

**EX. 1: Inventory of Potential Breeding Bird Species and Habitats along
 the Connecticut Portions of Interstate Reliability Project**

**INVENTORY OF POTENTIAL BREEDING BIRD SPECIES AND HABITATS
ALONG THE CONNECTICUT PORTION OF THE
INTERSTATE RELIABILITY PROJECT**

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1.0 Introduction

The Connecticut Light and Power Company (CL&P) and National Grid USA (National Grid) propose to construct and operate approximately 75 miles of new 345-kilovolt (kV) transmission lines and make related modifications and improvements to existing 345-kV lines and 115-kV lines in northeastern Connecticut, northwestern Rhode Island, and south central Massachusetts (Figure 1). These proposed improvements are referred to as the Interstate Reliability Project.

CL&P would construct and operate the Connecticut portion of the Interstate Reliability Project, which would consist of approximately 36.8 miles of new 345-kV transmission lines, extending between CL&P's existing Card Street Substation, Lake Road Switching Station, and the Connecticut/Rhode Island border, as well as related modifications to two existing substations and the Lake Road Switching Station (Figure 2). For the purposes of this report, the Connecticut portion of the Interstate Reliability Project is referred to as "the Project".

1.1 Study Objectives

Pursuant to the Connecticut Siting Council's (Council's) *Application Guide for Electric and Fuel Transmission Line Facility* (April 2010), applicants proposing transmission line projects must perform an inventory of breeding birds and their habitats¹. Accordingly, the purpose of this report is to:

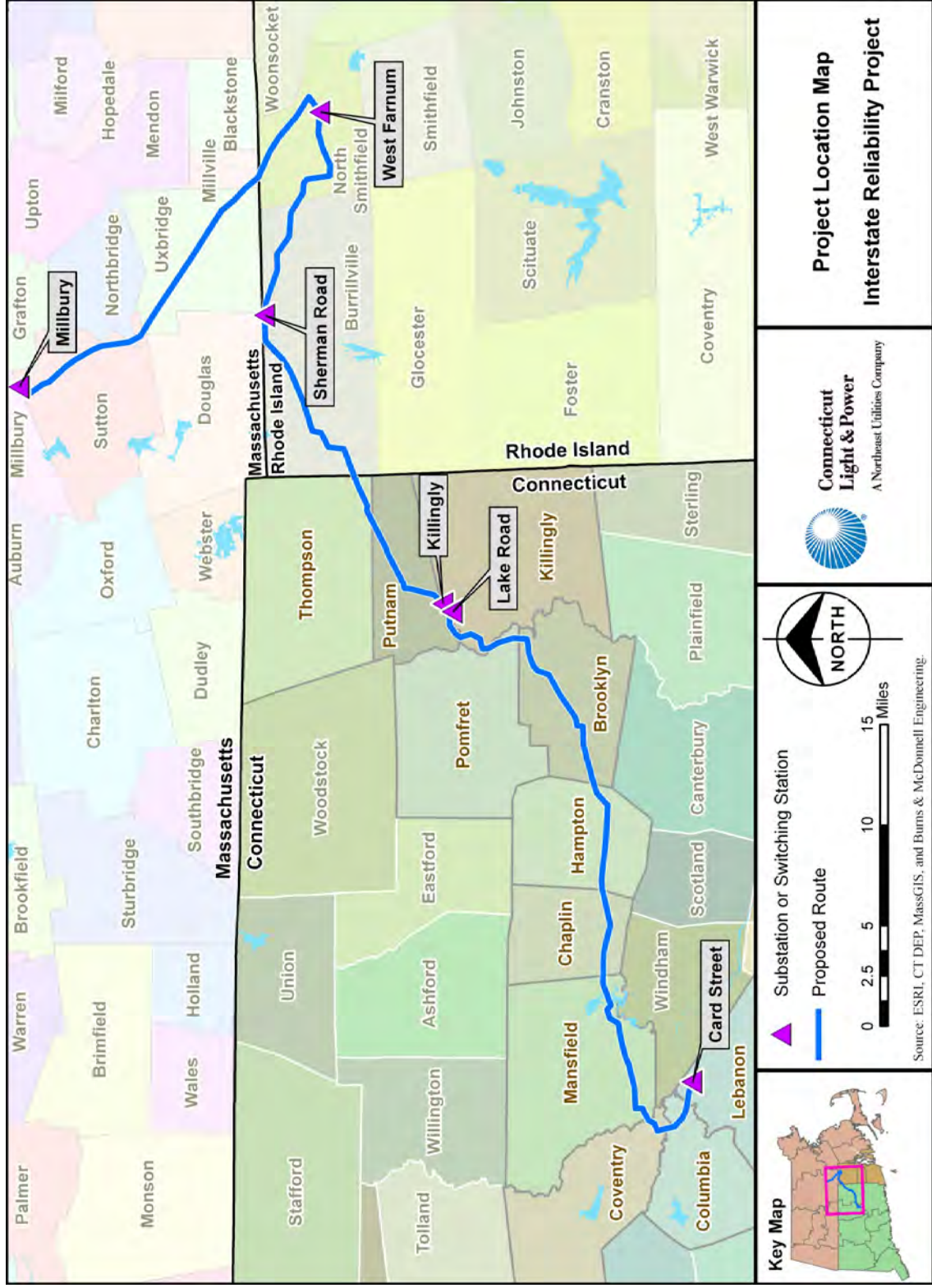
- Present an inventory of the bird species that are known or expected to breed in the Project region and that may occur along the proposed Project right-of-ways (ROWs), based on the results of available breeding bird research and an analysis of the habitat types present on and in the vicinity of the ROWs;
- Review the results of research concerning state and regional (Northeast U.S.) trends in bird populations associated with the habitats found on ROWs;
- Review the results of research concerning bird use of ROWs;

¹ *Application Guide*, Section VI.H.1(a)(iv)

- Present the results of field surveys conducted along segments of the ROWs for certain state-listed bird species, as requested by the Connecticut Department of Environmental Protection (CTDEP²); and
- Describe in general terms the potential effects of ROWs on bird species.

