

Exhibit 2

Wildlife Habitat Survey

Stepstone 35L Substation

Stepstone Hill Road
Guilford, Connecticut

Prepared for



**Connecticut
Light & Power**

The Northeast Utilities System

Prepared by

VHB/Vanasse Hangen Brustlin, Inc.
54 Tuttle Place
Middletown, Connecticut 06457
(860) 632-1500

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I. Introduction

The Connecticut Light and Power Company (“CL&P”) is evaluating the feasibility of developing a new bulk power substation (to be known as the Stepstone Substation, heretoin referred to as the “Substation”) on a portion of its ±38-acre property adjacent to Stepstone Hill Road and Route 77 in the Town of Guilford (the “Property”). The Substation is proposed to be located in the south-central portion of the Property in the vicinity of an existing transmission line right-of-way (ROW). Figure 1 depicts the location of the Property.

This Wildlife Habitat Survey was performed by qualified and experienced scientists of Vanasse Hangen Brustlin, Inc. (VHB) in accordance with the requirements for a Certificate of Environmental Compatibility and Public Need from the Connecticut Siting Council (“CSC”) for the construction of an electric substation facility as defined in General Statutes § 16-501 (a) (1). The overall goal of the study is to identify and document the existing wildlife and vegetation existing on the entire ±38-acre Property and to determine potential environmental impacts of the proposed Substation Facility development. This report provides a detailed analysis of the various wildlife habitats occupying the Property.

II. Study Methodology

The wildlife habitat evaluation was divided into five parts: 1) Vegetation Assessment, 2) Bird Monitoring, 3) Vernal Pool Monitoring 4) Habitat Structure Assessment and 5) NEWild™ analysis. All five components of the wildlife habitat evaluation were completed for the entire Property. This section discusses the methodology used to perform the wildlife habitat study.

A. Vegetation Assessment

The Property was segmented into three major habitat types, which were delineated using upland and wetland boundaries and dominant vegetative cover types. The boundaries of each habitat type are outlined in Figure 2, Habitat Assessment\Existing and Proposed Conditions Map. The three habitat types identified are deciduous upland forest, palustrine forested wetland and vernal pool. The dominant tree, shrub and herbaceous layers of each habitat were identified and documented on a Vanasse Hangen Brustlin, Inc. (VHB) Wildlife Habitat Evaluation Checklist, included in Appendix A of this report.

B. Bird Monitoring

The avian study component of this wildlife survey was designed in accordance with standard avian monitoring techniques, such as those being utilized by the Massachusetts Audubon Society, which are recognized by the Connecticut Audubon Society and Connecticut Department of Environmental Protection¹. Bird observations were conducted at six stations chosen randomly across the Property (see Figure 2 for avian station locations). Each location was visited on June 18, 2005 by a trained scientist

¹ Vickery P.D, and Perkins, S.A. *Massachusetts Audubon Society Recommended Protocol for Monitoring Songbird Populations*.

between 5 am and 9 am. Visual and auditory observations of avifauna were recorded at each station over a 10-minute period. Observations included bird calls, songs, and visual sightings such as nesting/brooding and birds in flight. Avian findings for each plot are located in the Fauna section of this report.

C. Vernal Pool Monitoring

The methods employed on the Property to conclusively identify potential vernal pool habitats included a variety of recognized field exploration techniques. Potential vernal pools located on the Property are conclusively identified based on both physical characteristics (i.e., occurs within a confined depression or basin that lacks a permanent outlet stream, standing water for approximately two months during the growing season, lacks any fish population, and dries out most years) and the occurrence of one or more obligate wildlife species (i.e., spotted, Jefferson, and marbled salamanders, wood frogs, and fairy shrimp). This methodology generally follows the guidelines noted in the University of Connecticut Cooperative Extension System, *A Guide to the Identification and Protection of Vernal Pool Wetlands of Connecticut*. The identification of vernal pool species utilized methods described in the *Guidelines for Certification of Vernal Pool Habitat* (Massachusetts Division of Fisheries and Wildlife, 1998) along with various amphibian and vernal pool species field guides.

