# SUMMARY

## S.1 BACKGROUND

### S.1.1 Purpose and Need for National Environmental Policy Act Review

Executive Order (E.O.) 10485 (September 9, 1953), as amended by E.O. 12038 (February 7, 1978), requires that a Presidential permit be issued by the U.S. Department of Energy (DOE) before electric transmission facilities may be constructed, operated, maintained, or connected at the U.S. international border. Bangor Hydro-Electric Company (BHE) has applied to DOE to amend Presidential Permit PP-89, which authorizes BHE to construct a single-circuit, 345,000-volt (345-kV) alternating-current (AC) electric transmission line across the U.S. international border in the vicinity of Baileyville, Maine.

The proposed transmission line would originate at the existing Orrington Substation, located in Orrington, Maine, and extend eastward to the international border between the United States and Canada near Baileyville, Maine, where it would connect with a transmission line to be constructed, operated, and maintained by New Brunswick Power Corporation (NB Power). DOE has determined that an amendment to the Presidential permit would constitute a major Federal action that may have a significant impact on the environment within the meaning of the National Environmental Policy Act of 1969 (NEPA). For this reason, DOE has prepared this environmental impact statement (EIS) to address potential environmental impacts from the proposed action and the range of reasonable alternatives.

### S.1.2 Background of Project Permitting and NEPA History

In 1970, Maine Electric Power Company (MEPCO), a partnership of Central Maine Power Company, Maine Public Service Company, and BHE, placed in service a 345-kV transmission interconnection with NB Power. The BHE system now comprises about 600 mi (966 km) of transmission line corridors, including the MEPCO 106-mi (171-km), 345-kV transmission line that interconnects the Orrington Substation with NB Power's system and that crosses the border near Orient, Maine.

On December 16, 1988, BHE applied to DOE for a Presidential permit to construct and operate a second 345-kV transmission line to New Brunswick, Canada, that would extend eastward 84 mi (135 km) from the Orrington Substation to the U.S.-Canada border near Baileyville, Maine. The route was referred to as the Stud Mill Road Route. At the border, the proposed transmission line was to connect with a transmission line to be built, operated, and owned by NB Power. DOE published a notice of that application in the *Federal Register* on January 19, 1989 (Volume 54, page 2201 [54 FR 2201]), and a "Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Public Scoping Meetings" in the *Federal Register* on May 22, 1989 (54 FR 22006). In August 1995, DOE published an EIS titled *Construction and Operation of the Proposed Bangor Hydro-Electric Company's Second 345-kV*

*Transmission Tie Line to New Brunswick*. DOE decided to grant Presidential Permit PP-89 in a Record of Decision (ROD) signed on January 18, 1996 (62 FR 2244), and issued the Permit on January 22, 1996.

In addition to the Presidential permit, the BHE transmission line required regulatory approval from the State of Maine. BHE received its original State permit for the Stud Mill Road Route in 1992 and was granted State permit extensions in 1994 and 1996. In 1999, a natural gas transmission line was constructed by Maritimes & Northeast Pipeline, L.L.C. (M&N) in the same general vicinity of Stud Mill Road and BHE's approved electric transmission route. In 2001, BHE requested a third State permit extension. The Maine Board of Environmental Protection, Maine's primary environmental review entity, conducted a public hearing and indicated, in a draft order, a preference for BHE to use a route different from the Stud Mill Road Route, one that would be more closely consolidated with established linear corridors. This order was never finalized because BHE withdrew the request for an extension of the State permit. On May 10, 2005, BHE applied to the Maine Department of Environmental Protection for new permits under the Site Location of Development Act, the Natural Resources Protection Act, and Section 401 of the Clean Water Act.

On September 30, 2003, BHE applied to DOE to amend Presidential Permit PP-89 for a modification of the previously authorized transmission line route.[1] DOE published a notice of that application in the *Federal Register* on October 29, 2003 (68 FR 61659). The proposed transmission line project (now referred to as the Northeast

**Northeast Reliability Interconnect Project Time Line**

- 1970: MEPCO and BHE placed in service a 106-mi (171-km)-long 345-kV interconnection with NB Power.
- December 1988: BHE applied to DOE for a second 345-kV line from the Orrington Substation to the U.S.-Canada border near Baileyville, Maine.
- 1992: BHE received the State permit for the proposed line referred to as the "Stud Mill Road Route."
- December 1993: DOE published a draft EIS for the proposed line.
- 1994: The State granted a permit extension.
- August 1995: DOE issued the final EIS for the proposed line.
- January 1996: DOE issued a ROD and Presidential Permit PP-89 for the proposed line.
- 1996: The State granted a second permit extension.
- 1999: The M&N natural gas pipeline was built near Stud Mill Road.
- 2001: BHE requested a third State permit extension; request subsequently withdrawn.
- September 2003: BHE applied to DOE to amend PP-89.
- November 2, 2004: DOE published a Notice of Intent to conduct an EIS for the proposed PP-89 amendments.
- November 17–18, 2004: DOE held scoping meetings in Maine for the EIS.
- May 10, 2005: BHE applied for a new State permit.
- August 2005: DOE issued a draft EIS for PP-89 amendments (this document).

[1] The application to DOE to amend Presidential Permit PP-89 did not specify a preferred route; however, BHE subsequently advised DOE of its selection of the Modified Consolidated Corridors Route as the applicant's preferred route.

Reliability Interconnect [NRI]) that is the subject of this EIS differs from the original project in the proposed route between the Orrington Substation and the international border crossing near Baileyville, Maine. This proposed project also differs from any of the routes analyzed in the 1995 EIS. In the United States, the applicant's preferred transmission line route (referred to as the Modified Consolidated Corridors Route) would be about 85 mi (137 km) long. Figure S-1 shows the locations of the Modified Consolidated Corridors Route, the Previously Permitted Route (the Stud Mill Road Route), the existing MEPCO 345-kV transmission line, and substations that would need to be modified. In Canada, the NB Power transmission line would continue for almost 60 mi (96.6 km) to the substation at the Point Lepreau Nuclear Generating Station via Keswick, a town north of Fredericton.

## S.2 PURPOSE AND NEED

### S.2.1 DOE's Purpose and Need

The purpose and need for DOE's action is to respond to BHE's request to amend Presidential Permit PP-89. DOE may issue or amend a Presidential permit if it determines that the action is in the public interest and after obtaining favorable recommendations from the U.S. Departments of State and Defense. In determining whether issuance of a permit for a proposed action is in the public interest, DOE considers the environmental impacts of the proposed project pursuant to NEPA, the project's impact on electric reliability by ascertaining whether the proposed project would adversely affect the operation of the U.S. electric power supply system under normal and contingency conditions, and any other factors that DOE may consider relevant to the public interest.

If DOE determines that granting or amending a Presidential permit would be in the public interest, the information contained in the EIS would provide a basis upon which DOE would decide which alternative(s) should be implemented and which mitigation measures, if any, would be appropriate for inclusion as a condition of the permit. A decision, in the form of a ROD, can be issued no sooner than 30 days subsequent to the U.S. Environmental Protection Agency's (EPA's) publication of a "Notice of Availability of the Final EIS" in the *Federal Register*. The issuance of the Presidential permit or permit amendment would occur simultaneously with or subsequent to the ROD.

Because the proposed project also would involve the export of electric energy from the United States, BHE must obtain a separate electricity export authorization from DOE under Section 202(e) of the Federal Power Act before it could export electricity to Canada over the proposed 345-kV transmission line. DOE may authorize electricity exports to a foreign country if it determines that the proposed export would not impair the sufficiency of electric supplies within the United States and that it would not impede, or tend to impede, the coordination of regional transmission facilities. DOE also must comply with NEPA prior to authorizing electricity exports. Therefore, this EIS also will serve to satisfy DOE's NEPA responsibilities in determining whether to authorize exports over the proposed international transmission line.

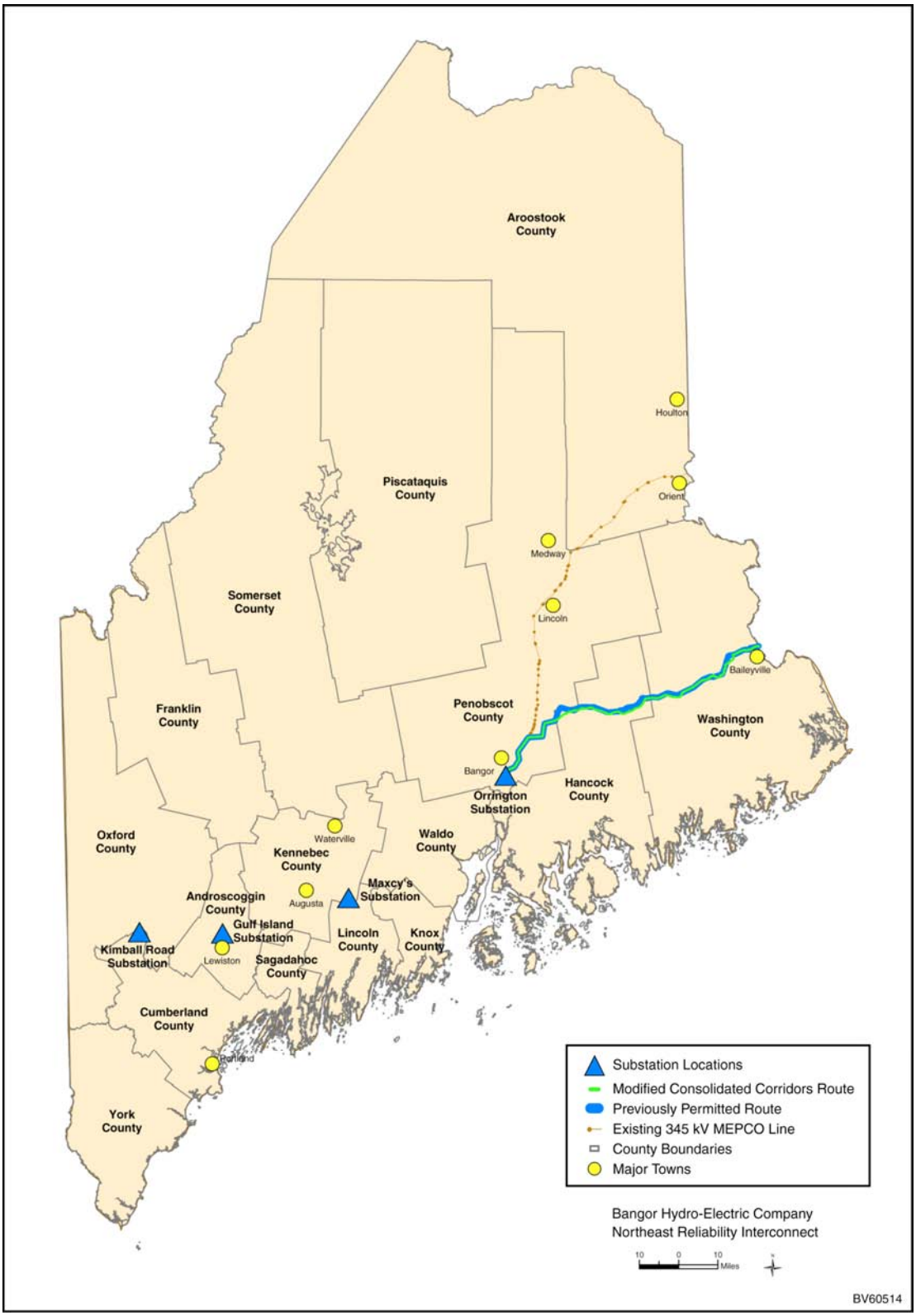


**FIGURE S-1 Locations of the Modified Consolidated Corridors Route, Previously Permitted Route, Existing MEPCO 345-kV Transmission Line, and Substations That Would Require Modification**