² As of July 1, 2011, the CTDEP was merged with other state agencies to become the Connecticut Department of Energy and Environmental Protection (CT DEEP). References herein to CTDEP related to consultations that occurred prior to July 1, 2011.

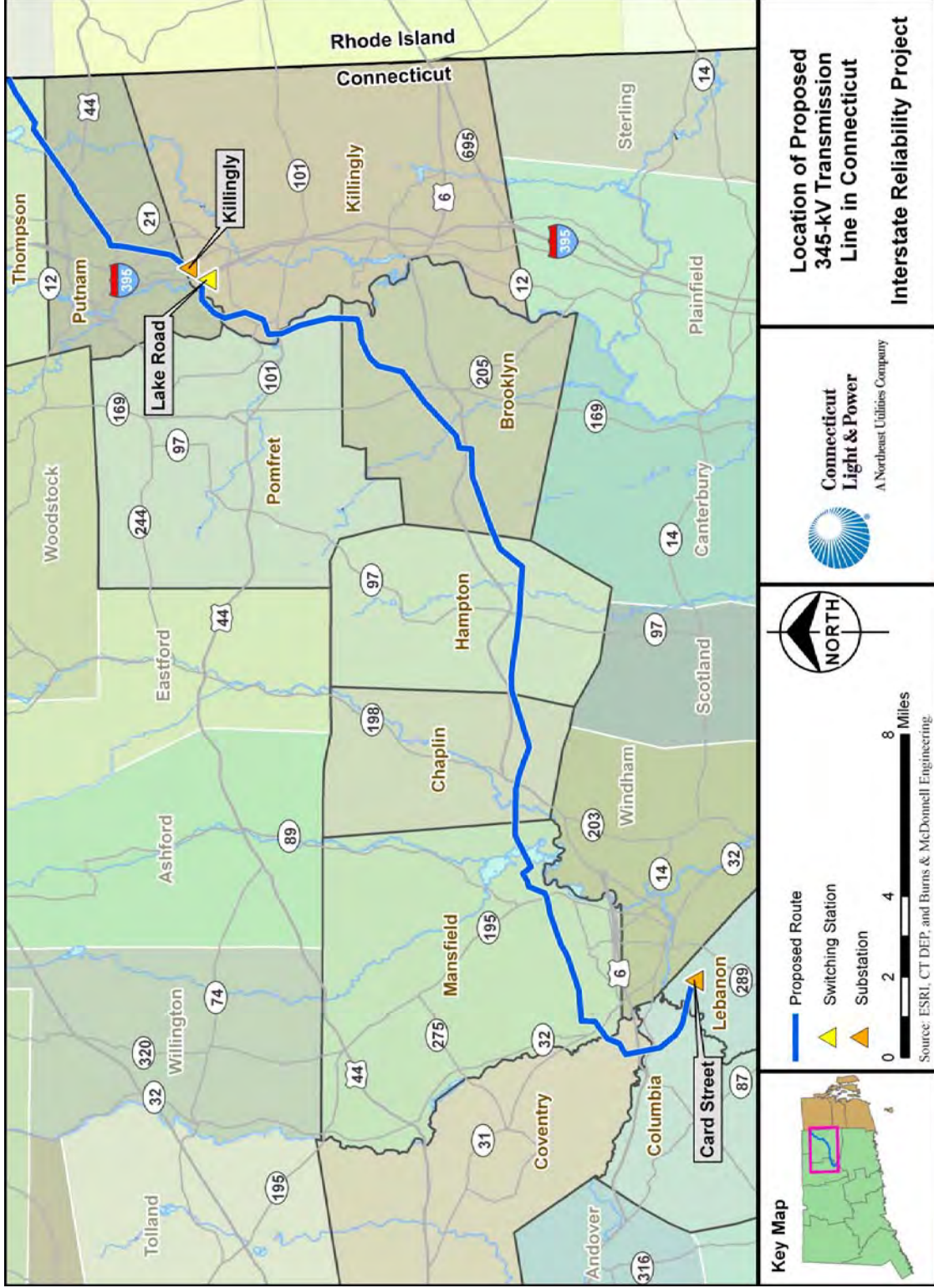
Figure 1: Interstate Reliability Project Location



Source: ESRI, CT DEP, MassGIS, and Burns & McDonnell Engineering.

August 18, 2011

Figure 2: Location of Proposed 345-kV Transmission Lines in Connecticut



To perform the inventory of breeding birds and their habitats in the Project area, CL&P retained AECOM Environment (AECOM). AECOM's literature review concerning breeding birds in the Project area was performed over a four-year period (2007 – 2011).³ In addition, in 2008 and again in 2011, field surveys were performed along segments of the ROWs to assess the presence of, or potential habitat for, certain rare bird species, as identified based on CL&P's initial consultations with the CTDEP.