Vernal pools located on the Property were inspected in the field by a wetland scientist and subsequently described and mapped. Potential vernal pools were inspected for any indirect (i.e., chorusing) or direct evidence of amphibian breeding (such as the presence of two or more egg masses or sightings of adults). In addition, cover searches were performed (i.e., downed tree limbs, logs, large rocks) in the immediate vicinity of the vernal pool, including the proposed development and access/utility easement areas, for adult salamanders and frogs. Vernal pool inspections were conducted periodically during the months of May, June and July 2005 and March, April, May and June 2006. Vernal pool locations are identified on Figure 2. Details of the investigation can be found the vernal pool section of this report.

D. Habitat Structure Assessment

Various habitat structural features were identified and documented for each habitat type. Forested areas were evaluated for canopy cover, perch height and midstory composition. All habitat areas were assessed to determine soil and substrate type, depth to bedrock, slash piles, depth of leaf litter, topography and groundwater elevation. The locations of dirt paths, structures and stone walls were also documented. VHB scientists searched for and documented the occurrence of burrows, tree cavities, snags and vernal pools (seven vernal pool habitats were identified on the Property). Habitat structure assessments were documented for each habitat type on a Wildlife Habitat Evaluation Checklist, which are included in Appendix A of this report.

Figure 1: Site Location Map

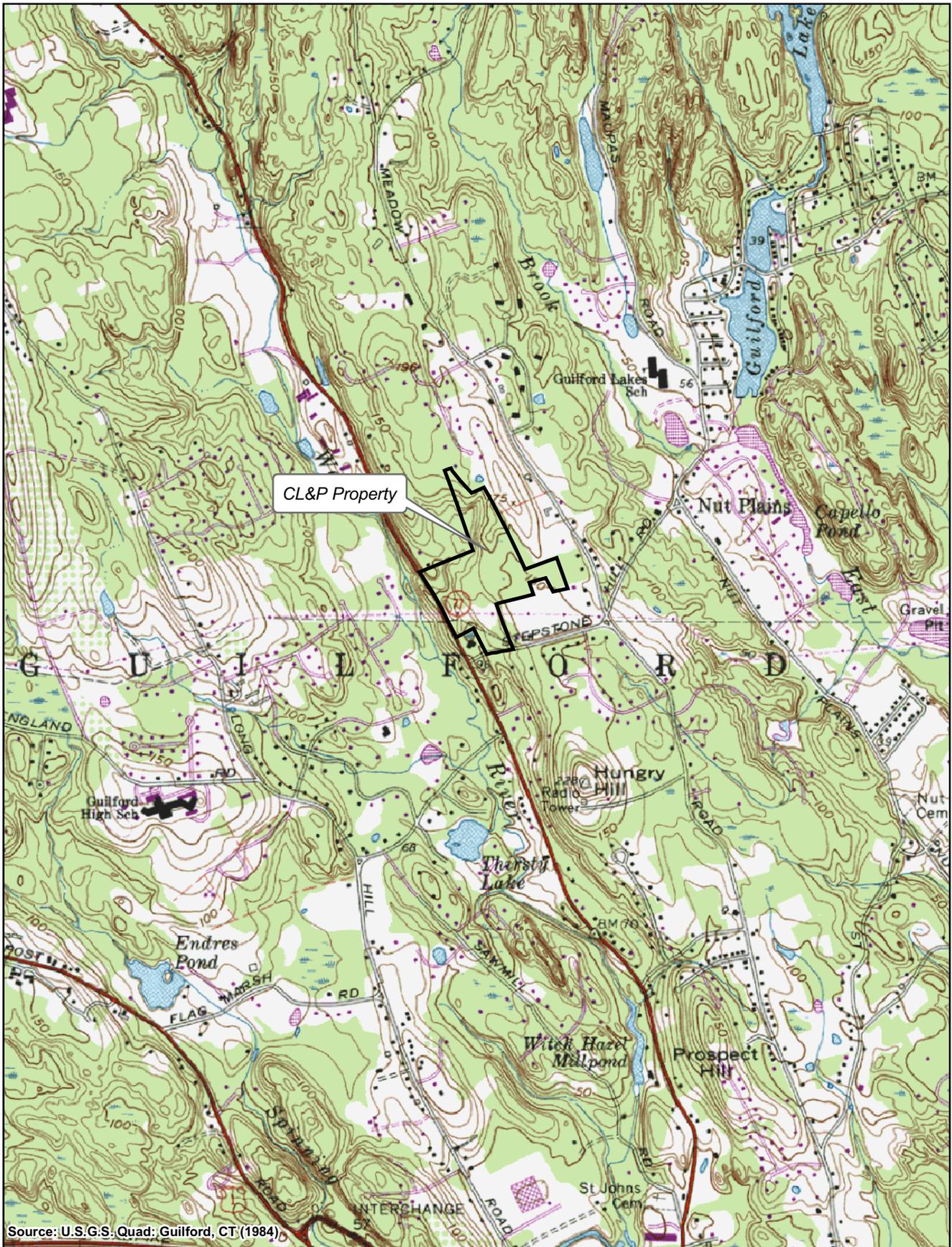
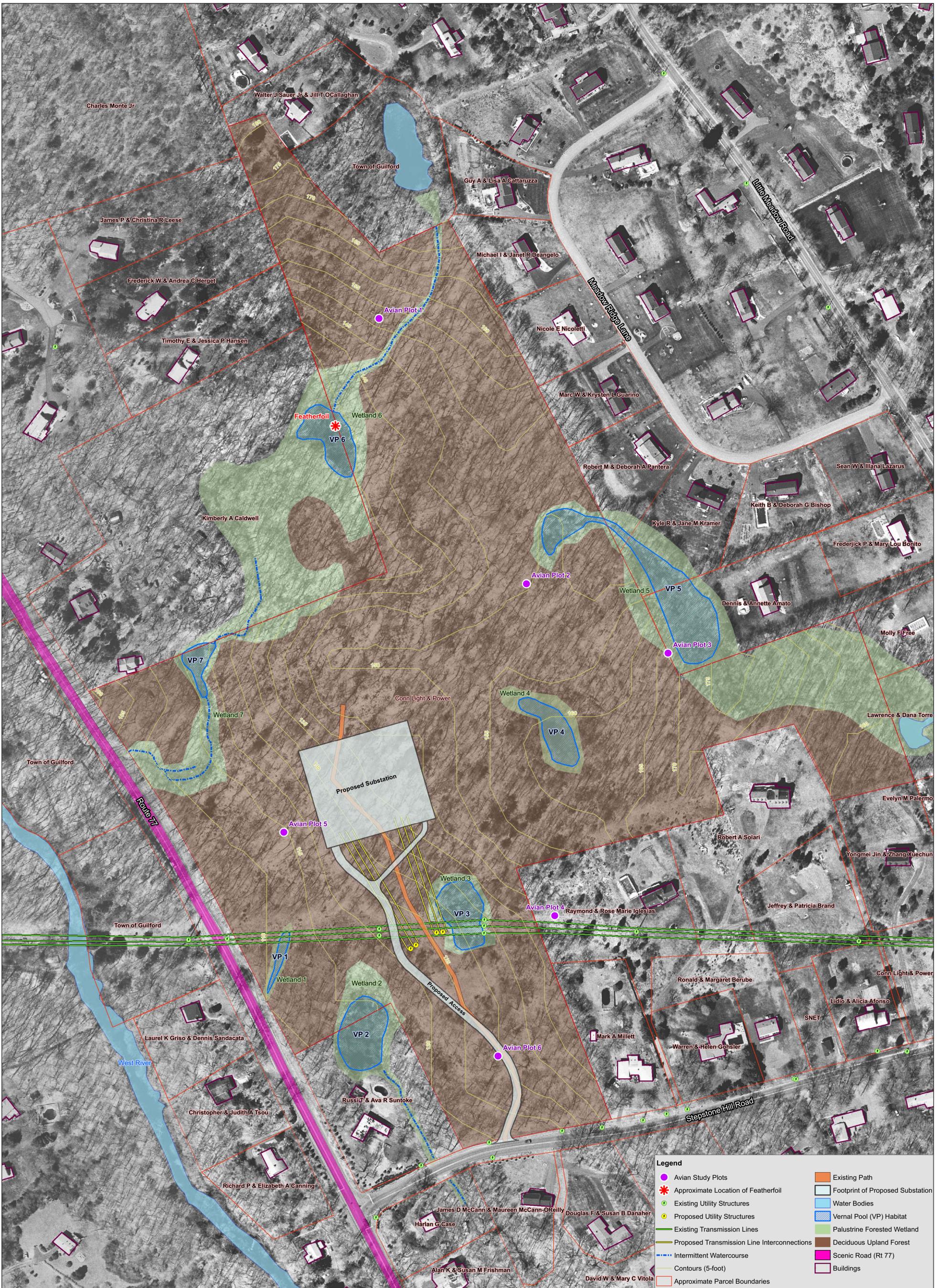


