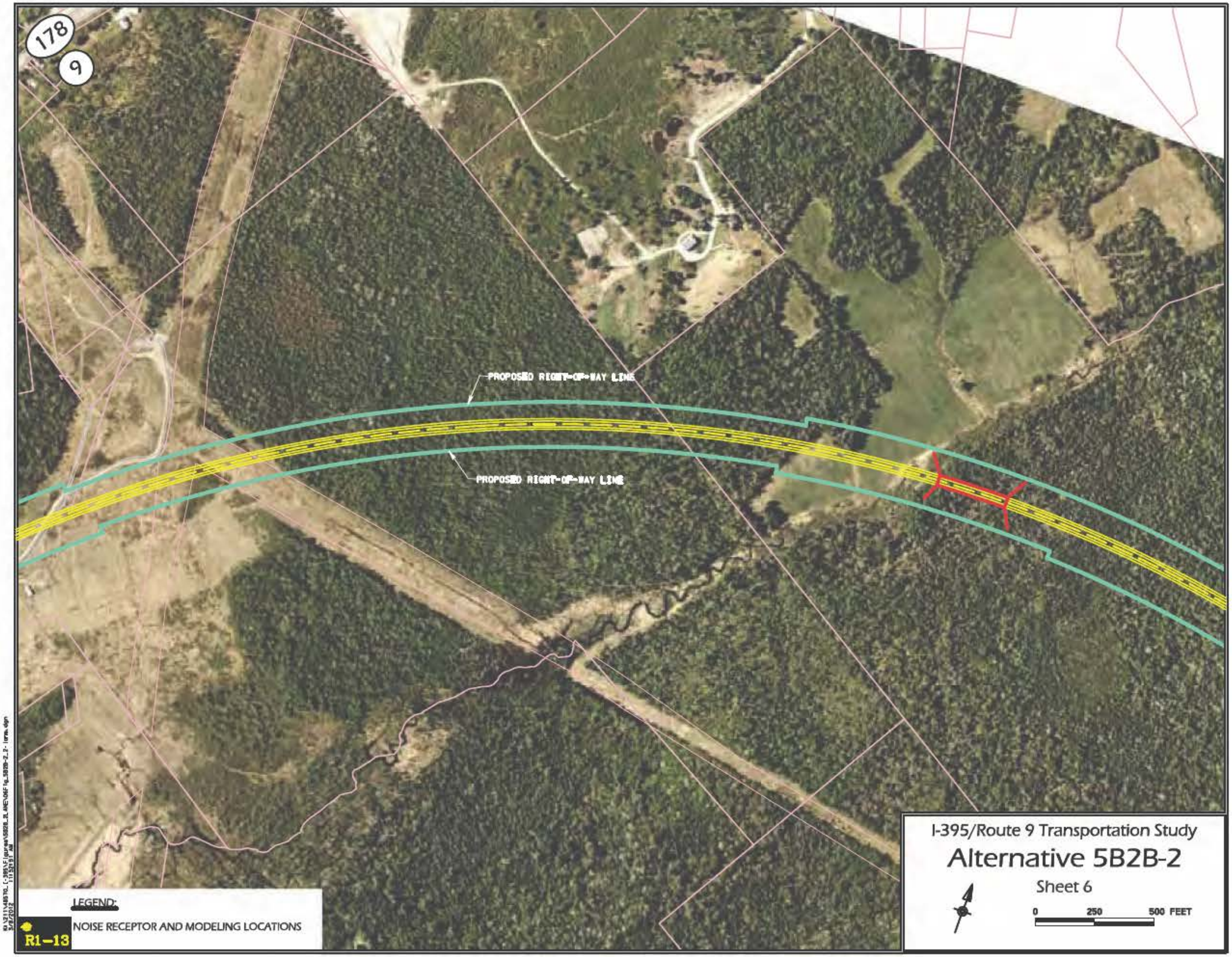
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PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
I-395/Route 9 Transportation Study
Alternative 5B2B-2
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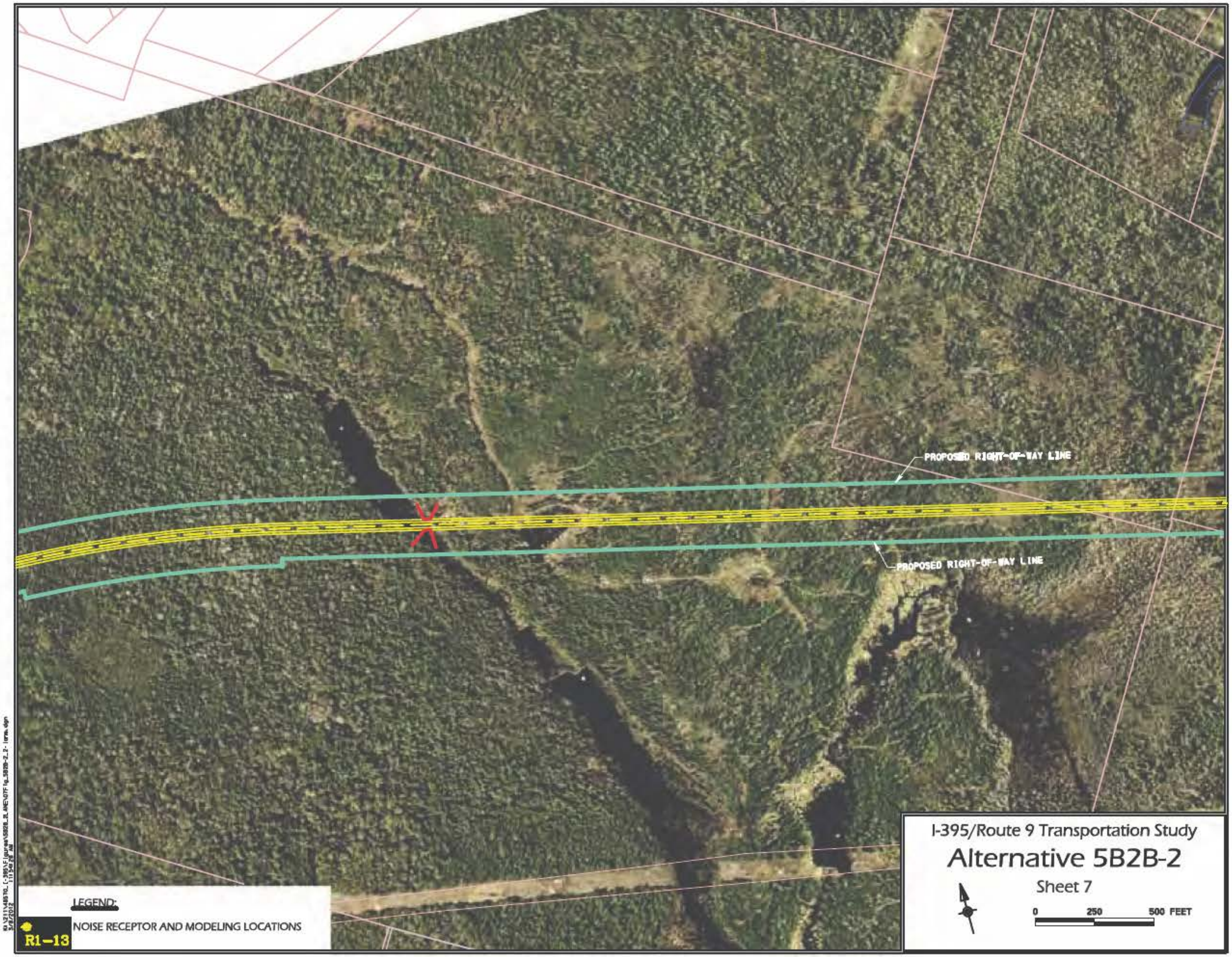
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS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PROPOSED RIGHT-OF-WAY LINE
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I-395/Route 9 Transportation Study