1.2 Project Location and Background

The Project would be located in portions of New London, Tolland, and Windham counties. All of the Project would be aligned through inland areas in northeastern Connecticut, along ROWs that are located more than 30 miles from New London County's coastal zone along Long Island Sound.

CL&P proposes to develop the new 345-kV transmission lines, in overhead configurations, along existing ROWs, adjacent to existing overhead 345-kV lines.⁴ Commencing at the Card Street Substation in the Town of Lebanon (in northern New London County), the proposed 345-kV transmission lines would extend north-northeast along these ROWs, traversing portions of 11 towns (Lebanon, Columbia, Coventry, Mansfield, Chaplin, Hampton, Brooklyn, Pomfret, Killingly, Putnam, and Thompson), before terminating at the Connecticut/Rhode Island border in the Town of Thompson (Windham County). The CL&P transmission lines would connect to the proposed National Grid facilities at the state border.

With the exception of a 1.4-mile segment across federally owned properties in the towns of Mansfield and Chaplin, the proposed 345-kV transmission lines would be located within presently unused portions of CL&P's ROWs, which typically average 300 feet in width. Across the federally-owned properties, the CL&P ROW is only 150 feet wide. As a result, for this 1.4-mile area, CL&P has identified various alternative ROW expansion

³ As part of initial Project planning efforts, a preliminary inventory of potential breeding bird species and habitat was conducted by ESS Group, Inc. This August 2004 inventory was included in the Project's September 2008 Municipal Consultation Filing (Exhibit 5), which CL&P published in accordance with the Council's requirements.

⁴ The new 345-kV lines would be aligned parallel to existing CL&P 345-kV lines along the length of the proposed route. Along segments of the proposed route, the ROWs also include other transmission lines (115 kV and 69 kV) and distribution lines.

and transmission line configuration options. Table 1-1 summarizes the counties and towns along the proposed transmission line route, identifies the existing width of the CL&P ROWs along which the new 345-kV lines are proposed, and provides the estimated width of each ROW segment that CL&P routinely manages in scrub-shrub vegetation in the vicinity of the existing transmission and distribution lines that presently occupy these ROWs.

**Table 1-1
Proposed 345-kV Transmission Lines: Location (County / Town) and Widths of Existing
CL&P ROWs**

Town	ROW		
	Miles	Width Range (feet, typical)	Width of Current Vegetation Management along ROW (feet, typical)
New London County			
Lebanon	0.6	350	275
Tolland County			
Columbia	1.7	300-350	275
Coventry	1.2	300	275
Mansfield	6.4	150*-300	100-140
Windham County			
Chaplin	3.3	150*-300	140
Hampton	4.3	300	140
Brooklyn	7.2	300-360	260
Pomfret	1.7	360	260
Killingly	3.0	250-400	260-345
Putnam	5.6	340-400	140-345
Thompson	1.8	300	140
Total	36.8		

* Along federally owned property in Mansfield and Chaplin, the CL&P ROW is 150 feet wide.

Although CL&P prefers to locate the new 345-kV transmission lines in overhead configurations along the 36.8-mile Proposed Route, as part of the Project planning process, CL&P also identified six variations to segments of this route. Breeding bird inventories for these variations are discussed in Appendix B.

1.3 Report Organization

This report both summarizes the research conducted regarding breeding birds in Connecticut and avian uses of ROWs, and presents the results of field surveys conducted for birds along segments of the Proposed Route. Section 2 describes the methods used to perform the breeding bird inventory, whereas Section 3 summarizes current research concerning avian use of ROWs and trends in bird populations relating to the use of habitats commonly found on ROWs.

Section 4 describes the major habitat types present along the Project ROWs, as well as the results of research concerning the bird species that may breed or otherwise occur in such habitats. Section 5 summarizes the results of field surveys conducted along the Project ROWs in the towns of Mansfield and Putnam to assess the presence of state-listed bird species. Section 6 reviews the general effects of ROWs on bird populations. References are included in Section 7.

Appendix A includes agency correspondence concerning state-listed rare, threatened, or endangered bird species in the Project vicinity. Appendix B reviews the potential breeding bird species that could occur along six route variations to portions of the proposed Project route. Appendix C includes the 2011 Whip-poor-will survey report, which presents the results of the additional field investigations that were conducted for this state-listed species of special concern along segments of the ROW in the Town of Putnam.

2.0 Methods

The inventory of potential breeding bird species in the Project area was compiled based on the following:

- Consultations with the CTDEP Natural Diversity Database (NDDDB), and the United States Fish and Wildlife Service (USFWS) to determine if any rare bird species are reported to occur within or in close proximity to the Project area.
- Review of published data concerning breeding birds in Connecticut, and particularly in the northeastern Connecticut Project region.
- Examination of published research concerning avian use of ROW habitats.
- Evaluation of aerial photography and video footage (based on helicopter overflights) of the proposed ROWs to identify habitats along and adjacent to the ROWs.
- Field reconnaissance of the proposed 345-kV transmission line ROWs and site-specific surveys for certain state-listed bird species, as requested by CTDEP.

2.1 Review of Agency Consultations

On behalf of CL&P, AECOM initiated consultations with CTDEP and the USFWS regarding the Project in 2007. Copies of correspondence with these agencies are provided in Appendix A.