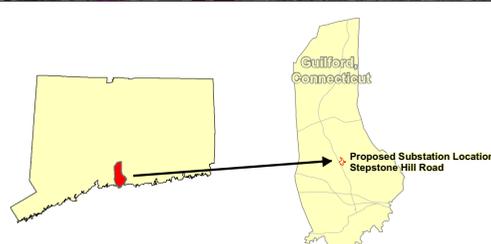
Figure 2: Habitat Assessment/Existing and Proposed Conditions Map



Legend

Avian Study Plots	Existing Path
Approximate Location of Featherfoil	Footprint of Proposed Substation
Existing Utility Structures	Water Bodies
Proposed Utility Structures	Vernal Pool (VP) Habitat
Existing Transmission Lines	Palustrine Forested Wetland
Proposed Transmission Line Interconnections	Deciduous Upland Forest
Intermittent Watercourse	Scenic Road (Rt 77)
Contours (5-foot)	Buildings
Approximate Parcel Boundaries	

10/03/06



E. NEWild™ Study

New England Wildlife Database (“NEWild™”) software was utilized by environmental scientists as a general predictive tool to identify potential fauna that may be occupying the Property. NEWild™ is a computer based wildlife habitat evaluation program developed by Scott A. Thomas and Linda E. Thomas of the USDA Forest Service. The program includes a database of 338 species and is based on the book, “New England Wildlife: Habitat, Natural History, and Distribution”, written by Richard DeGraaf and Deborah Rudis in 1986. The program determines potential avian, amphibian, reptile and mammal species that may occupy the Property based on general habitat requirements. The habitat conditions found at the Property were entered into the program and a list of potential species was generated. As the program generally over predicts the variety of species utilizing a particular habitat, potential species were reviewed by experienced scientists. The list of potential species (Table 15) that may be utilizing the Property is included in the Mammal and Herpetofauna Evaluation section of this report.

III. Existing Conditions

The Property in its entirety encompasses approximately 38 acres of land. The majority of the property is undeveloped and forested with the exception of an overhead transmission line, five transmission line structures and respective maintained corridor, which bisects the southern portion of the Property. The general topography of the Property is moderately sloping from east to west. The highest elevations occur at approximately 175 feet along the northeastern boundary of the Property and the lowest elevations are approximately 90 feet along the western boundary. The majority of vegetation is common to post agricultural mid-successional forest growth.