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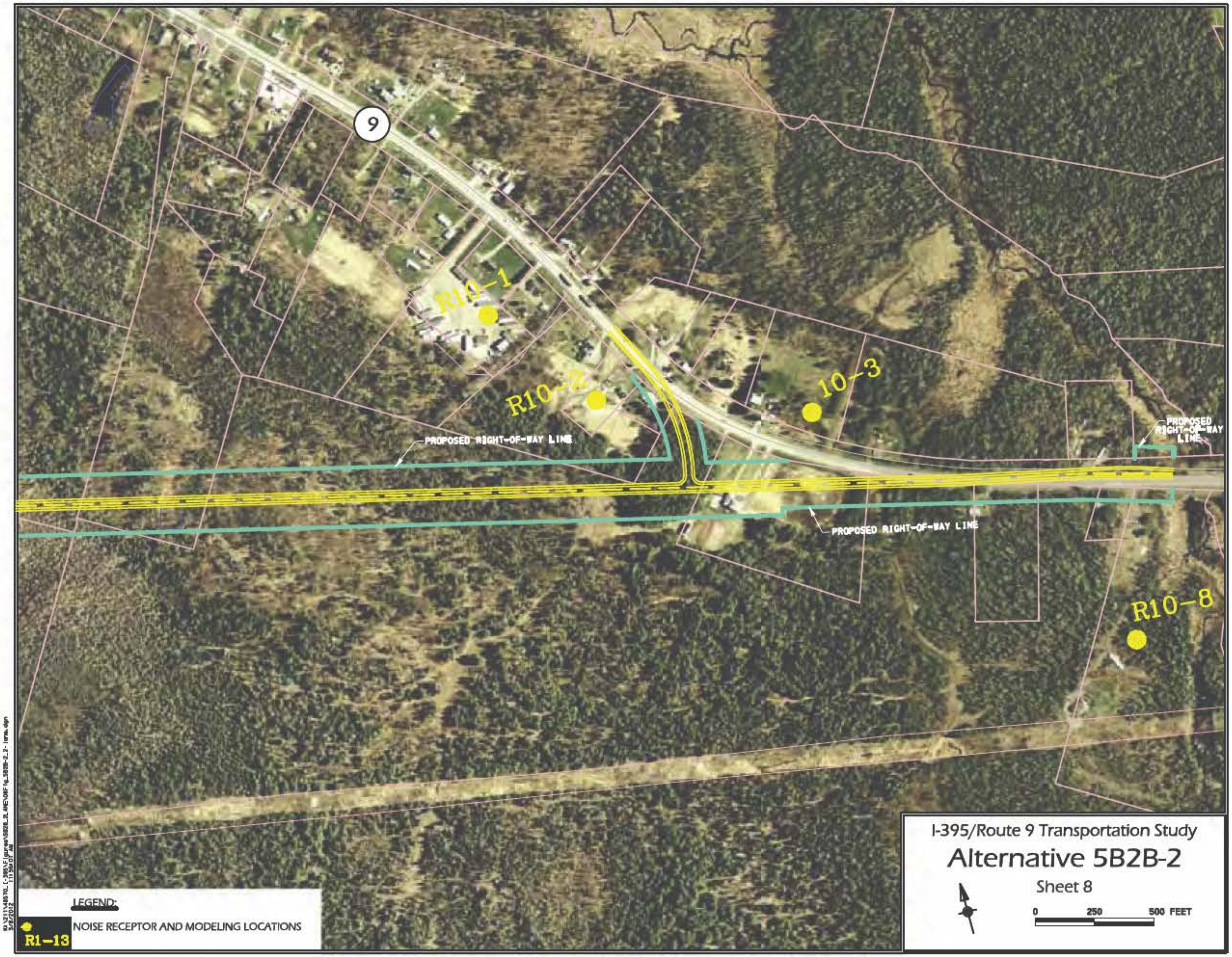
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R10-1
R10-2
10-3
R10-8
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PROPOSED RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
LEGEND:
R1-13
NOISE RECEPTOR AND MODELING LOCATIONS
I-395/Route 9 Transportation Study
Alternative 5B2B-2
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U.S. ARMY CORPS OF ENGINEERS
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
(33 CFR 325)