In correspondence dated November 2007 and April 2009, the USFWS indicated that there are no federally-listed rare, threatened, or endangered bird species within the Project area. In the same 2007 and 2009 correspondence, the USFWS further indicated that CL&P should consult the USFWS website for future updates regarding federally-listed bird species. Accordingly, on December 9, 2010, AECOM consulted the USFWS website to review updates concerning the occurrence of federally-listed species. Based on this review, no federally-listed bird species were identified as occurring within the towns in the Project area.

Consultations with the CTDEP NDDDB (correspondence dated February 25, 2008 and March 8, 2010⁵; refer to Appendix A) indicated historic records of six state-listed species

⁵ Consultation with the CTDEP NDDDB in December 2010 verified that this information was the most current data regarding state-listed bird species in the Project area.

of birds in the Project area. These species, all of which were reported to either potentially nest or forage on or near portions of the Project ROWs in the towns of Mansfield or Putnam, are:

- Horned Lark (*Eremophila alpestris*, state-listed as endangered).
- Grasshopper Sparrow (*Ammodramus savannarum*, state-listed as endangered).
- American Kestrel (*Falco sparverius*, state-listed as threatened).
- Whip-poor-will (*Caprimulgus vociferous*, state-listed as species of special concern).
- Savannah Sparrow (*Passerculus sandwichensis*, state-listed as species of special concern).
- Eastern Meadowlark (*Sturnella magna*, state-listed as species of special concern)

Table 2-1 summarizes the primary habitat characteristics of these six species, along with the general locations (all in the towns of Mansfield and Putnam) where the species were reported to occur near the Project ROWs (based on NDDB records). To determine whether the six state-listed bird species occur along CL&P's existing ROWs in the towns of Mansfield and Putnam, AECOM biologists performed a series of field surveys and evaluated the ROW for potentially suitable habitat by performing a habitat assessment. The results of these surveys are detailed in Section 5.

Table 2-1
State-Listed Bird Species Reported to Occur in the Vicinity of the Proposed Route
(Based on CTDEP NDDDB Records)

Species (Common Name)	Species (Scientific Name)	State Status*	NDDDB Record of Observation (Town along ROW)	General Habitat Preference and Nest Characteristics
Horned Lark	<i>Eremophila alpestris</i>	SE	Mansfield	Open areas with little cover (large fields, open areas, grasslands, agricultural areas). Common migrant and winter visitor, but rarely nests in Connecticut. Nests in hollows in ground lined with fine grass. Breeding usually begins mid-June.
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SE	Mansfield	Grasslands, pastures and old fields. Breeds in late May – early June. Nests on ground. Minimum grassland size for breeding habitat is reported as 30 acres (Jones and Vickery, Grassland Conservation Program, MAS, Lincoln, MA).
American Kestrel	<i>Falco sparverius</i>	ST	Mansfield	Grassland or shrubland at the edge of forest; requires cavities for nesting and perches for hunting. Nests in a natural tree cavity or man-made next box. Eggs typically laid by end of April.
Savannah Sparrow	<i>Passerculus sandwichensis</i>	SSC	Mansfield	Upland meadows, pastures, old fields, cultivated fields, and hayfields with damp soils. Nest is formed in shallow depressions on ground in tall grass clumps or base of low woody shrubs. Minimum grassland size is 20-40 acres.
Eastern Meadowlark	<i>Sturnella magna</i>	SSC	Mansfield	Upland meadows, pastures, old fields, crop lands, and capped landfills. Nests in depression within meadows, hayfields on ground with dense vegetative cover 10-20 inches tall. Minimum grassland size is 15 to 20 acres.
Whip-poor-will	<i>Caprimulgus vociferus</i>	SSC	Putnam	Scrubby immature woods, wooded areas following a disturbance. Nests on ground among dried leaves.

*Key: SSC=State Species of Special Concern, ST=State Threatened, SE=State Endangered

2.2 Review of Breeding Bird Atlas Data

The Atlas of Breeding Birds of Connecticut (Atlas; Bevier, [ed] 1994) was the primary source consulted to determine which bird species are likely to breed in the Project area.

The *Atlas* compiles the results of a comprehensive and systematic survey of Connecticut's breeding birds and their habitats.

The *Atlas* was initiated to determine the bird species that nest in Connecticut and the locations within the state used by each species. The information presented in the *Atlas* is the result of field surveys conducted over a five-year period from 1982 to 1986 and involving more than 500 volunteers. The *Atlas* utilizes a grid system based on the United States Geological Survey (USGS) topographic quadrangle mapping system. The system divides Connecticut into 596 "blocks", with each "block" consisting of one-sixth of a USGS topographic quadrangle, representing approximately 10 square miles of geographic coverage. For each block, volunteers recorded observations of bird species and their behavior, identifying which species were observed and whether breeding in that block was considered possible, probable, or confirmed. For each bird species recorded in Connecticut, the *Atlas* includes a discussion of the species' habitat preferences and provides a distribution map that indicates in which blocks the species was observed and whether breeding was confirmed, probable, or possible.

The Project extends through portions of New London, Tolland, and Windham Counties. Given the geographic distribution of the Project, and in an effort to be as thorough as possible, a bird species listed in the *Atlas* was considered potentially occurring in the Project area if:

- 1) It was listed as a confirmed breeder in the vicinity of the proposed Project in New London, Tolland, or Windham counties in the *Atlas*⁶; or
- 2) It was identified by the CTDEP NDDB as reportedly occurring in the Project area (i.e., as part of the NDDB's records concerning the previously identified locations of state-listed special concern, threatened, or endangered species).