Three major habitat types exist on the property, which are deciduous upland forest, deciduous wetland forest and vernal pool. The majority of the Property is deciduously forested with the exception of the disturbed transmission line ROW. Of the wetland forest habitat, seven wetland areas exist in various locations on the Property. Each of the wetland areas contain vernal pool habitat which provide varying degrees of amphibian breeding habitat quality. Woods roads that traverse the Property appear to be free from excessive ATV usage. An informal paint-ball course is situated in the northern extent of the Property.

Details of the habitats are summarized below and provided in the Wildlife Habitat Evaluation Checklist, provided as Appendix A.

A. Habitat Areas**Deciduous Upland Forest**

The majority of the Property is occupied by deciduous upland forest common to post agricultural mid-successional forest growth. The forest contains scattered areas with ledge outcroppings, ledge walls and talus slopes. Woods roads traverse various areas of the Property, many of which are being

reclaimed by the forest. Navigable woods roads appear to receive little ATV traffic. The majority of the upland forest is dominated by well drained or somewhat excessively drained soils with the exception of a moderately well drained rich-woods slope immediately upgradient north of Wetland 4.

The forest on the Property is primarily occupied by sawtimber with a diameter breast height (DBH) greater than 10 inches. Canopy closure is generally greater than 65 percent resulting in moderate herbaceous and shrub layers with many tree snags and tree throws. Selective timber harvesting appears to have occurred in small summit and side slope areas within the last 10 to 15 years. Areas that were subjected to timber harvesting are primarily occupied by pole timber and sapling/seedling sized trees with a DBH less than 8 inches, a closed canopy of less than 60 percent and dense shrub and herbaceous layers. Few wood chips piles, cut logs and slash piles remain.

The highest elevations of the upland forest are primarily vegetated with black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), red oak (*Quercus rubra*), beech (*Fagus grandifolia*), red maple (*Acer rubrum*), mountain laurel (*Kalmia latifolia*), huckleberry (*Gaylussacia baccata*), early low bush blueberry (*Vaccinium vacillans*), partridgeberry (*Mitchella repens*) and green briar (*Smilax rotundifolia*). Mid-slope and toe-slope forested upland areas are commonly vegetated with tulip poplar (*Liriodendron tulipifera*), red oak, red maple, shagbark hickory, white oak (*Quercus alba*), beech, black birch (*Betula lenta*), black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*), mountain laurel, mapleleaf viburnum (*Viburnum acerifolium*), saspirilla (*Aralia hispida*), early low bush blueberry, Canada may flower (*Maianthemum canadense*), sedge (*Carex pensilvanica*) and ground pine (*Lycopodium obscurum*). The rich woods seepage slope north of Wetland 4 is dominantly vegetated with sugar maple (*Acer Saccharum*), green ash (*Fraxinus pennsylvanica*) tulip poplar, beech, mapleleaf viburnum, sassafras, jack-in-the-pulpit (*Arisaema triphyllum*), doll's eyes (*Actaea pachypoda*) and enchanter's nightshade (*Circaea quadrisulcata*).

Palustrine Forested Wetland

There are seven palustrine forested wetland areas on the Property (Wetlands 1 – 7 depicted on Figure 2). These wetlands primarily function to receive and store groundwater and surface runoff, recharge groundwater and provide production export and wildlife habitat. All of the wetland areas on the property are seasonally inundated and provide varying degrees of vernal pool habitat. Wetlands 3 and 4 are part of a large wetland system that facilitates the movement of water from an area north of the Property westward to the West River and as such additionally function to provide nutrient removal, retention and transformation. Most of the wetlands on the Property offer visual quality and aesthetic value especially during the growing season and during the late winter/early spring period due to the vernal pool habitats.