OMB APPROVAL NO. 0710-0003
EXPIRES: 31 AUGUST 2012

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
First - Kenneth Middle - Last - Sweeney
Company - Maine Department of Transportation
E-mail Address - Ken.Sweeney@Maine.gov

8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Middle - Last -
Company -
E-mail Address -

6. APPLICANT'S ADDRESS:
Address- 16 State House Station
City - Augusta State - ME Zip - 04333 Country - U.S.

9. AGENT'S ADDRESS:
Address-
City - State - Zip - Country -

7. APPLICANT'S PHONE NOs. w/AREA CODE
a. Residence
b. Business (207) 624-3011
c. Fax (207) 624-3001

10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, RUSSELL CHARETTE to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

SIGNATURE OF APPLICANT 3/8/12 DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
I-395/Route 9 Transportation Study

13. NAME OF WATERBODY, IF KNOWN (if applicable)
Eaton,Felts,Meadow, and Mill Brook, unnamed streams, wetlands

14. PROJECT STREET ADDRESS (if applicable)
Address
City - State- Zip-

15. LOCATION OF PROJECT
Latitude: •N Longitude: •W

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality Brewer, Eddington, Holden
Section - Township - Range -

ENG FORM 4345, OCT 2010 EDITION OF OCT 2004 IS OBSOLETE Proponent: CECW-OR

17. DIRECTIONS TO THE SITE
From Augusta to Brewer, Holden, and Eddington, Maine: North on I-95 to I-395, east on I-395 to Brewer, east on Route 1A to Holden, and north on Route 9 to Eddington, Maine.