⁶ For the purposes of this inventory, species recorded within approximately 10-15 miles of the Proposed Route were considered to have the potential to occur in the Project area. Further, some species (primarily coastal birds) were eliminated from consideration in this inventory due to lack of suitable breeding habitat in the Project area.

- 3) The bird species is known to use habitats that occur on the Project ROWs (e.g., upland or wetland shrubland habitat along the managed portion of the ROWs and typically forested habitat along the un-utilized portion of the ROWs).

2.3 Review of Published Literature Regarding Breeding Birds and ROWs

In addition to the *Atlas*, a literature search was conducted of published data concerning both the status of bird species in Connecticut and the effects of vegetatively managed ROWs on avian habitat utilization. This data ranged from information compiled by CTDEP to studies conducted by university researchers and conservation organizations.

For example, since 2006, the Connecticut Audubon Society has annually published a *Connecticut State of the Birds* report, which each year has focused on a different issue regarding birds in the state. Each of these Audubon *State of the Birds* reports (2006 – 2011) was reviewed for relevancy to the proposed Project.

2.4 Field Reconnaissance of Breeding Bird Habitat along the Project ROWs

To assess the terrestrial and palustrine habitat types present along and in the vicinity of the Project, AECOM biologists reviewed aerial photographs and videos (taken during helicopter over-flights) to identify general habitat cover types along the proposed Project ROWs.

In 2008, AECOM conducted field reconnaissance (meander surveys) of the Project ROWs to verify the habitat cover types and to document dominant plant species assemblages within the cover types. During the meander surveys, representative segments of the Project ROWs were investigated to identify existing cover types and specifically to evaluate the nature and extent of avian utilization. All bird species observed during the ROW meander surveys were documented.

In 2011, AECOM conducted a Whip-poor-will survey along the CL&P transmission line ROW segment in Putnam. The objective of the 2011 survey effort was to augment the 2008 survey and to provide more data relative to the presence or absence of the species.

3.0 Avian Regional / State Population Trends and Use of ROWs

To evaluate avian population trends in Connecticut, with an emphasis on avian utilization of ROWs, several sources of information were utilized. Sources of data include the Connecticut Ornithological Association, the Connecticut Audubon Society, the *Atlas of Breeding Birds of Connecticut*, and Connecticut's *Comprehensive Wildlife Conservation Strategy* ([CWCS]; CTDEP, October 2005). A summary of the findings of this data review is provided below.

3.1 Summary of Avian Population Trends and Issues in Connecticut

Although a small state, Connecticut is characterized by a variety of habitats, ranging from Long Island Sound beaches and tidally influenced rivers to inland wetlands and upland forests. These habitats in turn support a diverse assemblage of bird species. According to the Avian Records Committee of the Connecticut Ornithological Association, 424 species of birds have been recorded in the state and, of these, 335 species occur regularly or annually. An estimated 170 species regularly breed in Connecticut.

Review of Connecticut Audubon Society Reports

Since 2006, the Connecticut Audubon Society has issued an annual *Connecticut State of the Birds* report. Each report focuses on a different key issue related to the state's birds. For instance, the first (2006) report spotlighted habitat loss as the greatest threat to the state's native bird populations. The report identified six major bird habitats in Connecticut: shoreline (beaches, dunes, bluffs, and headlands), tidal marshes, inland wetlands, grasslands, shrublands, and forests.

The proposed Project region encompasses four of these habitat types (i.e., inland wetlands, grasslands, shrublands, and forests). The 170 avian species known to breed in the state use these four inland habitats as follows:

- 70-80 species nest in forests
- 20-30 species nest in shrublands

- 15-20 species nest in freshwater wetlands
- 10 species nest in grasslands

The 2006 report noted that as a result of habitat loss, 50% of the state's native birds are declining, with 17% listed by the CTDEP as threatened, endangered, or special concern. Birds that inhabit shrublands and grasslands have shown particular declines in Connecticut, due to the conversion of farmlands to development or as a result of natural reforestation/succession. As identified in the 2006 report, transmission line ROWs provide "the most important source of habitat for shrubland specialists" and "support a rich diversity of shrubland birds, including species that have suffered substantial population declines in the region, such as Brown Thrasher, Yellow-breasted Chat, Blue-winged Warbler, and Eastern Towhee". Furthermore, the report states that transmission line ROWs provide enough suitable nesting habitat to sustain shrubland bird populations and also that some shrubland bird species were found in greater densities on wider ROWs, "suggesting that consolidation of utility ROWs may produce better shrubland habitat (while minimizing fragmentation of forests)". (*Connecticut State of the Birds* 2006, pp. 30-31).

Lastly, the 2006 *Connecticut State of the Birds* report identified five specific recommendations for mitigating threats to the state's bird populations and habitats:

- (1) Inventory and map key habitats
- (2) Better use of current land resources
- (3) Prioritize species of greatest conservation need
- (4) Review Connecticut's 21% open space goal (by 2023) to verify the inclusion of prioritized bird habitats
- (5) Improve information regarding birds (e.g., bird counts and surveys)

Under recommendation No. 2 (better use of current land resources), the report emphasized the importance of transmission line ROWs as a major source of shrubland habitat and recommended that utility companies be encouraged to maintain power line corridors as shrubland.