### S.2.2 Applicant's Purpose and Need

The following material reflects the view of the applicant regarding the merits of the proposed project:

> BHE's stated purpose for the NRI is to improve the reliability and stability of the bulk electric transmission system of both the Maritimes area of Canada (New Brunswick, Nova Scotia, and Prince Edward Island) and New England, increase the import-export transmission capacity between Maine and New Brunswick, and reduce costly line losses.
>
> The NRI would increase the north-to-south (New Brunswick to Maine) transfer capacity by 300 megawatts (MW) (700-MW capacity exists currently). The NRI also would increase a south-to-north (Maine to New Brunswick) transfer capacity to 400 MW on a more consistent basis than provided by the existing single tie-line. The transfer capacity of the present single tie-line to export power from Maine to New Brunswick ranges from zero to 150 MW, depending upon specific system conditions, including which generation units are in use. The NRI would thus enhance the sharing of generation capacity between the Maritimes and New England, thereby reducing reserve generation requirements, increasing the reliability of the overall transmission system, and allowing for expanded exports of energy to the Maritimes from the New England Power Pool (NEPOOL). This also would allow for long-term contracts of export energy and may allow utilities that are not directly connected to the U.S. electric grid (e.g., Eastern Maine Electric Cooperative [EMEC]) access to market-based power. The opportunity for NEPOOL to export power would most likely occur in the winter months during the Maritimes' period of peak demand. During New England's peak summer use, Canada has surplus generating capacity that could be sold in the New England market. Increased trading of power would help balance supply with demand and increase the reliability and stability of bulk electric transmission.
>
> The proposed transmission line also would reduce transmission line losses in the overall regional system. Transmission line loss is electrical energy lost through heat as electricity flows through a wire. Such losses are inefficient and require production of more electricity to compensate for the line losses. Line losses increase with distance and the amount of power sent through a line.

## S.3 PUBLIC PARTICIPATION AND THE NEPA PROCESS

### S.3.1 Cooperating Agencies

In accordance with the regulations implementing the procedural provisions of NEPA, specifically the *Code of Federal Regulations*, Title 40, Part 1501.6 (40 CFR 1501.6), DOE invites an agency to participate in the preparation of an EIS, either as a contributor in its area of expertise or as a cooperating agency, to ensure that any jurisdiction it may have by law will be adequately addressed in the document. The U.S. Department of the Interior's U.S. Fish and Wildlife Service (USFWS) and the U.S. Department of Commerce's National Oceanic and

Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) are cooperating agencies in DOE's EIS preparation but have no decisions to make based on it.

### S.3.2 Public Scoping

DOE issued the "Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Public Scoping Meetings and Notice of Floodplain and Wetlands Involvement; Bangor Hydro-Electric Company" in the *Federal Register* on November 2, 2004 (69 FR 63514). DOE also placed announcements in local newspapers. A project Web site maintained for DOE by Argonne National Laboratory (ANL) provides background information on the proposed project, including DOE's NEPA process (http://web.ead.anl.gov/interconnecteis). This site is regularly updated as the preparation of the EIS progresses. DOE planned three public scoping meetings at Maine locations on November 17 (Baileyville) and November 18 (Lincoln and Brewer), 2004. No members of the public attended the Lincoln meeting; thus, no official records or transcript were made. Transcripts of the Baileyville and Brewer meetings are available at the Web site referenced above. In all, three individuals presented oral comments at the two public scoping meetings.

DOE also solicited written and electronic comments on the scope of the EIS in the Notice of Intent, at the scoping meetings, and electronically through the Web site. Three submissions of written comments were received during the scoping period, which closed on December 2, 2004.

The following issues were raised and are addressed in this EIS:

- The EIS should evaluate the impact of the project on bald eagles (*Haliaeetus leucocephalus*) that nest or feed within the general vicinity of the proposed transmission line corridor.

- The EIS should evaluate impacts on fish habitats, particularly identified Atlantic salmon (*Salmo salar*) streams and other water bodies that provide appropriate habitat that is or could be used by the Atlantic salmon, including impacts from transmission line construction, installation of AC mitigation to the M&N gas pipeline, and removal of forest vegetation where corridors cross streams.

- The EIS should carefully consider the temporary and permanent impacts of the proposed project on wildlife habitats, including impacts of habitat alteration and fragmentation, particularly on sensitive forest-interior bird species, and the effects of noise and disturbance, particularly on nesting birds in wetland areas.

In addition, commentors stated that the NRI would provide socioeconomic benefits to eastern Maine and the region (New England); for example, it would foster new business development and expansion in eastern Maine.

### S.3.3 Issues outside the Scope of the EIS

Impacts of the Canadian transmission line that would connect to the NRI are outside the scope of this EIS. NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation. E.O. 12114, "Environmental Effects Abroad of Major Federal Actions," was issued on January 9, 1979 (44 FR 1957). The E.O. requires Federal agencies to prepare an analysis of significant impacts from a Federal action in certain defined circumstances and exempts agencies from preparing analyses in others. The E.O. does not require Federal agencies to evaluate impacts outside the United States when the foreign nation is participating with the United States or is otherwise involved in the action (Section 2-3[b]).

In addition, the proposed Federal action is not an action that, for purposes of E.O. 12114, would require analysis of impacts outside the United States, as it would not affect the global commons (e.g., outer space or Antarctica); would not produce a product, emission, or effluent that is "prohibited or strictly regulated by Federal law in the United States because its toxic effects on the environment create a serious public health risk," or which involves regulated or prohibited radioactive materials; and would not significantly affect natural or ecological resources of global importance designated for protection under Executive Order by the President.

The Federal action evaluated in this EIS is only to permit the transmission line to cross the United States border. Limiting NEPA reviews to the U.S. portion of the transmission line interconnection (1) is consistent with applicable Federal laws, including the generally held legal presumption that Acts of Congress do not ordinarily apply outside the U.S. borders; (2) avoids the appearance of the assertion of extraterritorial control over actions that were approved by and occur within the lands of another sovereign nation; and (3) prevents interference in the foreign relations of the United States. The scope of the NEPA review is particularly appropriate here, because the transmission line to be built in New Brunswick has both been reviewed for the environmental impacts of the project and has been approved by Canada (the foreign sovereign).

Other topics outside the scope of this EIS are as follows:

- The development of emergency outage response plans, which is the purview of local public safety officials.

- The proposed transmission line presents no greater target for terrorists than any other high-voltage transmission line in the United States. Therefore, homeland security issues are not addressed in this EIS. A good general discussion of this subject can be found at http://www.globalsecurity.org/security/intro/power.htm and at http://www.globalsecurity.org/security/library/congress/2003_h/030904-gilbert.htm.

NB Power prepared an environmental impact assessment (EIA), a supplemental information report, and a comprehensive study report on the potential impacts of the proposed Canadian portion of the transmission line interconnection. The Canadian EIA is equivalent to an EIS prepared under NEPA for a U.S. project and is subject to review by various provincial and

Federal agencies in Canada, as well as by the public. The entire document can be found on the Web at http://transmission.nbpower.com/en/regulatory/EIA.html. The New Brunswick transmission line project has been approved and licensed by the National Energy Board of Canada. For details, see http://transmission.nbpower.com/en/intlpowerline/nebipldec.pdf.

## S.4 ALTERNATIVES ANALYZED

This section describes the proposed action and the five alternatives that are analyzed in the EIS. It also describes other alternatives (two alternative routes and alternative technologies) that were considered but dismissed from detailed analysis. Descriptions of transmission line specifications; construction, operation, and maintenance activities; and schedule and mitigation common to all construction alternatives are also provided.

The five alternatives analyzed in this EIS are as follows:

1. Modified Consolidated Corridors Route,

2. Consolidated Corridors Route,

3. Previously Permitted Route (No Action),

4. MEPCO South Route, and

5. Rescission of Presidential Permit PP-89.

The first four are route alternatives (including the No Action Alternative) and could result in construction of the 345-kV transmission line. The rescission alternative could not result in construction of the line along any route.

DOE's proposed action is to grant the amendment to Presidential Permit PP-89 for construction of the line along the Modified Consolidated Corridors Route. This is the applicant's and DOE's preferred alternative. DOE could choose, however, to grant an amendment to PP-89 for any one, two, or three of the new routes (Modified Consolidated Corridors Route, Consolidated Corridors Route, and MEPCO South Route).

If DOE were to deny an amendment to the Presidential Permit, PP-89 would remain in effect and a transmission line could be constructed along the Previously Permitted Route, as analyzed under the Previously Permitted Route Alternative (equivalent to "No Action" on the part of the Department).

If DOE were to both deny the amendment to the Presidential Permit and rescind PP-89, no transmission line as proposed could be built.

### S.4.1 Alternative Routes

Alternative routes between the two desired connection points are considered by the applicant for the purpose of selecting the transmission line corridor that is best, that is, that holistically optimizes considerations of impacts, practicality, viability, economics, reliability, etc. The four route alternatives presented in this EIS reflect the outcome of the applicant's selection process.