18. Nature of Activity (Description of project, include all features)
Construction of a controlled-access highway connecting I-395 to Route 9 in the city of Brewer, and the towns of Holden and Eddington. The project consists of four alternatives, including the No-Build Alternative. The build alternatives are Alternative 2B-2, Alternative 5A2B-2, and Alternative 5B2B-2. See attached preliminary drawings.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)
The basic project purpose is to provide for the safe and efficient flow of east-west traffic and shipment of goods from Brewer (I-395) to Eddington (Route 9), Maine for current and future projected traffic.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
Construction of new controlled access highway.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type	Type	Type
Amount in Cubic Yards	Amount in Cubic Yards	Amount in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
Acres Wetlands impacts range from 26 to 32 acres. Floodplains impacts range from 2 to 11 acres.
or
Linear Feet Stream impacts range from 222 to 567 feet.

23. Description of Avoidance, Minimization, and Compensation (see instructions)

ENG FORM 4345, OCT 2010

24. Is Any Portion of the Work Already Complete? ☐Yes ☒No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

a. Address-

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

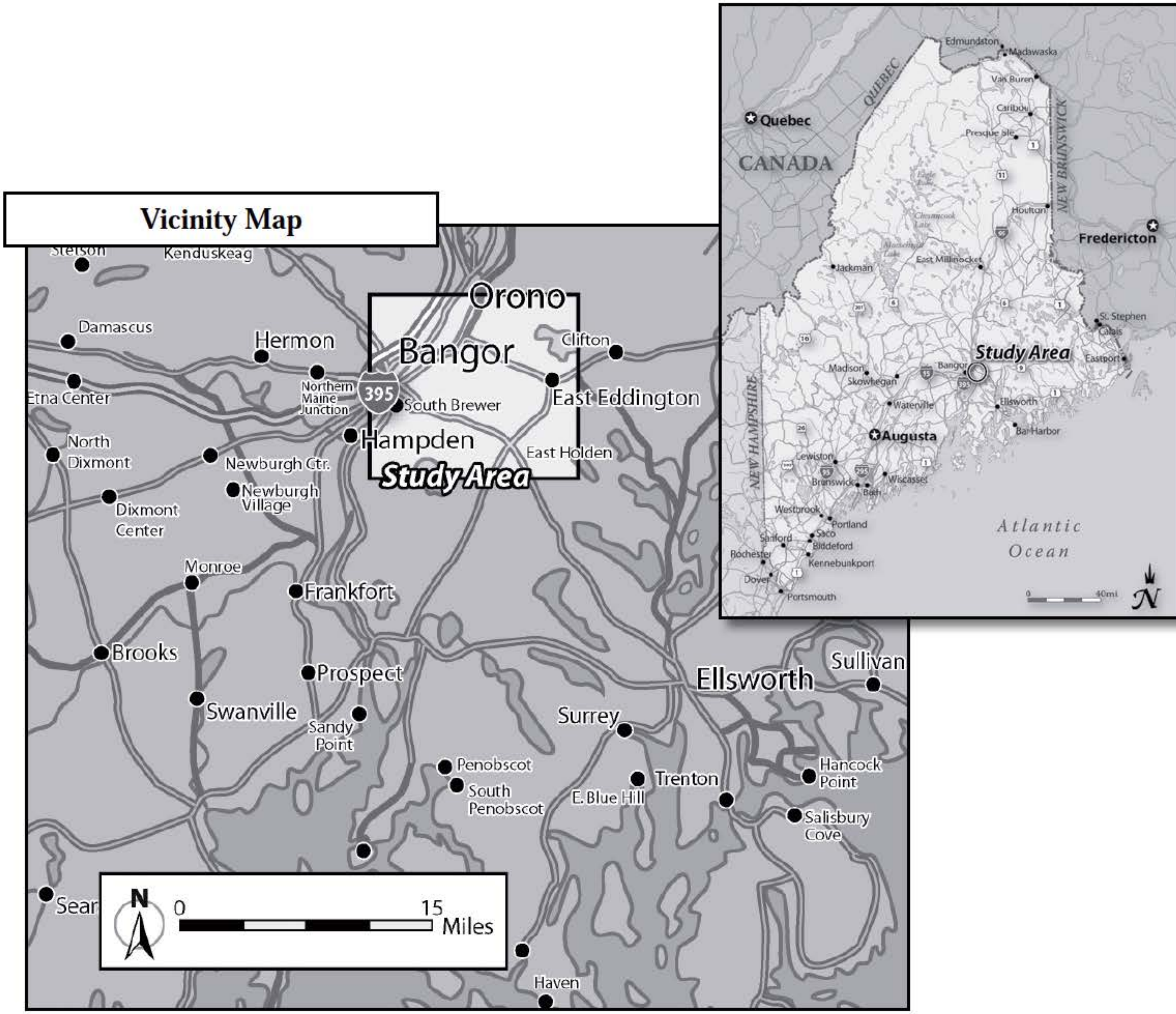
27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT — 3/8/12 DATE — SIGNATURE OF AGENT — 3/8/12 DATE