After the 2006 focus on habitat loss as the most critical threat to birds in the state, the *Connecticut State of the Birds 2007* report described various secondary, but serious, risks to native birds, including glass strikes, cats, and interference of tall structures, specifically referencing cell towers and transmission lines with blinking lights for aircraft warning purposes. Subsequently, the 2008 report focused on conservation strategies for six bird species in serious decline (none of which are reported to occur in the Project area).

The 2009 report described the federal and state endangered species acts, identified Connecticut-listed birds, and selected 20 species to serve as indicators of where important habitat exists or can be created in the state. Of these 20 species, nine species⁷ were either observed during surveys of the Project ROWs or are otherwise reported to occur in the Project vicinity. The *Connecticut State of the Birds 2010* report describes the role of “citizen scientists” in bird survey and conservation efforts and also reviews recommendations for the protection of critical bird habitat.

The *Connecticut State of the Birds 2011* report reviews the status of the state’s forest land, one of the six major bird habitats identified in the 2006 report. As described in the 2011 report, approximately 60% (1.87 million acres) of Connecticut is forested, and birds are the predominant wildlife group within forest communities. However, the quality of forest habitat is threatened by urban / suburban development (causing fragmentation, parcelization, and canopy perforation, as well as the loss of habitat to buildings and parking lots); noxious pests and invasive plants; over-browsing by White-tailed Deer; and climate change. As an example, of the state’s 1.87 million acres of forest, only 46% (about 860,000 acres) represents “core forest” that consists of forest that is at least 300 feet from a non-forest habitat type. In addition, over the past 35 years, Connecticut’s forest cover has declined by more than 13%, primarily as a result of the conversion of forests to urban / suburban development. The 2011 report refers to the importance of

⁷ These species are: American Black Duck (*Anas rubripes*), American Woodcock (*Scolopax minor*), Blue-winged Warbler (*Vermivora cyanoptera*), Bobolink (*Dolichonyx oryzivorus*), Brown Thrasher (*Toxostoma rufum*), Eastern Meadowlark (*Sturnella magna*), Golden-winged Warbler (*Vermivora chrysoptera*), Grasshopper Sparrow (*Ammodramus savannarum*), and Least Bittern (*Ixobrychus exilis*). Of these nine species, four have been observed during on ROW surveys: American Woodcock, Blue-winged Warbler, Brown Thrasher, and Eastern Meadowlark.

preserving both forest land and farmland habitats in New England⁸, and emphasizes the need to focus the CTDEP’s land acquisition strategy on identifying and acquiring for preservation forest land that provides valuable forest habitat (rather than just acquiring land that is available), and also for effectively managing the forest land that is under public stewardship.

Connecticut Comprehensive Wildlife Conservation Strategy

Connecticut’s *Comprehensive Wildlife Conservation Strategy* ([CWCS]; CTDEP, October 2005), which presents a strategy for the conservation of wildlife through 2015, includes extensive information regarding birds, threats to bird species, and conservation actions for priority species, categorized by habitat type. The CWCS identifies the *Atlas of Breeding Birds of Connecticut* (1994) as the best source of information on the distribution and abundance of breeding birds in the state. The CWCS also defines 12 key habitats that are essential for species of greatest conservation need in the state. Among these are “intensively managed habitats”, which are defined as including early successional shrublands and forests found on utility ROWs, as well as cool season grasslands and wet meadows.

CTDEP also has recently verified the importance of shrubland habitat, re-emphasizing the CWCS strategy for conserving and increasing breeding populations of early successional shrubland birds (Kearney-McGee, 2011). At the 5th Connecticut Conference on Natural Resources (2011), CTDEP noted that shrub-dominated habitats and the birds that occupy such habitats continue to decline rapidly in the Northeast U.S. as a result of forest succession, changes in timber harvest practices, disruption in natural disturbance regimes, and development.

The CWCS also describes the various bird monitoring and conservation programs that CTDEP conducts, typically in partnership with the USFWS and various non-governmental conservation groups. These programs include annual monitoring of grassland birds, as well as upland gamebird management and waterbird conservation.

⁸ The 2011 report references the Harvard Forest May 2010 “Wildlands and Woodlands, A Vision for the New England Landscape”, which advocates permanently preserving about 30 million acres of New England forest, as well as farmland. The Wildlands and Woodlands report also advocates the management of 90% of protected forests for timber, recreation, and other values.

3.2 Avian Utilization of Rights-of-Way Habitats

The old field/shrubland habitat typically maintained on ROWs is becoming scarce in Connecticut and in the Northeast in general, as farmlands have been abandoned and have reverted back to forest and as existing woodlands mature (Saucier, 2003). At its peak around the middle of the 19th century, agricultural practices resulted in the clearing of nearly three-fourths of the forestland in Connecticut, while at present approximately 60% of the state is forested (USDA, 2001).

According to the United States Department of Agriculture (USDA), the amount of acreage in forestland in Connecticut has remained relatively stable since 1972, with losses due to commercial and residential development being approximately offset by new young forest habitats that have become established on abandoned pastures, meadows, and old farm fields; this trend was expected to continue for the foreseeable future (USDA, 2001). However, given present day land use, this trend will not continue, as there are no longer large amounts of farmland to revert to forest, and development pressures are increasing on both habitat types (Wharton et al., 2004).