The four alternative routes, including the applicant's preferred transmission line route, are evaluated in detail in this EIS for their environmental impacts: (1) Alternative One, the Modified Consolidated Corridors Route, the proposed action and the applicant's and DOE's preferred alternative; (2) Alternative Two, the Consolidated Corridors Route; (3) Alternative Three, the Previously Permitted Route, also considered the No Action Alternative; and (4) Alternative Four, the MEPCO South Route (Figure S-2). All of these routes have the same beginning and end points, namely the Orrington Substation and the crossing of the St. Croix River near Baileyville. Also, the initial 12.2 mi (19.6 km) from the Orrington Substation would be identical for all four routes (Figure S-3). The applicant considered a number of factors when evaluating the alternative routes, including concerns expressed by State and local authorities, local zoning and planning regulations, cost and engineering criteria, and environmental and land use considerations. Through its stakeholder outreach process, the applicant solicited and considered public comment regarding all of the route alternatives. DOE conducted public scoping meetings as described previously. The scoping process was designed to solicit concerns and suggestions from property owners, local residents, government agencies, Indian Tribes, public interest groups, and other stakeholders. DOE has reviewed the methodology and rationale employed in the applicant's evaluation and, on the basis of that review, concludes that the alternative routes identified by the applicant are an acceptable range of reasonable alternatives.

#### S.4.1.1 Alternative One: Modified Consolidated Corridors Route (Preferred Alternative)

From the Orrington Substation, the Modified Consolidated Corridors Route would parallel the existing 345-kV MEPCO transmission line to Blackman Stream in Bradley (Figure S-3). The Modified Consolidated Corridors Route would then proceed northeast within a new corridor until meeting Stud Mill Road and M&N gas pipeline right-of-way (ROW); it would then proceed east-northeast, generally paralleling the M&N gas pipeline and Stud Mill Road, to the international border near Baileyville, Maine (Figures S-3 and S-4). The total distance of the Modified Consolidated Corridors Route would be about 85 mi (137 km) and would consist of 15 mi (24 km) of new ROW, 58 mi (93 km) adjacent to the M&N gas pipeline and/or Stud Mill Road, and 12 mi (19 km) adjacent to the existing MEPCO 345-kV transmission line (including portions that are co-located with the M&N gas pipeline and/or other transmission lines).

### S.4.1.2 Alternative Two: Consolidated Corridors Route

The Consolidated Corridors Route would be similar to the Modified Consolidated Corridors Route, except where the Modified Consolidated Corridors Route deviates from it in two locations (Figures S-3, S-5, and S-6). The first and longest route deviation occurs between Blackman Stream and Stud Mill Road southeast of Pickerel Pond (Figure S-5) and is referred to in this EIS as the "Pickerel Pond Reroute." The second deviation occurs in the area of Myra Camps, just west of Dead Stream (Figure S-6), and is referred to in this EIS as the "Myra Camps Reroute." After this short deviation, the Consolidated Corridors Route and the Modified Consolidated Corridors Route would be identical to the international border near Baileyville, Maine. The Consolidated Corridors Route would traverse a total distance of about 85 mi (137 km) and would consist of 2 mi (3 km) of new ROW, 68 mi (109 km) adjacent to the M&N gas pipeline and/or Stud Mill Road, and 15 mi (24 km) adjacent to the existing MEPCO 345-kV transmission line (including portions that are co-located with the M&N gas pipeline and/or other transmission lines).

### S.4.1.3 Alternative Three: Previously Permitted Route (No Action)

The initial portion of the Previously Permitted Route from the Orrington Substation would be the same as the Modified Consolidated Corridors Route until it crosses the border between Penobscot and Hancock Counties (Figure S-3). The Previously Permitted Route would proceed to the east-northeast, generally paralleling the M&N Pipeline and Stud Mill Road to the international border near Baileyville, Maine (Figures S-3 and S-4). Although formerly known as the Stud Mill Road Route, the Previously Permitted Route would not be immediately adjacent to the road but would be separated by as much as 9,400 ft (2,865 m). The Previously Permitted Route would cross over Stud Mill Road 13 times, would parallel the road in several locations with about a 200-ft (61-m) separation, and would have an average separation of about 2,500 ft (762 m). The total distance of the Previously Permitted Route would be about 84 mi (135 km) and would consist of 62 mi (100 km) of new ROW, 10 mi (16 km) adjacent to the M&N gas pipeline and/or Stud Mill Road, and 12 mi (19 km) adjacent to the existing MEPCO 345-kV transmission line (including portions that are co-located with the M&N gas pipeline and/or other transmission lines).

### S.4.1.4 Alternative Four: MEPCO South Route

From the Orrington Substation, the MEPCO South Route would parallel the existing 345-kV transmission line to Chester, Maine (Figure S-2). This includes an initial crossing of the Penobscot River south of Lincoln. The route would then proceed southeast (recrossing the Penobscot River) to Route 6 east of Lee, Maine. The MEPCO South Route would then generally parallel, but not be co-located with, Route 6 until just west of Route 1 at Topsfield, Maine. The route would then generally proceed southeast to the international border near Baileyville, Maine (Figure S-2). The total distance of the MEPCO South Route would be about 114 mi (183 km) and would consist of 39 mi (63 km) of new ROW, 54 km (87 km) adjacent to the existing

MEPCO 345-kV transmission line (including portions that are co-located with the M&N gas pipeline and/or other transmission lines), and 21 mi (34 km) adjacent to an existing EMEC 69-kV transmission line.

### S.4.2 Rescission of the Presidential Permit Alternative

Under the Rescission of the Presidential Permit Alternative, the presently permitted transmission line could not be constructed. Thus, it is reasonably foreseeable that the environmental status quo would continue and that there would be no environmental impacts related to the construction, operation, maintenance, and connection of a transmission line. It is possible, however, that BHE or another entity could take other actions to achieve the purpose of the proposed project if the currently permitted or proposed transmission line were not built.

### S.4.3 Transmission Line Specifications, Construction, Operation, Maintenance, and Schedule Common to All Alternative Routes

#### S.4.3.1 Transmission Line Design Parameters

Table S-1 lists the basic design parameters for the proposed AC transmission line. The transmission line would have a single-circuit configuration and would consist of two overhead shield wires and three phases with two conductor wires per phase. Table S-1 lists the number of structures required and the average span between structures for each of the alternative routes. Self-supporting wood-pole H-frame structures (Figure S-7) would be used as the tangent support structure (i.e., structures used where the line is essentially along a straight path).

In addition to tangent structures, angle and dead-end structures would be required. These structures would consist of either three wood poles or three steel poles. The wood-pole angle and dead-end structures would use guy wires for support (e.g., Figure S-8), while guy wires would not be required for the steel-pole structures (e.g., Figure S-9). Dead-end structures would be required either (1) where the line makes an angle of 30 degrees or more, or (2) after 7 to 8 mi (11.3 to 12.9 km) of continuous suspension-type (tangent and light- and medium-angle) support structures to prevent the potential cascading (domino-like collapse) of all of the support structures in the event of a major accident. A dead-end structure would also be used for the last structure before the crossing of the St. Croix River.

The conductors would be protected from lightning strikes by grounding systems installed at each structure (counterpoise ground wires) and by two aerial ground wires (shield wires). The transmission line would meet required horizontal and vertical clearance requirements as discussed below. Transmission line height reflects requirements for protecting the line from interference due to tall trees. The amount of sag on a given conductor is determined by a number of variables, including distance between towers, conductor weight, capacity, and temperature. Conductors also swing laterally. Side clearance is determined on the basis of a worst possible

**TABLE S-1 Design Parameters for the NRI**

| Parameter | Value (or Description)[a] | | | |
|---|---|---|---|---|
| | MCCR[b] | CCR | PPR | MSR |
| Length of line (U.S. portion) | 85 mi | 85 mi | 84 mi | 114 mi |
| Voltage | 345 kV | | | |
| Capacity | 500 MW[c] | | | |
| Conductors | Standard 1,192.5 kcml[d] 45/7 ACSR[e] code "bunting" (two per phase) with a diameter of 1.302 in., a weight of 1.344 lb/ft, and a rated breaking strength of 32,000 lb | | | |
| Shield wires | Standard 7 No. 8 Alumoweld[f] | | | |
| Guy wires (if, and where, required) | Standard 7 No. 5 Alumoweld, 0.546-in. diameter | | | |
| Insulators – conductor | 5.75-in. × 10-in. porcelain ball and socket or polymer composite units | | | |
| Insulators – shield wire | Porcelain pin-clevis type | | | |
| Number of structures (total) | 608 | 636 | 563 | 885 |
| Tangent (wood) | 491 | 472 | 499 | 821 |
| Angle and dead-end (wood) | 110 | 86 | 64 | 60 |
| Angle and dead-end (steel) | 7 | 78 | 0 | 4 |
| Average span length (ft) | 731 | 706 | 786 | 680 |
| Minimum vertical clearance to vegetation (ft) | 15 | | | |

[a] To convert miles to kilometers, multiply by 1.609; to convert inches to centimeters, multiply by 2.54; to convert pounds to kilograms, multiply by 0.454; to convert feet to meters, multiply by 0.305.

[b] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

[c] Maximum capacity of 1,000 MW during emergency conditions.

[d] kcml = 1,000 circular mil(s); the wire size for multiple-stranded conductors. A mil is one thousandth of an inch (0.001 in.) or approximately 0.0254 millimeter.

[e] ACSR = aluminum conductor, steel reinforced.

[f] One shield wire may be replaced with an optical ground wire if BHE were to install fiber communication as part of the project.