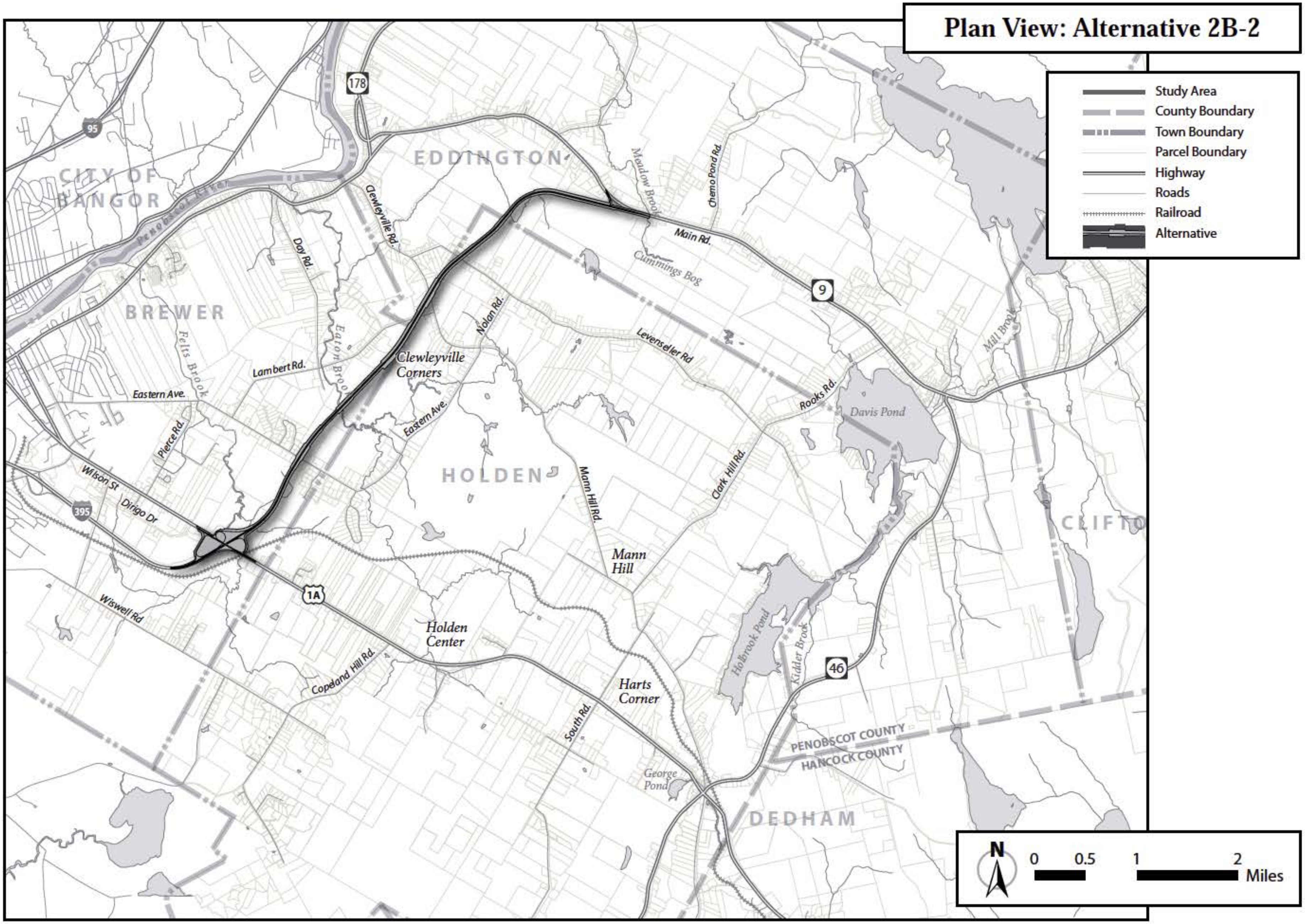
The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