ROWs therefore represent an important component of regional habitat diversity, providing a stable, long-term source of shrubland habitat in a region where it is becoming scarce. The proportion of scrub-shrub habitat present on utility corridors, compared to the amount of scrub-shrub habitat available regionally, varies by state. Of the Neotropical migrant bird species from all habitats that show a decline in abundance from 1980 to 2000 in the Northeast U.S., 90% use disturbance-generated habitats such as open fields, shrublands, mid-successional forests, open parkland, and forest edge, and 72% prefer disturbance and non-climax habitats (Confer and Pascoe, 2003).

Consequently, perpetuating disturbance-generated habitats such as those typical of managed utility ROWs is becoming an increasing concern for avian conservation, as species dependent upon those habitat types are becoming less common. The exchange of forested habitats for shrublands is often interpreted as a net gain for regional biodiversity (Confer and Pascoe, 2003).

Scrub-shrub habitats along utility ROWs are dominated by low-growing, woody vegetation with trees nearly or entirely absent. Historically, these habitats were created by natural and anthropogenic disturbances, which have declined over time. Due to these reductions in disturbances, this habitat type currently represents a small and declining portion of the overall landscape in the northeast (Trani et al., 2001). The overall lack of this type of habitat places additional biological importance on existing and newly created scrub-shrub habitat often associated with utility corridors and the “edge effect” these utility corridors create.

The “edge effect” is a classic ecological principal, which states that the edge between differing habitat types, such as between a utility corridor managed in shrub-scrub vegetation and adjacent forested areas, typically produces larger numbers and a greater diversity of wildlife than the adjacent habitats considered alone. This is because the border between habitats is inhabited by species that specialize in utilizing edge habitats, as well as by species that primarily use either of the adjacent habitat types. This situation is the norm for ROWs in New England, where the dominant old field/shrubland habitat of a typical ROW often borders different habitat cover types.

As a result, the vegetative community commonly found in managed ROWs can support a large and diverse population of bird species (Confer and Pascoe, 2003; King and Byers, 2002; Yahner et. al., 2002; Yahner et. al., 2003). Long-term studies of bird populations on ROWs have demonstrated that the shrubland/meadow complex is generally able to support a greater number and diversity of birds than adjacent forested habitats, as they not only provide food and nesting opportunities for early successional species, but also are important sources of food and cover for woodland species (Confer and Pascoe, 2003; Pagen et. al., 2000; Yahner et. al., 2002; Yahner et. al., 2003). It is recognized however that certain forest-interior bird species demonstrate a preference for un-fragmented forest habitats.

Although utility corridors frequently support a greater diversity of wildlife than adjacent habitats, the size and width of the corridor and associated scrub-shrub habitat can influence the presence of scrub-shrub specific bird species. Some species appear to have a specific set of criteria for habitat selection and will not inhabit areas that appear

suitable (Askins et al., 2007; Chandler et al., 2009). Studies have suggested that wider utility corridors result in a greater abundance of scrub-shrub specific birds (Confer and Pascoe, 2003; King et al., 2009), including species that are often listed as rare or endangered. Corridor width may also affect nesting success, as scrub-shrub birds tend to avoid edges (Schlossberg and King, 2008; King et al., 2009) and nest predation of scrub-shrub bird nests is higher along the edges (Weldon and Haddad, 2005; King et al., 2009). Wider utility corridors ensure that a larger portion of important scrub-shrub habitat is available away from the habitat edges.

Research studies have also shown that vegetation management on ROWs does not have a significant detrimental effect on bird populations that utilize the habitat either for nesting or simply for foraging for food resources and/or protective cover habitat (King and Byers, 2002; Yahner et. al., 2003). Similarly, the presence of a ROW does not significantly affect either nesting success of woodland species in the adjacent forested habitat or brood parasitism by brown-headed cowbirds (Confer and Pascoe, 2003; King and Byers, 2002; Yahner et. al., 2003).

4.0 Correlation of Habitat Types to Potential Breeding Birds: Results

4.1 Habitat Types along the Project ROWs

The proposed 345-kV transmission lines would be aligned along existing CL&P ROWs that average approximately 300 feet wide and are presently occupied, in part, by overhead 345-kV and other transmission lines. In the vicinity of these existing overhead transmission lines, CL&P routinely performs vegetation management to maintain shrubland or other low-growth habitats that are compatible with overhead transmission line operation. Consequently, the habitats along the managed and adjacent un-managed portions of the ROWs are often diverse.

Based on the review of the video and aerial photography of the Project area and the 2008 field investigations of the ROWs, eight habitat cover types were identified as occurring along or near the Project ROWs. These eight habitats are identified on the Project maps⁹ and are described below. Land use and vegetative cover types adjacent to the overall ROW vary considerably and include areas of each category discussed below. However, the dominant habitat type adjacent to the ROW and in the surrounding region is forested land, both upland and wetland.

Old Field/Shrub and Sapling Thickets (OFS)

This upland habitat, which is the dominant cover type in the managed portions of the ROWs, is composed of areas dominated by grasses, forbs, shrubs and saplings. Plant species commonly observed in these habitats include deer tongue (*Panicum clandestinum* = *Dichanthelium clandestinum*), big bluestem (*Andropogon gerardii*), timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), goldenrod (*Solidago* spp.), aster (*Symphyotrichum* sp. = *Aster* spp.), common mullein (*Verbascum thapsus*), whorled loosestrife (*Lysimachia quadrifolia*), brambles (*Rubus* spp.), multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*), eastern red cedar (*Juniperus virginiana*), witch-hazel (*Hamamelis virginiana*), grape (*Vitis* spp.), bittersweet (*Celastrus* spp.) and poison ivy (*Toxicodendron radicans*).