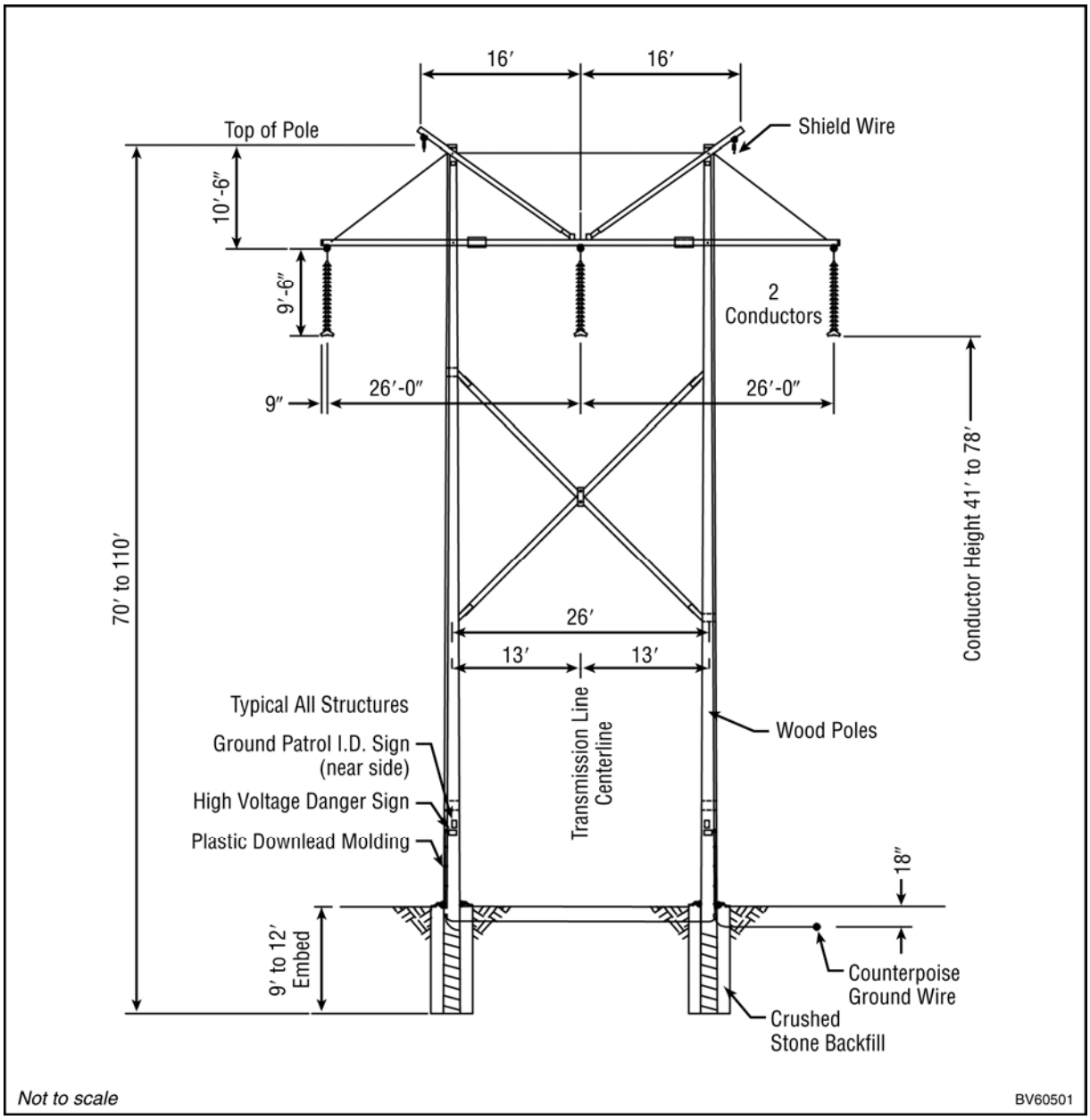


**FIGURE S-7 H-Frame Wood-Pole Tangent Support Structure**

condition (i.e., high temperature and high wind velocities). A minimum distance is maintained between conductors of different phases or voltages to prevent "flashover," defined as a sudden surge of voltage causing an arc between conductors.

The transmission line design would meet the National Electric Safety Code specifications for heavy-loading conditions (e.g., radial ice of 0.5 in. [1.3 cm] thickness and 4 lb/ft$^2$ [19.5 kg/m$^2$] of wind pressure) and extreme wind conditions (i.e., wind pressure of 23 lb/ft$^2$ [112 kg/m$^2$], equivalent to a wind speed of 90 mph [145 kph]). In addition, the transmission

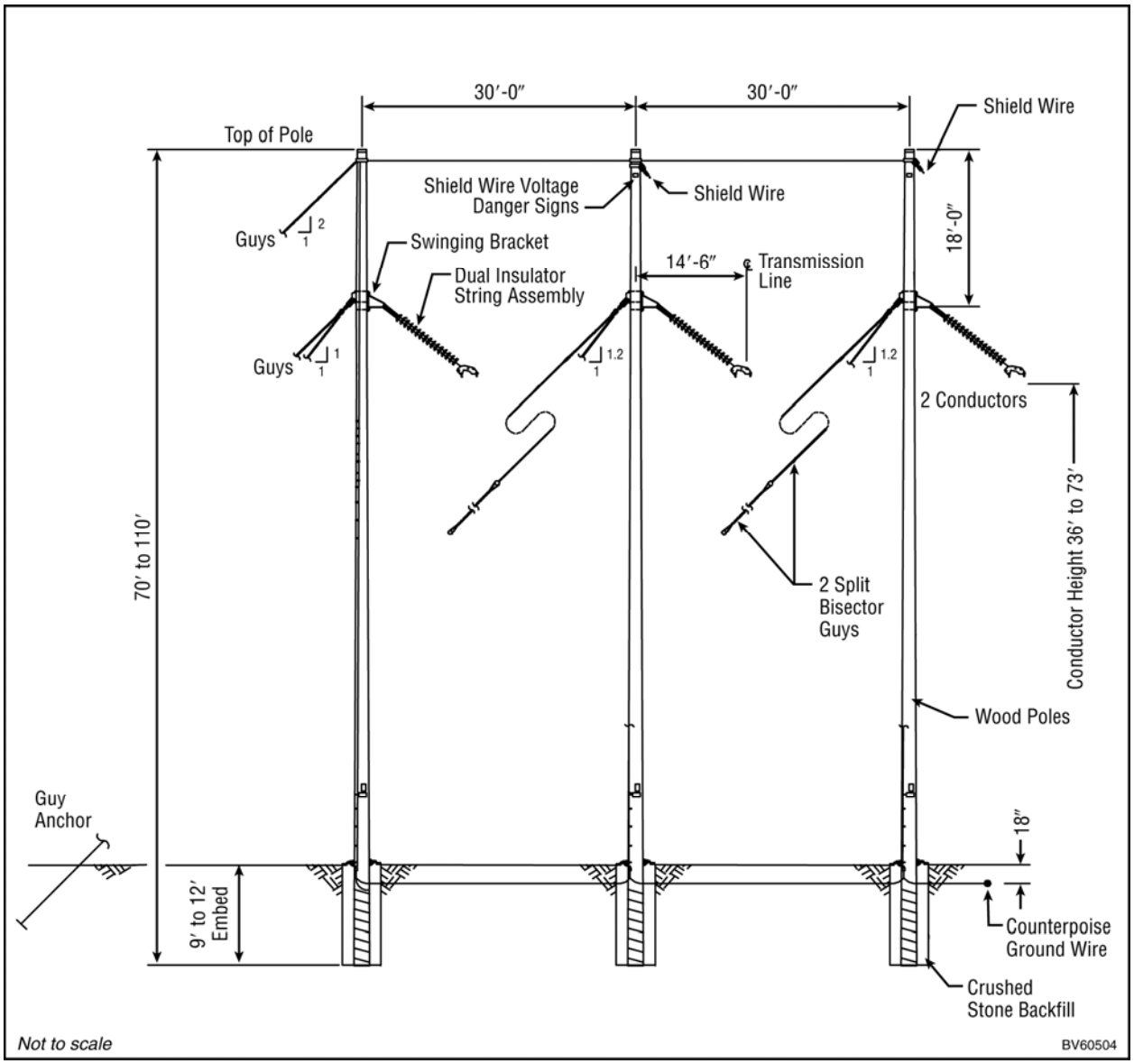


**FIGURE S-8 Heavy-Medium Angle Wood-Pole Support Structure**

structures would be designed to withstand heavy icing as determined from a review of meteorological data (e.g., radial ice of 1.3 in. [3.3 cm] thickness) and longitudinal loading imbalance due to differential ice buildup and sheering.

### S.4.3.2 ROW Configurations

The ROW widths for various segments of the transmission line routes would depend on the types of structures and their proximity to existing utility ROWs or roads. The wood-pole H-frame support structure and its horizontal configuration of phases (a 26-ft [7.9-m] separation