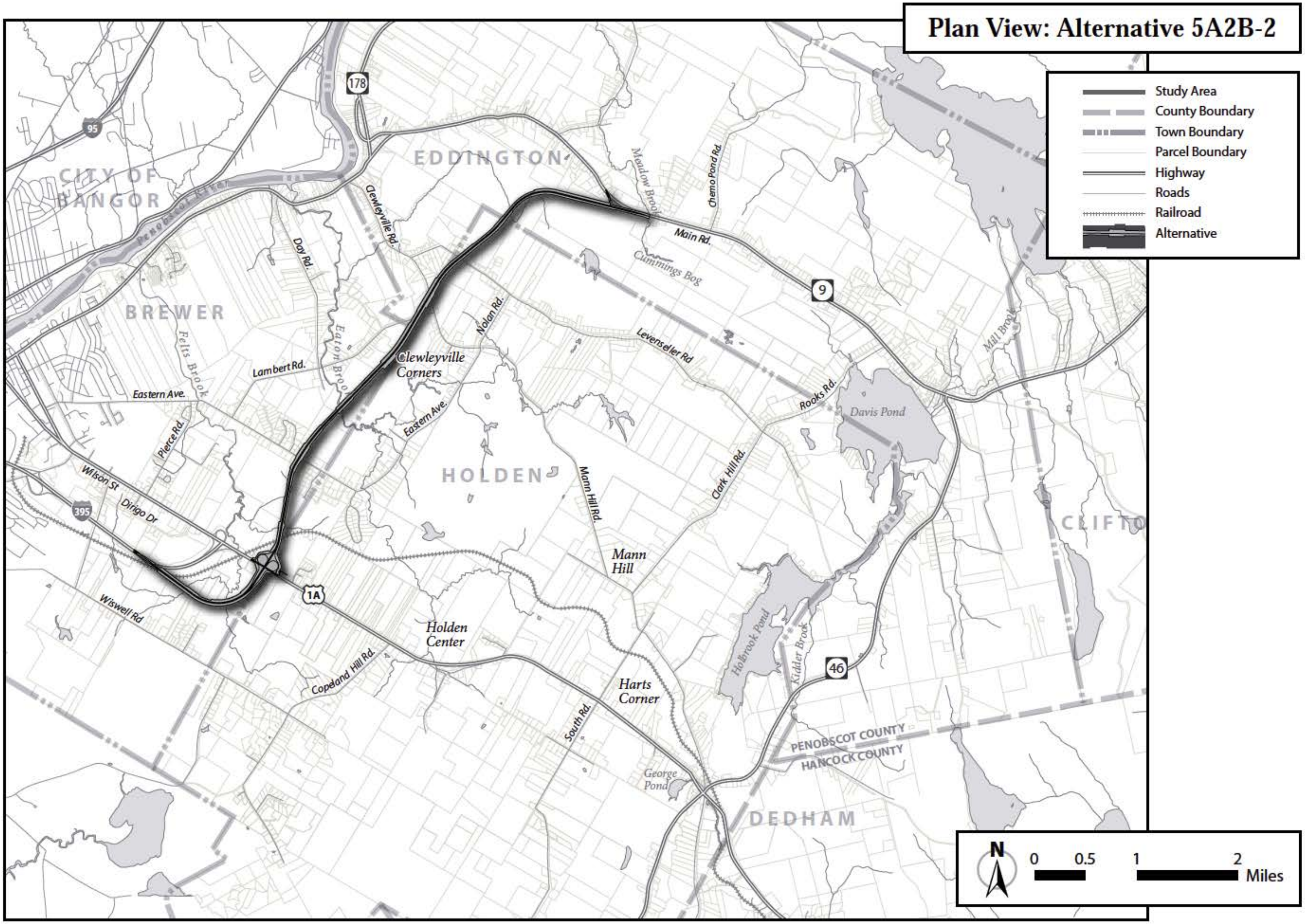
18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