⁹ The Volume 9 maps identify each of the habitats by acronym (e.g., OFS, UF, etc.); the scale of the Volume 11 maps allows a closer view of the vegetative cover types, which are not specifically identified.

Mixed Deciduous Forest/Conifers (UF)

This upland habitat is the dominant cover type in the portions of the ROWs that are not vegetatively managed. Included in this category are deciduous hardwoods such as oak (*Quercus* spp.), maple (*Acer* spp.), hickory (*Carya* spp.), birch (*Betula* spp.) and cherry (*Prunus* spp.). Interspersed with these hardwoods are coniferous trees such as eastern hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*) and spruce (*Picea* spp.). These habitats typically have an underlying shrub and sapling stratum composed of the overstory species mentioned above, as well as witch-hazel, Japanese barberry, hazelnut (*Corylus* spp.), lowbush blueberry (*Vaccinium angustifolium*) and buckthorn (*Rhamnus* spp.).

Forested Wetland (PFO)

Forested wetlands are found on certain portions of the ROWs that are not vegetatively managed. Typically, these areas have canopies that are dominated by some combination of red maple (*Acer rubrum*), yellow birch (*Betula allegheniensis*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), elm (*Ulmus* spp.) and tupelo (*Nyssa sylvatica*). The canopies of forested wetlands are frequently subtended by a shrub layer composed of species such as northern arrowwood (*Viburnum dentatum*), winterberry (*Ilex verticillata*), wild raisin (*Viburnum cassinoides*), spicebush (*Lindera benzoin*) and swamp azalea (*Rhododendron viscosum*), among others. The herbaceous plant strata can be diverse in many of these wetlands. However, skunk cabbage (*Symplocarpus foetidus*), jewelweed (*Impatiens capensis*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), sphagnum moss (*Sphagnum* spp.) and royal fern (*Osmunda regalis*) are frequently dominant.

Shrub Swamp (PSS)

Along the ROWs, habitats identified as shrub swamps frequently occur in areas with substantial accumulations of organic materials and are commonly associated with deep organic soils (Histosols). Within the managed portions of the ROWs, shrub swamps are typically the predominant type of wetland. These types of habitats are frequently inundated and many remain saturated throughout the entire year. Woody plant species prevalent in these areas include buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), willow (*Salix* spp.), speckled alder (*Alnus rugosa*), highbush blueberry (*Vaccinium corymbosum*), steplebush (*Spiraea tomentosa*), and meadowsweet (*Spiraea alba* var. *latifolia*). Common herbaceous plants interspersed with these woody species include emergent herbaceous species such as common cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifolia*), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), soft-stem bulrush (*Scirpus validus*), tussock sedge (*Carex stricta*), wool grass (*Scirpus cyperinus*), as well as other sedges (*Carex* spp.) and rushes (*Juncus* spp.). While these areas do exhibit some degree of interspersed among herbaceous and woody vegetation, these habitat types are dominated by the latter.

Emergent Marsh (PEM)

Like the shrub swamp habitats described above, emergent marsh habitats frequently occur in areas exhibiting substantial accumulations of organic materials and are commonly associated with deep organic soils (Histosols). These types of habitats

are frequently inundated and many remain saturated throughout the entire year. This habitat type is typically dominated by emergent herbaceous species such as common cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifolia*), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), soft-stem bulrush (*Juncus effuses*), as well as other wetland dependent sedges (*Carex* spp.) and rushes (*Juncus* spp.).

Open Water (POW)

This habitat type is characterized by significant areas of open water associated with both lentic (lakes and ponds) and lotic (streams and rivers) waterbodies.

Agricultural Land (AG)

Agricultural land includes all lands currently in active agriculture such as hay fields, pastures, orchards and cultivated fields.

Urban Areas (CI and/or HY)

Urban areas encompass suburban and urban residential (HY), commercial, or industrial developments (CI); recreational areas such as park playgrounds, ballfields, and golf courses; and other locations (including roadsides) where vegetation is intensively managed.

4.2 Potential Breeding Bird Species in the Project Area

As discussed in Section 2, the *Atlas of Breeding Birds of Connecticut* (Bevier, 1994) was the primary source consulted to determine the bird species likely to breed in the vicinity of the proposed Project. In addition, during the 2008 and 2011 field surveys of the ROWs, and the species-specific surveys for the state-listed species, any birds observed were noted.

To develop the list of potential breeding birds in the Project area (refer to Table 4-1, located at the end of this section), the distribution maps of each breeding bird, as provided in the *Atlas*, were compared to the location of the Project ROWs. For the purposes of this analysis, any species that the *Atlas* identified as possible, probable, or confirmed for breeding within approximately 10-15 miles of the ROWs was included in Table 4-1. As described in Section 1.2, the Project would be aligned through inland areas in northeastern Connecticut, along ROWs that are located more than 30 miles from New London County's coastal zone along Long Island Sound. Therefore, limited coastal bird species are included in Table 4-1, with only those species which are known to breed both along the coast and in inland habitats represented.