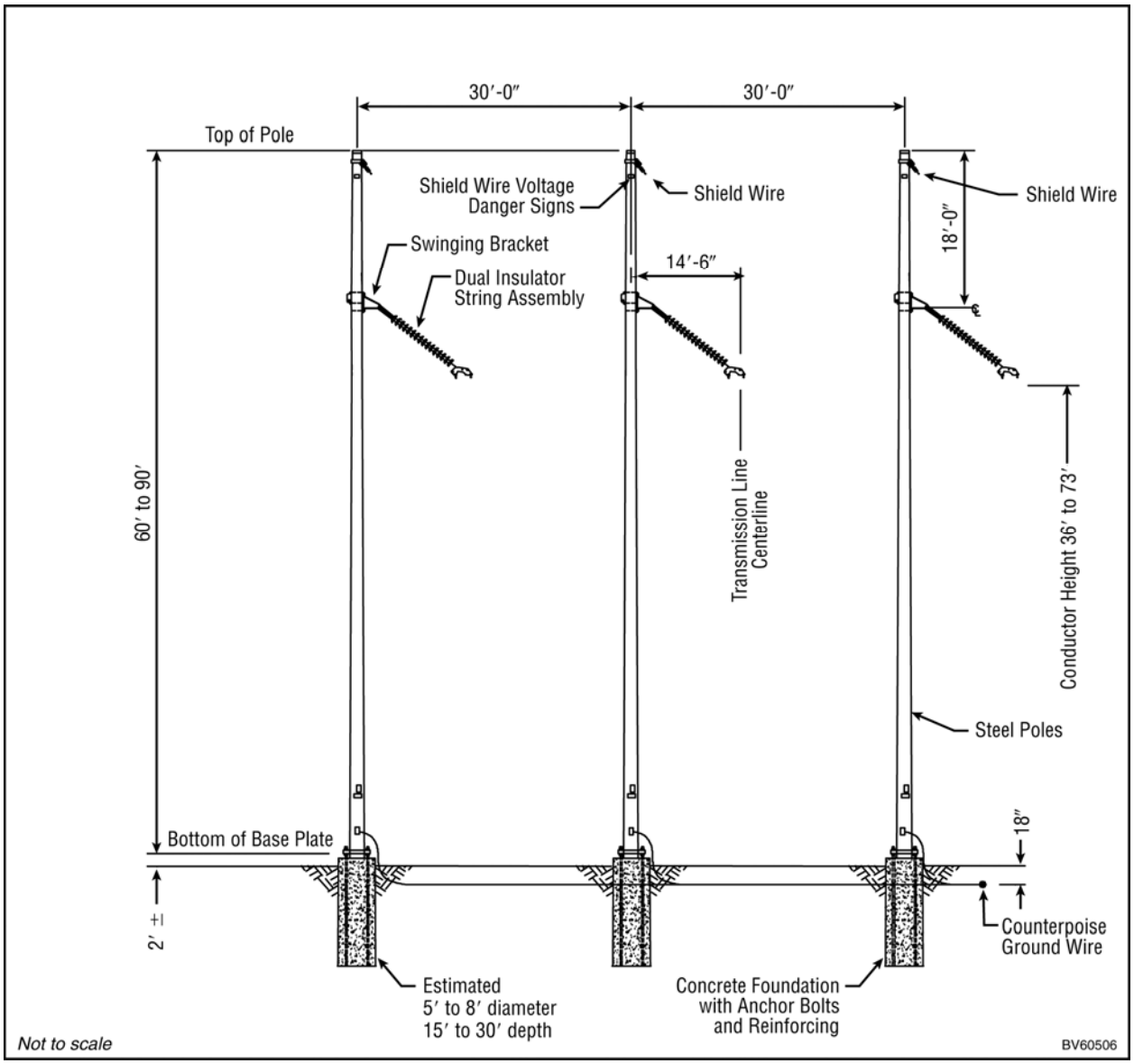


**FIGURE S-9 Heavy-Medium Angle Steel-Pole Support Structure**

from the outside phase to the centerline) were used as the standard support structure design to estimate the ROW widths (Figure S-10). The ROW width for a new corridor segment would be 170 ft (51.8 m). This width is based on the spacing of the conductors (26 ft [7.9 m]) and the desired clearances of the outside conductor to the edge of the ROW (e.g., to trees) to ensure a safe and reliable line.

Where the transmission line would be immediately adjacent to an existing cleared ROW or road, the required ROW width would be reduced on the side where the ROWs or road would be adjoining. Where the transmission line would parallel an existing transmission line, the ROW width would be based on the requirement of MEPCO to maintain a minimum of 100 ft (30.5 m)

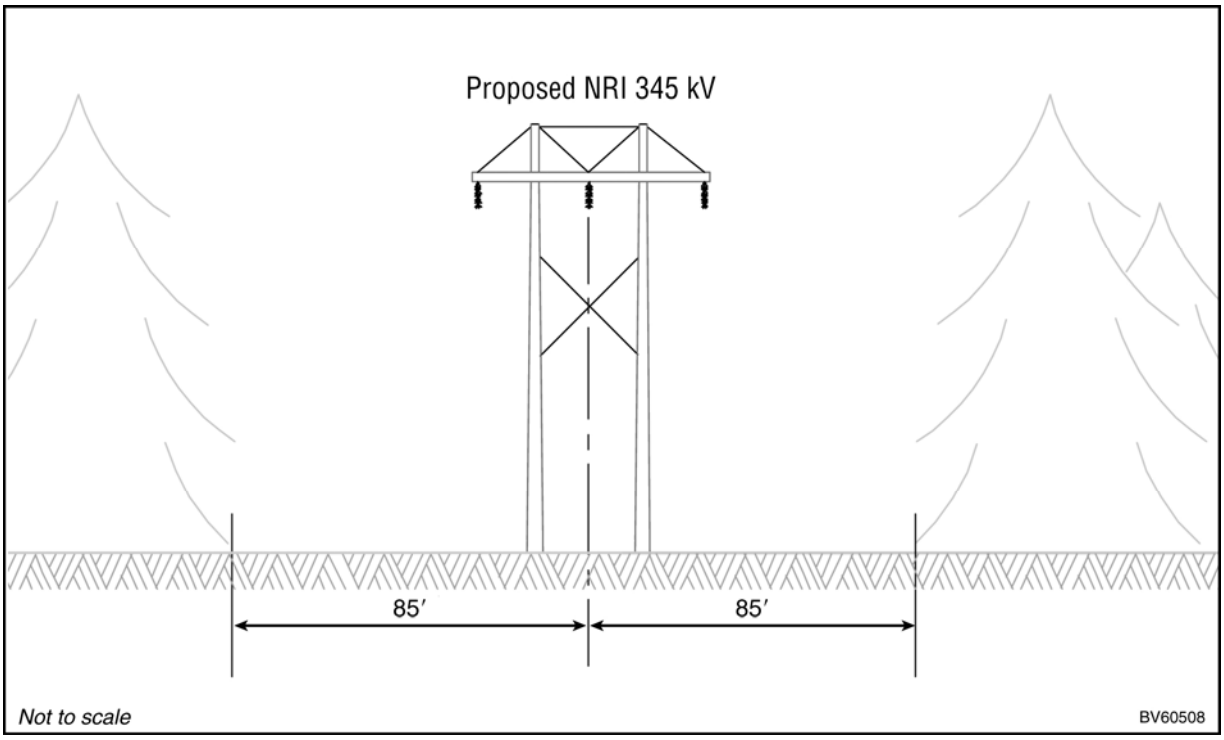


**FIGURE S-10 Placement of the NRI within a New ROW**

of separation between the centerlines of the two transmission lines. The distance to the edge of the opposite side of the ROW would be 85 ft (25.9 m), one-half of the 170 ft (51.8 m) required for the full width of a new corridor. Where the M&N gas pipeline would be located between the two transmission lines, the centerline separation between the lines would be 125 ft (38.1 m).

Where the M&N gas pipeline or Stud Mill Road would be paralleled, the proposed transmission line ROW width would average 155 ft (47.2 m). This situation would occur wherever the NRI would parallel the M&N pipeline, parallel first the M&N pipeline and then Stud Mill Road, or parallel first Stud Mill Road and then the pipeline. This dimension is based on the requisite half-width of 85 ft (25.9 m) from the transmission line centerline to the forested side of the ROW and 70 ft (21.3 m) between the centerline of the transmission line and the edge of the pipeline ROW or Stud Mill Road. Table S-2 lists the lengths and percentages of the ROWs for the alternative routes that would be either a new ROW or adjacent to an existing ROW. It also provides the total area within each alternative route.

### S.4.3.3 Substation Alterations

Alterations to four substations within Maine would be required regardless of the alternative route selected. The substations to be modified would be the Orrington Substation located in Orrington, the Maxcys Substation located in Windsor, the Gulf Island Substation

**TABLE S-2 Summary of NRI ROW Requirements by Alternative**

| Requirement | Alternative[a] MCCR | CCR | PPR | MSR |
|---|---|---|---|---|
| ***ROW length (mi)***[b,c] | | | | |
| Total line | 85 | 85 | 84 | 114 |
| ***ROW configuration (mi)*** | | | | |
| New ROW (170 ft wide[d]) | 15 (18%) | 2 (2%) | 62 (74%) | 39 (35%) |
| Adjacent to M&N gas pipeline and/or Stud Mill Road (155 ft wide) | 58 (68%) | 68 (80%) | 10 (12%) | 0 (0%) |
| Adjacent to MEPCO line (100 ft wide) | 5 (6%) | 8 (10%) | 5 (6%) | 47 (41%) |
| Adjacent to M&N gas pipeline and MEPCO line (125 ft wide) | 7 (8%) | 7 (8%) | 7 (8%) | 7 (6%) |
| Adjacent to the EMEC[e] 69-kV line (100 ft wide) | 0 (0%) | 0 (0%) | 0 (0%) | 21 (18%) |
| ***Total ROW area (acres)*** | 1,566 | 1,522 | 1,633 | 1,734 |

[a] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

[b] Values rounded to nearest whole mile, acre, or percent. Percentage values are percent of total ROW length.

[c] To convert miles to kilometers, multiply by 1.609; to convert feet to meters, multiply by 0.305; to convert acres to hectares, multiply by 0.405.

[d] Maximum width of new clearing required.

[e] EMEC = Eastern Maine Electric Cooperative.

located in Lewiston, and the Kimball Road Substation located in Harrison (Figure S-1). Required changes to each substation are described below.

The Orrington Substation would require modifications both inside and outside the current fenced boundary of the substation. Modifications within the existing fence line would include the relocation of an existing line, the addition of breakers and associated disconnect switches, the addition of a new dead-end structure and other miscellaneous components, and the expansion of the existing control house. The proposed project would also require the addition of series compensation on the line south of the substation. The construction of two short ground access roads and the modification of an existing retention pond would be conducted outside the existing fence line These modifications would require approximately 0.8 acre (0.3 ha) of new substation area.

The Maxcys Substation would require the replacement of an existing breaker. This change would occur within the current fence line. The existing breaker would need to be replaced with a breaker of higher short-circuit current rating. The Gulf Island Substation would require a new capacitor bank within the current fence line. The Kimball Road Substation would

also require a new capacitor bank. However, this would require a 0.2-acre (0.09-ha) expansion of the existing substation.

### S.4.3.4 Transmission Line Construction

The construction of the NRI, including ROW clearing and installation of the structures, would be performed by independent contractors under close daily supervision by BHE engineering and environmental inspectors to ensure that work is performed as specified by permit conditions and construction specifications. The general sequence of activities would be surveying; construction of access roads; ROW clearing; and support structure installation, framing, and stringing.

**S.4.3.4.1 Surveying.** The first operation to be completed would be a survey of the selected route. Surveying would establish the centerline and edges of the ROW. Generally, only a survey crew and small items of survey equipment would be required during this phase of the project. Establishing the ROW centerline could require limited cutting of trees for line-of-sight staking, profiling, and distance measuring. Existing roads would be used to obtain access to the selected route. Most of the surveying work would proceed cross-country and on foot.

**S.4.3.4.2 Construction of Access Roads.** To the extent possible, existing roads would be used to gain access to project construction sites. An extensive network of timber haul roads traverses much of the project area. In addition, the existing MEPCO corridor allows access to the initial 12.2 mi (19.6 km) of any of the alternative transmission line routes and would eliminate the need to construct new access roads within that area.

No new permanent access roads would be required for construction or maintenance of any of the alternative transmission line routes. However, some new temporary access roads would be required to reach the ROW construction area from existing roads. It is preferable that there be at least one point of access for each 1.0 mi (1.6 km) along the route. The approximate clearing required for new temporary access roads (20-ft [6.1-m] width) would be as follows: Modified Consolidated Corridors Route — none; Consolidated Corridors Route — none; Previously Permitted Route — 21 acres (8.5 ha); and MEPCO South Route — 32 acres (13 ha).