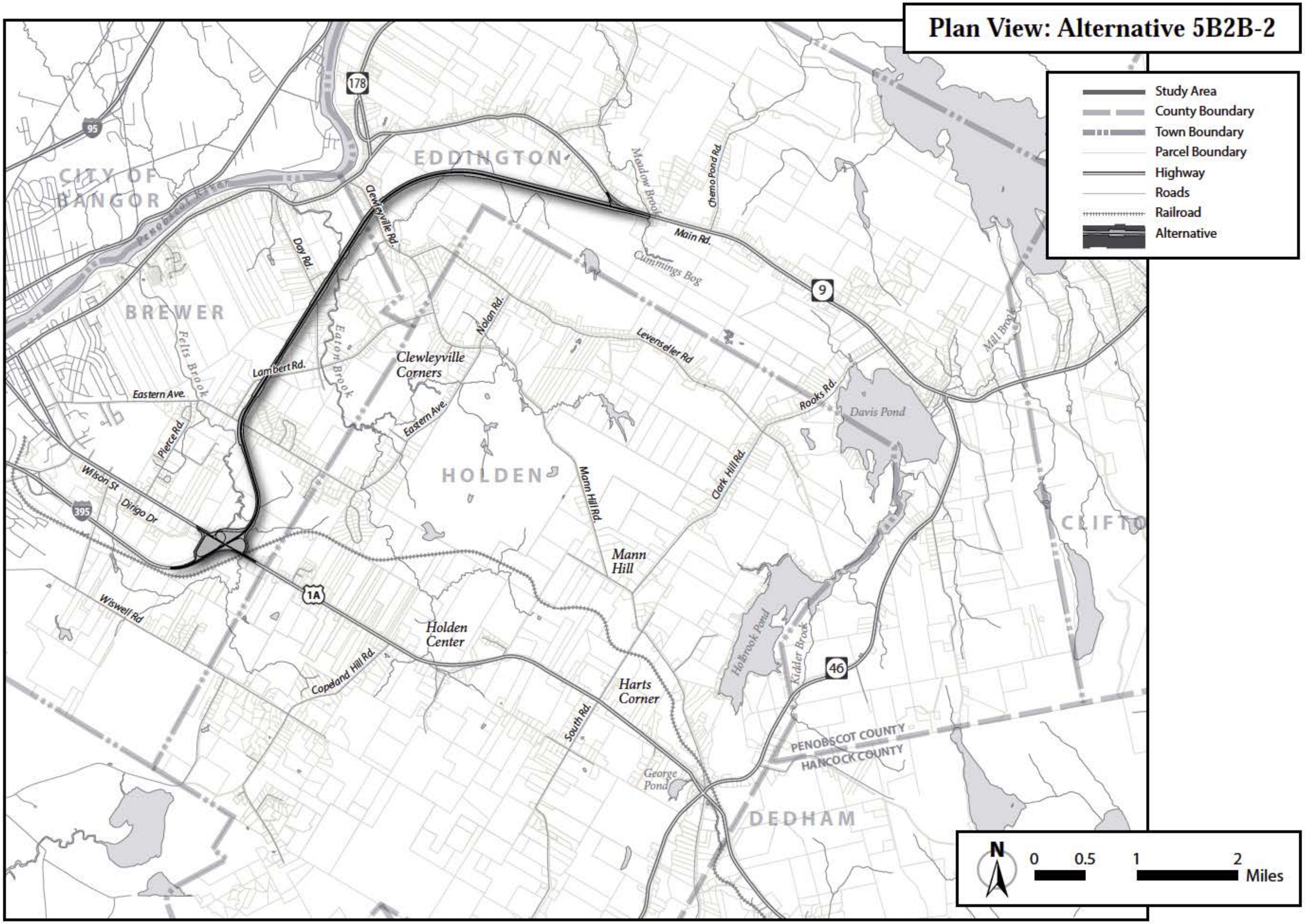
ENG FORM 4345, OCT 2010


Vicinity Map
Stetson
Kenduskeag
Damascus
Hermon
Orono
Bangor
Clifton
Etna Center
Northern Maine Junction
395
South Brewer
East Eddington
North Dixmont
Newburgh Ctr.
Hampden
East Holden
Study Area
Newburgh Village
Dixmont Center
Monroe
Frankfort
Brooks
Prospect
Swanville
Sandy Point
Ellsworth
Sullivan
Surrey
Penobscot
South Penobscot
Trenton
E. Blue Hill
Hancock Point
Salisbury Cove
Sear
N
0
15
Miles
Haven
Edmundston
Madawaska
Van Buren
QUEBEC
Quebec
Caribou
Presque Isle
CANADA
NEW BRUNSWICK
Houlton
Fredericton
Jackman
East Millinocket
St. Stephen
Calais
Study Area
Madison
Skowhegan
Bangor
Eastport
NEW HAMPSHIRE
Waterville
Ellsworth
Bar Harbor
Augusta
Lewiston
Brunswick
Bath
Wiscasset
Westbrook
Portland
Saco
Biddeford
Sanford
Rochester
Kennebunkport
Dover
Portsmouth
Atlantic Ocean
40mi

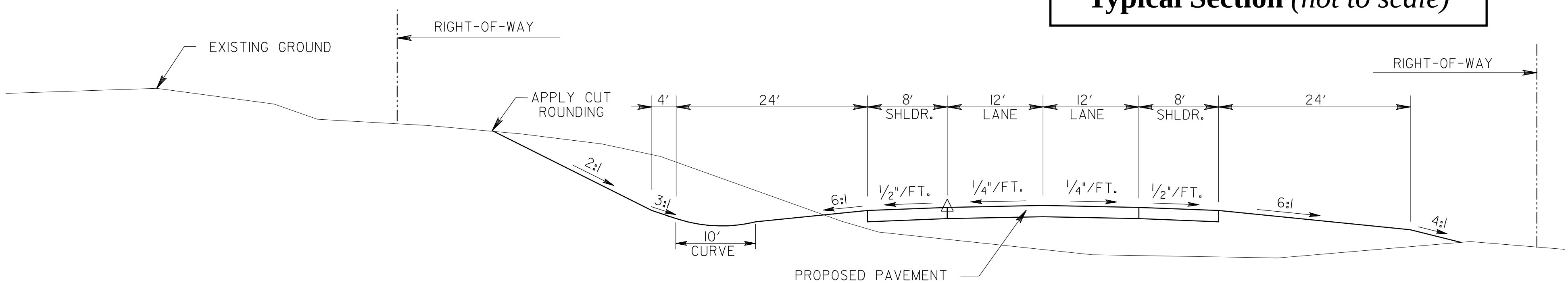
Plan View: Alternative 2B-2




Plan View: Alternative 5A2B-2
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Alternative
CITY OF BANGOR
Penobscot River
EDDINGTON
BREWER
HOLDEN
CLIFTO
DEDHAM
PENOBSCOT COUNTY
HANCOCK COUNTY
95