Wetland 1 (flags #1 through #12) is a small isolated wetland located near the western property boundary adjacent to Route 77. The northern portion of the wetland extends into the transmission line right-of-way. The wetland contains seasonal shallow inundation in a ±75-foot long by ±20-foot wide depression for a short period during the growing season. The forested portion of the wetland is primarily vegetated with red oak, ironwood (*Carpinus caroliniana*), swamp azalea (*Rhododendron viscosum*), pepperbush (*Clethra alnifolia*), royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*) and sphagnum moss. The portion of the wetland in the disturbed ROW is primarily vegetated with gray dogwood (*Cornus racemosa*), steeplebush (*Spirea tomentosa*), pepperbush, bristly

dewberry (*Rubus hispidus*), deer-tongue grass (*Dichantheium clandestinum*), spotted joe-pye weed (*Eupatorium dubium*), lurid sedge (*Carex lurida*), Canada rush (*Juncus canadensis*), soft rush (*Juncus effuses*), beggar-tick (*Bidens frondosa*), mad-dog skullcap (*Scutellaria lateriflora*), sensitive fern (*Onoclea sensibilis*), bladder sedge (*Carex intumescense*), sedge, royal fern, cinnamon fern and sphagnum moss. Trees within the forested area are generally pole timber with the majority of wetland vegetated with shrubs and herbaceous species.

Wetland 2 (flags #13 through #22) is a large groundwater-controlled depressional wetland located in the southwest corner of the Property. The wetland extends off the Property onto the adjacent residential property and drains south under Stepstone Hill Road. The portion of the wetland on the Property is palustrine forested with seasonal saturation and pockets of seasonal inundation. The portion of the wetland on the adjacent property consists of a sparsely-vegetated large basin-shaped depression that experiences seasonal inundation and palustrine forested wetland. The wetland extends east to a ledge wall and talus slope. The wetland is dominantly vegetated with pin oak (*Quercus palustris*), tulip poplar, red maple, pepperbush, spicebush (*Lindera benzoin*), highbush blueberry (*Vaccinium corymbosum*) and sphagnum moss. The forested wetland contains a range of timber sizes from sapling/seedling to mature sawtimber with a canopy closure greater than 60 percent. Tree snags, tree throws and broken limbs are abundant in this wetland area.

Wetland 3 (flags #118 through #137) consists of a small wetland located in the southeastern portion of the Property. The majority of the wetland is located under the transmission line ROW with a small portion extending north into a wooded area. This wetland is groundwater controlled and experiences seasonally shallow inundation. The forested portion of the wetland is dominantly vegetated with pin oak, red maple, highbush blueberry and mountain laurel. Under the ROW the wetland is dominantly vegetated with steplebush, pepperbush, bristly dewberry, deer tongue grass (*Dichantheium clandestinum*) and soft rush (*Juncus effuses*). Trees within the forested area are generally pole timber with the majority of wetland vegetated with shrubs and herbaceous species.

Wetland 4 (flags #138 through #156) is a large seasonally inundated pond and surrounding palustrine forested wetland. The groundwater-controlled depressional wetland is isolated in a central portion of the Property. The wetland is dominated by the sparsely vegetated pool with the narrow wetland forest surrounding the pool dominated by red maple, red oak, pepperbush and mountain laurel. Timber ranges from sapling/seedling to mature sawtimber with an average canopy closure greater than 50 percent.

Wetland 5 (flags #92 through #117) is located along the eastern Property boundary. The majority of this groundwater-controlled depressional wetland is located off-site on the adjacent residential properties east of the Property. The portion of this wetland on the Property is palustrine forest with areas of seasonally saturation and shallow inundation. Dominant vegetation within the wetland includes red maple, red oak, American elm, pin oak, highbush blueberry, ironwood, pepperbush and winterberry (*Ilex Verticillata*). Tree sizes range from sapling/seedling to mature sawtimber with an average canopy closure greater than 65 percent.