**S.4.3.4.3 ROW Clearing.** Trees would be cleared within the ROW only where necessary in order to facilitate (1) staking, access, assembly, and erection of structures; (2) installation of conductors and shield wires; (3) provision of adequate clearance for energized lines; and (4) maintenance. Low-growth woody vegetation would be left undisturbed where possible. The clearing program would be planned and implemented to encourage growth of low-growing native plants that would both stabilize the ROW against erosion and minimize the growth of trees.

Because about 90% of each of the alternative ROWs is forested (including forested wetlands), vegetation clearing can be generally categorized as (1) clear-cutting; or (2) several types of selective cutting. In addition to ROW clearing, danger trees (trees that could pose a threat to the operation of the line if they grew or fell into the conductor security zone before the next cutting cycle) would be cleared outside of the designated ROW. Generally, trees would be cut to 6 in. (15 cm) above the ground within cleared sections of the ROW. All logs would be removed from the ROW, while stumps would be removed only from support structure sites and from some temporary access road areas.

The applicant's normal cutting practice in forested areas would be used. First, the appropriate environmental safeguards would be established in the area to be cleared, primarily by placing appropriate erosion control measures to the extent practicable. Trees would then be cut. Clear-cutting involves the manual or mechanical cutting of all trees within the ROW. Low-growing shrubs and brush would be left to the extent practicable. All vegetation cut during initial clearing would be cleaned up and disposed of in accordance with the Maine Slash Law. As part of land-clearing operations, much of the merchantable wood materials (e.g., sawlogs and pulpwood) would be salvaged. Tops of trees, cull material, and branches could be chipped on site and the chips hauled to local power plants for use as fuel. Trees less than 2 in. (5 cm) in diameter may be left on site to deter the formation of new drainage channels in areas susceptible to erosion. In areas of low erosion potential, such trees may be windrowed or mulched. Following cutting and removal of the timber, the tree stumps of deciduous species may receive a basal application of approved herbicide applied by a low-pressure backpack applicator.

Table S-3 summarizes the clearing and cutting practices that would be conducted within the ROW, including various types of buffers. Figure S-11 illustrates the vegetation clearing and maintenance along the NRI.

Because of the limited reach of feller bunchers,[2] three access ways would be required within the 75-ft (23-m)-wide water body buffers. They would enable large trees across the ROW to be cut and removed with minimal additional ground disturbance and damage to remaining vegetation that would otherwise occur if the trees were hand cut and dragged out of the buffer with a cable. One access way would be located at about the middle of the ROW, and each of the other two would be located about halfway between the middle access way and an edge of the ROW. The access ways would be 10 to 12 ft (3 to 4 m) wide. The stream buffer access ways differ from temporary access roads in that, within the access ways, only trees that would prevent the harvesting equipment from performing its job or that would otherwise be seriously damaged by the equipment traveling along the access way would be removed. Also, access ways would not require grading or the addition of any surfacing materials such as gravel. The access ways would not extend closer than 25 ft (7.6 m) to the edge of the stream banks. The two outer access ways would be restored at the completion of clearing activities, while the central access way would be restored at the end of all construction activities in the area. The outer access ways

[2] A feller buncher is a large logging machine similar to a backhoe with an attachment that cuts trees in place of a shovel. It consists of a standard heavy-equipment base with a tree-grabbing device equipped with a saw or other device at the bottom that cut the tree off at the base and places it on the stack of cut trees.

**TABLE S-3 Summary of Clearing and Cutting Practices during ROW Construction and Maintenance**

| Location | Buffer Width | Clearing and Cutting during Construction[a] | Cutting during Maintenance[a] |
|---|---|---|---|
| Typical ROW areas with no restrictions | Not applicable | Cut at ground level all vegetation >2 in.[b] in diameter at breast height; remove or top[c] all other vegetation that is 8 to 10 ft[b] or taller. | Cut at ground level all capable trees that are 8 to 10 ft or taller; top all other vegetation that is 8 to 10 ft or taller. |
| Standard stream buffers where NRI parallels the existing MEPCO 345-kV line | 25 ft on each side of the water body | Cut at ground level all capable trees[d] that are 8 to 10 ft or taller; no other vegetation is cut. | Cut at ground level all capable trees that are 8 to 10 ft or taller; no other vegetation is cut. |
| Standard stream buffers where NRI does not parallel the existing MEPCO 345-kV line | 75 ft on each side of the water body | Cut at ground level all capable trees that are 8 to 10 ft or taller; no other vegetation is cut. | Cut at ground level all capable trees that are 8 to 10 ft or taller; no other vegetation is cut. |
| Atlantic salmon stream buffers | 75 ft on each side of the water body | Top all capable trees that could grow to within 15 ft of a conductor in the next 3 to 4 years; no other vegetation is cut. | Top all capable trees that could grow to within 15 ft of a conductor in the next 3 to 4 years; no other vegetation is cut. |
| Visual buffers at the Narraguagus, Machias, and St. Croix Rivers | Varies from 75 to 500 ft | Top all capable trees that could grow to within 15 ft of a conductor in the next 3 to 4 years; no other vegetation is cut. | Top all capable trees that could grow to within 15 ft of a conductor in the next 3 to 4 years; no other vegetation is cut. |

[a] Dead or danger trees are removed at any time.

[b] To convert inches to centimeters, multiply by 2.54; to convert feet to meters, multiply by 0.305.

[c] The tree would be cut at ground level if topping would not leave sufficient foliage to sustain the tree.

[d] Capable trees are those that could grow within the conductor clearance zone before the next management cycle.

would be allowed to revert to their original state (within maintenance requirements), while the middle access way would be maintained as low-growing vegetation to allow small vehicle access during ROW vegetation maintenance.

**S.4.3.4.4 Support Structure Installation, Framing, and Stringing.** To accommodate installation of each support structure, a work area about 100 ft (30.5 m) wide and 170 ft (51.9 m) long, or 0.4 acre (0.16 ha), would be cleared of all woody growth except low shrubs and brush.

All small woody plants would be removed from the immediate structure locations. The structural components would be placed in these work areas in preparation for construction and installation of the support structures.

Holes for support structure poles would be made with an auger or backhoe. Some blasting might be required if bedrock occurred at structure locations or, more rarely, for breaking or moving large boulders that restricted access by construction equipment.

H-frame wood-pole structures would be directly embedded in the ground. A 9- to 12-ft (2.7- to 3.7-m)-deep foundation hole would be excavated at each pole location, and backfill would be placed around the pole after installation. Guy anchors for the wood-pole angle and dead-end structures would consist of steel anchor rods connected to a log buried in a trench about 7 ft (2.1 m) deep. The support structures would be assembled on the ground and erected by a crane with a long boom. Total construction time for a wood-pole support structure would be less than 1 day.

Steel-pole support structures could also be directly embedded in a similar manner except that some would be backfilled with concrete. They could also be installed on concrete bases, depending on site conditions. Foundation holes would be up to 30 ft (9 m) deep. Total construction time would be less than 4 days per steel-pole support structure.

After the support structures were in place, insulators would be installed and aerial shield (ground) wires and conductors strung. Conductors and shield wires would be pulled through the stringing blocks by tensioning equipment to keep them from coming in contact with the ground or other objects that could cause damage.

**S.4.3.4.5 Construction Staging Areas.** The same five staging areas (i.e., construction headquarters along the route where materials are received, stored, and shipped to the ROW) would be used during construction of the line along the Modified Consolidated Corridors Route, the Consolidated Corridors Route, or the Previously Permitted Route. The following staging areas would be used: Route 178, Costigan Mill, Pickerel Pond, Machias River, and Huntley Staging Areas. The Route 178 and Costigan Mill Staging Areas, along with the Chester, Topsfield, and Baileyville Staging Areas, would be used for the MEPCO South Route. These construction staging areas are described below. Figure S-2 shows the locations of the staging areas.

**Route 178 Staging Area.** This site is about 9 mi (14.5 km) northeast of the Orrington Substation. It is located on the west side of State Route 178 in Bradley north of the entrance to the Penobscot Experimental Forest. The site consists of about 5 acres (2 ha) of cleared and disturbed land.

**Costigan Mill Staging Area.** This 20-acre (8-ha) staging area would be located at a former sawmill operation in Penobscot County, Maine, near the Town of Milford and the

Community of Costigan. The Costigan Mill Staging Area would primarily be for rail unloading and storage of utility materials (e.g., poles and wire).

**Pickerel Pond Staging Area.** This staging area is located at an abandoned air strip near Pickerel Pond and is adjacent to Stud Mill Road. The site, which primarily consists of broken pavement and ground, encompasses about 6 acres (2.4 ha).

**Machias River Staging Area.** This staging area would consist of about 6.5 acres (2.6 ha) along Stud Mill Road, about 0.25 mi (0.4 km) west of the Machias River. This former work-camp site is presently cleared. About 1 acre (0.4 ha) of the staging area is located north of Stud Mill Road; the remainder is south of it.

**Huntley Brook Staging Area.** This site is located near where Stud Mill Road crosses Huntley Brook. About 4.5 acres (1.8 ha) of presently cleared land would be used.

**Chester Staging Area.** This 10-acre (4-ha) site is an inactive chip-burning facility in Chester, Maine. The plant has been dismantled and has a large yard for chip storage. The site is located near both proposed river crossings of the Penobscot River.

**Topsfield Staging Area.** This 6-acre (2.4-ha) site is the location of an old hayfield. The site is located along Route 1 and Route 6, the major transportation corridors in the region.

**Baileyville Staging Area.** This staging area, located near the terminus of the line, would consist of two parcels, one of 16 acres (6.5 ha) and one of 28 acres (11.3 ha). The staging area is the site of a now-closed oriented strand board mill. Each parcel has two large yards that can easily accommodate poles and other equipment.

### S.4.3.5 Installation of AC Mitigation for the M&N Gas Pipeline

Any time a wire carrying AC is in the vicinity of a metal pipeline, the wire has the potential of inducing voltages in the pipeline.

Induced voltages in the M&N gas pipeline could be a concern where the NRI would be located near (e.g., within 1 mi [1.6 km]), parallel to, or cross over the pipeline. AC mitigation would be required to protect worker and public safety, as well as to minimize potential impacts on the integrity of the pipeline facilities (e.g., reduce the effectiveness of the cathodic [corrosion] protection employed by the pipeline).