395
178
9
1A
46
Clewleyville Rd.
Day Rd.
Eaton Brook
Felts Brook
Lambert Rd.
Eastern Ave.
Pierce Rd.
Wilson St
Dirigo Dr
Wiswell Rd
Clewleyville Corners
Nolan Rd.
Eastern Ave.
Meadow Brook
Chemo Pond Rd.
Main Rd.
Cummings Bog
Levenseller Rd
Rooks Rd.
Davis Pond
Mill Brook
Clark Hill Rd.
Mann Hill Rd.
Mann Hill
Holden Center
Copeland Hill Rd.
South Rd.
Harts Corner
George Pond
Holbrook Pond
Kidder Brook
N
0
0.5
1
2
Miles


Plan View: Alternative 5B2B-2
Study Area
County Boundary
Town Boundary
Parcel Boundary
Highway
Roads
Railroad
Alternative
CITY OF BANGOR
BREWER
EDDINGTON
HOLDEN
CLIFTO
DEDHAM
Clewleyville Corners
Holden Center
Mann Hill
Harts Corner
Davis Pond
George Pond
Holbrook Pond
Cummings Bog
Main Rd.
Levenseller Rd
Rooks Rd.
Clark Hill Rd.
Mann Hill Rd.
South Rd.
Copeland Hill Rd.
Wiswell Rd
Dirigo Dr
Wilson St
Pierce Rd.
Eastern Ave.
Lambert Rd.
Day Rd.
Clewleyville Rd.
Nolan Rd.
Eaton Brook
Felts Brook
Chemo Pond Rd.
Meadow Brook
Kidder Brook
Mill Brook
PENOBSCOT COUNTY
HANCOCK COUNTY
95
395
178
9
1A
46
N
0
0.5
1
2
Miles

Typical Section *(not to scale)*



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