The AC mitigation technique under consideration for the M&N gas pipeline includes the installation of a zinc ribbon buried about 1.5 ft (0.5 m) deep above and parallel to the existing unprotected pipeline, the top of which is at least 3 ft (1 m) below ground. The zinc ribbon would be either plowed in place or installed into an excavated trench that would be backfilled after the ribbon is installed. The ribbons would be attached to the pipeline at regular intervals. The zinc ribbon would be installed over 68 mi (109 km) for the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes; while about 45 mi (72 km) of zinc ribbon would be required for the MEPCO South Route. The ribbon would not be installed where the existing pipeline crosses streams.

In addition to the zinc ribbon, ground mats would be installed at existing test stations along the pipeline. These stations, which resemble pipeline markers in appearance, are spaced at intervals of about every 1 mi (1.6 km) and are located directly above the pipeline. Ground mats would consist of a grounding material (e.g., coiled zinc ribbon) and crushed rock over an area up to 12 ft (3.7 m) in diameter around each test station. About 68 test stations would require ground mats for the Modified Consolidated Corridors Route, the Consolidated Corridors Route, or the Previously Permitted Route, while 45 ground mats would be required for the MEPCO South Route. In addition, four pipeline valve sites and the Baileyville Compressor Station would require some additional grounding. AC mitigation would be installed by M&N prior to energizing the NRI.

#### S.4.3.6 Post-Construction Maintenance Practices

Post-construction maintenance would consist primarily of line inspection and vegetation management. ROW inspections would be periodically required to determine if there are areas where trees may approach minimum clearances before the next scheduled vegetation maintenance period. Management of vegetation along the ROW would consist of the felling of danger trees adjacent to the ROW and control of vegetation within the ROW.

Maintenance clearing generally would be performed on a 3- to 4-year cycle and would consist of some of the same types of activities as during the initial clearing. ROW maintenance within buffer zones would be limited to cutting only those trees that could present a safety hazard to the transmission line before the next cutting period. Encroaching branches from each side of the ROW would be cut (i.e., side trimming). The ROW would be maintained by hand and mechanical cutting, combined with optional foliar, basal, and cut-stump application of herbicides. Only herbicides registered for use by the EPA and approved for use by the State of Maine would be applied.

#### S.4.3.7 Schedule

Construction would begin with ROW clearing upon issuance of all required Federal, State, and local permits. ROW clearing is anticipated to begin in the winter in order to take advantage of frozen ground so as to minimize impacts, especially within wetlands. It is anticipated that the ROW would require about 6 months to clear, support structures would

require 8 months to install, and shield wires and conductors would require 8.5 months to install. To some extent, these activities could be conducted concurrently, and the use of additional crews would shorten the construction time. Substations would be modified as needed during the same period as the stringing operations. Site-specific mitigation and restoration activities would be carried out during all phases of construction. Plans call for the project to be completed and the line energized within 12 to 18 months of commencement of construction.

## S.5 COMPARISON OF THE POTENTIAL ENVIRONMENTAL IMPACTS AMONG ALTERNATIVES

Table S-4 at the end of this summary presents a comparison of the alternatives on the basis of the analysis presented in Chapter 4 of the EIS.

The following resource areas were evaluated for potential impacts:

- Air quality,
- Land features,
- Land use,
- Hydrological resources,
- Ecological resources,
- Cultural resources,
- Socioeconomics,
- Minority and low-income populations (environmental justice),
- Visual resources, and
- Health and safety.

The following discussion emphasizes the environmental implications of choosing among the alternatives, organized by resource area. Impacts during the construction period (approximately 12 to 18 months) and operation (particularly maintenance) of the project are considered. In general, the Rescission of the Presidential Permit Alternative has the least impact on the environment because it does not involve ground-disturbing activities or the introduction of a transmission line into the visual landscape.

### S.5.1 Air Quality

No significant differences in air quality impacts would occur for any of the four route alternatives. Temporary localized fugitive dust emission impacts from construction activities would occur. Fugitive dust impacts would be tempered since as much construction as possible would be conducted in winter and since, in most cases, ground vegetation would not require removal. The use of vehicles and equipment during construction and maintenance would also result in short-term localized emission of air pollutants. During operation of the line, corona-produced ozone ($O_3$) would be less than 1.0 part per billion (ppb), well below the 8-hour and 1-hour $O_3$ standards of 80 ppb and 120 ppb, respectively. A conformity review is not required for the proposed project because the project area is not located within a nonattainment area for any of the criteria pollutants.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no potential impacts on air quality beyond those already occurring.

### S.5.2 Land Features

The construction of the NRI along any of the alternative routes would not impact geologic resource availability. Construction of the alternative routes would require the excavation of approximately 7,933 $yd^3$ (6,069 $m^3$) of soil from the Previously Permitted Route, 9,097 $yd^3$ (6,959 $m^3$) of soil from the Modified Consolidated Corridors Route, 11,913 $yd^3$ (9,113 $m^3$) of soil from the Consolidated Corridors Route, and 12,347 $yd^3$ (9,445 $m^3$) from the MEPCO South Route. The amount of soil removed for any alternative route would be very small relative to the availability of the material in the region. Localized terrain changes could result from the installation of support structures, substation expansion, or establishment of new temporary access roads. These terrain changes would be localized to the individual locations of the support structures, the substation expansion area, and new temporary access roads. Because of the relatively flat terrain of most of the project area, topographic changes to the area would be negligible. Impacts on soils from localized erosion and compaction would be negligible because standard mitigation practices would be used to minimize soil erosion and promptly restore construction areas. Because most of the construction activities in sensitive areas would be conducted in winter when precipitation occurs as snowfall and the soil surface is frozen, the potential for soil erosion or compaction as a result of construction would be minimized. None of the alternative routes are located in areas of relatively high seismic activity.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no potential impacts on land features (physiography, geology, and soils) beyond those already occurring.

### S.5.3 Land Use

All four alternative routes would cross primarily through privately owned commercial forested land. ROW clearance and support structure installation are the main activities under the proposed action that could result in impacts on land use. The line length of each of the alternatives, except for the MEPCO South alternative, would be relatively similar (84 to 85 mi [135 to 137 km]). The MEPCO South line would be 114 mi (183 km) long.

Between about 1,391 and 1,513 acres (563 and 612 ha) of forested land could be impacted by ROW land-disturbing activities for the alternative routes, which is a very small fraction of the local acreage of timberlands (approximately 4.3 million acres [1.7 million ha]) within Hancock, Penobscot, and Washington Counties. The presence of the proposed project would not restrict the continuation of commercial forestry in areas adjacent to the ROW; however, the ROW area would be excluded from future timber production for the life of the project.

Between 28 acres and 86 acres (11 and 34 ha) of agricultural land (cropland, orchards, pastureland, and rangeland) could be impacted by the alternative routes. In the three-county area, there are more than 300,000 acres (120,000 ha) of land in farms. The MEPCO South Route would impact 86 acres (34 ha), while the other three routes would be at the low end of the range. The presence of the ROW would not restrict the continuation of agricultural land use, but it is probable that some support structures would need to be placed within agricultural lands. A support structure would exclude no more than 0.03 acre (0.01 ha) of agricultural land from production. Between 0.29 acre (0.12 ha) and 1.32 acres (0.53 ha) of agricultural land could be lost from production by the alternative routes because of constraints on farm equipment use in the immediate area of support structures (including guy wires).

Recreational activities in the project area include all-terrain vehicle (ATV) use, snowmobiling, canoeing, fishing, and hunting. The primary impact on recreational activities would be increased access and a change in the visual setting where recreation occurs. No land would be taken out of or removed from recreational use as a result of the proposed project. The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would be within the viewshed of two Outstanding River Segments, which are rivers declared by the Maine Legislature to provide irreplaceable social and economic benefits to people because of their unparalleled natural and recreational values.

The proposed project could affect residential areas either visually or through displacement of dwellings by condemnation through BHE's eminent domain rights as a public utility. Up to 10 dwellings would be displaced for the MEPCO South Route, while no dwellings would be displaced for the Modified Consolidated Corridors Route. The Previously Permitted and Consolidated Corridors Routes would displace two and three dwellings, respectively. The number of dwellings within 600 ft (183 m) of the proposed project[3] would be 121 for the

[3] The 600-ft (183-m) distance was selected during BHE's stakeholder process for the purpose of evaluating visual impacts on landowners and has been accepted by DOE as reasonable.

MEPCO South Route, 59 for the Consolidated Corridors Route, 40 for the Modified Consolidated Corridors Route, and 39 for the Consolidated Corridors Route.

No potentially limiting land use issues have been identified for the Modified Consolidated Corridors Route, Consolidated Corridors Route, or MEPCO South Route. The Previously Permitted Route crosses about 40 mi (64 km) of land owned by International Paper, and logging operations along this portion of the route could be disrupted. The Machias River Project[4] could also preclude the Previously Permitted Route's proposed crossing location of the Machias River.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no land use impacts beyond those already occurring.

### S.5.4 Hydrological Resources

No adverse impacts on surface water or groundwater resources would occur from any of the alternative routes. All four alternative routes would span about the same number of streams and rivers. BHE would avoid placing support structures within 75 ft (23 m) from the top of stream banks (25 ft [7.6 m] for the portion that would parallel the existing 345-kV transmission line). However, support structures would be placed as close to Atlantic salmon streams of special concern[5] as possible to minimize the amount of clearing required in order to maintain stream temperatures. The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would cross two designated Outstanding River Segments. Support structures would be placed farther away from these streams to minimize visual impacts. However, because the crossing locations for these streams are relatively open, no changes in stream temperatures from the ROW are expected.

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4 The Machias River Project was a Nature Conservancy initiative to establish conservation protection for the Machias River shoreline. In 2003, a transaction involving the State of Maine, The Nature Conservancy, and International Paper was completed, creating a conservation corridor along the Machias River consisting of conservation easement and fee ownership. In the vicinity of Stud Mill Road, this conservation corridor was conveyed to the State of Maine as fee land (i.e., the State became the owner of the property). This corridor is approximately 2,500 ft (762 m) wide and extends north of the Stud Mill Road to include the area of the crossing of the Previously Permitted Route. At Stud Mill Road, International Paper retained a 1,000-ft (205-m)-wide utility corridor that was subsequently conveyed to ECHO Easement Corridor, LLC. This utility easement provides the right to construct and maintain most types of utility facilities, including electric transmission lines. The Modified Consolidated Corridors and Consolidated Corridors Routes would cross the Machias River within this utility easement. In contrast, the Previously Permitted Route would cross the Machias River within the Machias River conservation corridor, where there is currently no established utility easement. The absence of an existing utility easement at this location does not preclude the crossing of the river by the Previously Permitted Route. A stream crossing may be negotiated with the State, or this portion of the Previously Permitted Route could be rerouted to move the Machias River crossing approximately 3,400 ft (1,036 m) south to the ECHO Easement Corridor location.

5 An Atlantic salmon stream of special concern is a stream or river identified by the Maine Atlantic Salmon Commission as being most important to the various life stages of the Atlantic salmon.

Restrictions on refueling and herbicide mixing locations would protect surface water and groundwater from contamination by fuel, lubricants, and herbicides during construction. Standard mitigation practices would be implemented along the length of the line for erosion and sedimentation control.

No support structures would be located in streams, and the placement of support structures elsewhere in floodplains is not expected to result in any increase in flood hazard. The support structure poles would not impede floodwater movement or reduce floodwater-storage capacity.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no impacts on hydrological resources beyond those already occurring.

### S.5.5 Ecological Resources

Vegetation would be affected by clearing to establish the ROW, installation of support structures, creation of new temporary access roads, and installation of AC mitigation, as required. Forest clearing for the project would fragment habitat by creating a new ROW through contiguous forested habitats or by expanding the ROW width where the NRI would be co-located with existing facilities. The acreage of forest clearing for the ROW would be as follows: Modified Consolidated Corridor Route — 1,411 acres (570 ha); Consolidated Corridors Route — 1,391 acres (563 ha); Previously Permitted Route — 1,461 acres (591 ha); and MEPCO South Route — 1,513 acres (612 ha). The ROW would be maintained in a shrubland or old field condition. Standard mitigation practices would minimize the potential for adverse impacts from selective herbicide use.

The potential impacts on wildlife (beneficial or adverse) for each alternative route would be proportional to the total acreage of the ROW. Impacts from transmission line construction would be local and affect only individual animals. Population-level impacts on wildlife species are considered to be very unlikely. Herbicides would not be expected to adversely affect wildlife. The potential exists for birds to collide with the transmission line conductors and shield wires. This would be most likely to occur where the proposed project crosses through areas where birds would be most likely to congregate, such as waterfowl and wading bird habitats. The acreage of waterfowl and wading bird habitats that would be crossed by the proposed project would be as follows: Modified Consolidated Corridors Route — 133 acres (54 ha); Consolidated Corridors Route — 113 acres (45 ha); Previously Permitted Route — 93 acres (37 ha); and MEPCO South Route — 148 acres (60 ha).

Minimal adverse impacts on aquatic biota would be expected for any alternative route because standard mitigation practices would be used to minimize erosion and sedimentation, stream warming, and chemical contamination (e.g., by herbicides or fuel).

Impacts on wetlands would occur where forested wetlands are converted to scrub-shrub or emergent wetlands. The acreage affected would be as follows: Modified Consolidated

Corridors Route — 70 acres (29 ha); Consolidated Corridors Route — 53 acres (21 ha); Previously Permitted Route — 103 acres (41 ha); and MEPCO South Route — 73 acres (29 ha). Only very minor permanent fills of wetlands would occur from support structure pole placement in wetlands. No impacts on wetlands with standing water from herbicide use are expected for any alternative route.

Impacts on special status species would be similar to those described for other biota, but any impacts could affect their populations because of the species' limited distribution and/or abundance. The establishment of a ROW would be potentially beneficial for some special status species and adverse for others. Potential adverse impacts from construction and maintenance of the ROW would be minimized or eliminated by the implementation of standard mitigation practices aimed at special status species. For example, ball markers and/or flappers would be placed on shield wires across the St. Croix River, Machias River, Narraguagus River, Great Works Stream, and Penobscot River to minimize the potential for bald eagles to collide with the wires, and standard mitigation practices would be employed at Atlantic salmon essential fish habitat streams to minimize erosion and sedimentation, protect stream banks, and maintain stream shading.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no impacts on ecological resources beyond those already occurring.

### S.5.6 Cultural Resources

No impacts on cultural resources are expected for the Modified Consolidated Corridors Route. The route was modified to avoid the one significant historic property recorded during the archaeological survey for the proposed project. Impacts on cultural resources are possible, but unlikely, for the Consolidated Corridors and Previously Permitted Routes; impacts on cultural resources would be more probable, however, for the MEPCO South Route since the Penobscot River drainage has been identified as an area of high potential for containing significant archaeological material. A cultural resource survey and approval of the survey results by the Maine State Historic Preservation Office would be required if the Consolidated Corridors Route, Previously Permitted Route, or MEPCO South Route were selected for the proposed project. Archaeological surveys may be required in areas designated for new temporary access roads and some staging areas. No cultural resources are expected in areas where AC mitigation may be required, since those areas were previously disturbed when the M&N gas pipeline was installed.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no impacts on cultural resources beyond those already occurring.

### S.5.7 Socioeconomics

The construction of the Modified Consolidated Corridors Route, Consolidated Corridors Route, or the Previously Permitted Route would create approximately 120 direct (construction) jobs and approximately 110 indirect (service-related) jobs. The MEPCO South Route would create approximately 150 direct jobs and 130 indirect jobs. The jobs created by the construction of the NRI would primarily benefit Hancock, Penobscot, and Washington Counties. No significant influx of population or stress to community services would be expected from project construction. No socioeconomic impacts would be expected from project operation because most jobs created would be filled by current residents.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no socioeconomic impacts beyond those already occurring.

### S.5.8 Environmental Justice Considerations

The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would not have a disproportionately high and adverse impact on minority or low-income populations. One minority census block group occurs within a small portion of the 2-mi (3.2-km) buffer along the MEPCO South Route. Standard mitigation practices would minimize potential impacts from noise, dust, and emissions during construction.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no impacts on environmental justice considerations beyond those already occurring.

### S.5.9 Visual Resources

Visual impacts would occur primarily from the introduction of support structures and transmission line wires into the landscape. A transmission line along any of the alternative routes would be moderately incompatible, mildly contrasting, and, occasionally, a dominant feature in the landscape. This would be most notable in areas where more remote recreational activities occur. The MEPCO South Route would be visible to more residents than the other alternatives, given its closer proximity to more towns and roads along the Route 2 and Route 6 corridors. The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would cross two designated Outstanding River Segments (Narraguagus and Machias Rivers). Standard mitigation practices would be used to minimize visual impacts at these two river crossings and at the U.S. side of the St. Croix River, which would be crossed by all four alternative routes.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no visual resource impacts beyond those already occurring.

### S.5.10 Health and Safety

Procedures are well established to reduce or eliminate the potential for shock hazards associated with operation of the NRI. AC mitigation would be required where the NRI would be located near, parallel to, or cross over the M&N gas pipeline.

Although each alternative route passes primarily though forested land, the MEPCO South Route would have the highest number of houses in close proximity to the transmission line. Electric field exposures at the edge of the ROW for all alternatives would be less than guidelines that have been established by several states. Magnetic field exposures at most residences for all routes would be well below average daily exposure to maximum magnetic fields (0.8 milligauss [mG]) from some common household and office appliances and machinery. No health effects would be expected from electric and magnetic field (EMF) exposure.

There are no significant differences in potential noise impacts from any of the four alternative routes. Noise levels would increase above background during construction. Temporary construction noise increases would primarily impact residents and recreationists close to the ROW. Elevated noise would occur only during daytime. During operation, long-term noise from the corona effect on transmission lines would generally be lost in background noise.

The potential risk to people with pacemakers would be negligible for all alternative routes. The potential for radio and television interference from the proposed project would be negligible. What little potential there is would be slightly greater for the MEPCO South Route because it has more dwellings within 100 ft (30 m) of the ROW and has more highway crossings than the other alternative routes.

The potential human health risks from herbicide usage for maintaining the proposed project ROW would be negligible because of adherence to regulations and implementation of standard mitigation practices associated with the use of these products.

The potential for fatalities of, and injuries to, construction and maintenance workers would be slightly greater for the MEPCO South Route than for the other alternative routes because of its greater length, which would require more clearing and more support structures. Nevertheless, fatality risks would be less than 1 fatality for all alternative routes. Nonfatal occupational injuries and illnesses for construction of the NRI would be 9.7 for the MEPCO South Route and 6.9 for the other alternative routes; nonfatal injuries and illnesses during maintenance would be fewer than 1 per 10 full-time field personnel for all alternative routes. The use of standard mitigation practices for occupational health and safety compliance would reduce the potential for fatalities and injuries.

Under the Rescission of the Presidential Permit Alternative, BHE would not build the NRI. Therefore, there would be no health and safety impacts beyond those already occurring.

## S.6 CUMULATIVE IMPACTS

The cumulative impacts from the combination of BHE's proposed project and other past, present, and reasonably foreseeable actions could affect air quality, land features, land use (including recreation), hydrological resources, ecological resources, cultural resources, socioeconomic resources, environmental justice considerations, visual resources, and health and safety. These potential cumulative impacts are primarily related to long-term development of land that is currently used for other activities such as commercial timber production and recreation. If multiple projects are under construction simultaneously, an increased amount of land could be used temporarily for construction lay-down and staging areas, and an increased amount of airborne dust could be generated. The cumulative change on land use could affect natural habitats, special status species, and cultural resources, and could lead to an increase in soil erosion. The cumulative impacts on human health and safety could be an increase in background EMF exposure to residents in the immediate vicinity of the NRI. No long-term cumulative human health impacts are expected to occur. No disproportionately high and adverse impacts were identified for minority or low-income populations for the proposed project. Thus, the proposed project would not contribute cumulatively to any environmental justice impacts.

The NRI would result in only very small incremental (cumulative) environmental impacts within east-central Maine because most of the new transmission facility would be constructed within commercial timber areas (where impacts associated with harvesting of trees currently occur). It is estimated that 22 to 98% of the proposed line, depending on the alternative route, would be located within existing ROWs, which would result in widening the ROWs by 100 to 155 ft (30 to 47 m). The remaining 2 to 78% of the proposed transmission line would be within a new 170-ft (52-m)-wide ROW. The new ROW segments would add to various ROWs and timber clearings that currently exist in the east-central portion of Maine.

The rescission of the Presidential Permit Alternative would not contribute to cumulative impacts within the project area.