Wetland 6 (flags #60 through #91) is a palustrine forested wetland located in the northern portion of the Property. It is a small portion of a large wetland system that meanders on and off of the Property in two locations, originating from a pond north of the Property and eventually discharging to the West

River to the west of Route 77. Wetland 4 includes an intermittent watercourse, palustrine forested wetland and seasonally inundated pool. The intermittent watercourse conveys flow from a pond north of the Property and discharges it to the palustrine forested wetland. This wetland area contains many fallen tree limbs, tree throws and tree snags. A previously undocumented State special concern species, featherfoil (*Hottonia inflata*), was identified in the seasonally inundated pool. Dominant species within the wetland forest include pin oak (*Quercus palustris*), red maple, sycamore (*Platanus occidentalis*), tulip poplar, pepperbush, spicebush, sensitive fern, Virginia chain fern (*Woodwardia virginica*), cinnamon fern and sphagnum moss. Trees within the forested wetland generally have a DBH greater than 12 inches with a canopy closure greater than 65 percent.

Wetland 7 (flags #23 through #59) is a palustrine forested wetland area adjacent to Route 77 in the northwest corner of the Property. It is a small portion of a large wetland system that meanders on and off of the Property in two locations, originating from a pond north of the Property and eventually discharging to the West River to the west of Route 77. The area identified as Wetland 3 is seasonally saturated and includes several braided intermittent watercourses and a shallow seasonally-inundated pool created by a small stone dam. The forested portions of the wetland are dominantly vegetated with tulip poplar, red oak, red maple, American elm (*Ulmus americana*), shagbark hickory, black birch, ironwood, pepperbush, spicebush skunk cabbage (*Symplocarpus feotidus*), false hellebore (*Veratrum viride*), water horehound (*Lycopus virginicus*), meadow-rue (*Thalictrum pubescens*), fowl mana grass (*Glyceria striata*), rice cutgrass (*Leersia oryzoides*), fringed sedge (*Carex crinita*), marsh blue violet (*Viola cucullata*), sensitive fern, cinnamon fern, marsh fern (*Thelypteris thelypteroides*), New York fern (*Thelypteris noveboracensis*) and sphagnum moss. Many tree snags, fallen branches and tree throws occur in this area. Trees ranges from sapling/seedling to mature sawtimber with an average canopy closure greater than 65 percent.

B. Fauna

This section describes the results of the vernal pool, bird and mammal investigation. Vernal pool inspections were conducted periodically during the months of May and June 2005. Vernal pools located on the Property were inspected in the field by a wetland scientist and subsequently described and mapped. The avian study was conducted at six stations chosen randomly across the Property. The study plots were visited on June 18, 2005 by a trained scientist between 5 am and 9 am. NEWild™ software was also utilized by environmental scientists to determine potential fauna that may be occupying the Property. Be aware that certain limitations are inherent in this survey due to the timing of the survey, both seasonal and time of day, which may limit the opportunity to observe other species that might use various habitats on the Property.

■ 1. Bird Monitoring

Plot One

Plot One was located in the northern end of the property within a rich woods upland hillside immediately north of Wetland 6. The location of Plot One enabled the visual and auditory identification of avifauna within this forested wetland and upland areas. Table 1 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 1: Avian Study Plot One – Upland/Wetland Edge in Northern Portion of Property

Common Name	Scientific Name	No.	Habitat Identified In
Cardinal	<i>Cardinalis cardinalis</i>	1	Deciduous upland forest
Crow	<i>Corvus brachyrhynchos</i>	2 – 4	Deciduous upland forest
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	1	Deciduous upland forest
Eastern Wood-Pewee	<i>Contopus virens</i>	1	Deciduous upland forest
Red-Bellied Wood Pecker	<i>Melanerpes erythrocephalus</i>	1	Deciduous upland forest
Red-eyed vireo	<i>Vireo olivaceus</i>	1	Wetland forest
Scarlet Tanager	<i>Piranga olivacea</i>	1	Deciduous upland forest
Wood Thrush	<i>Hylocichla mustelina</i>	1	Deciduous upland forest

Plot Two

Plot Two was established on a woods road within the deciduous upland forest ±75 feet west of the northern portion of Wetland 5. The birds in this area were heavily concealed by vegetation and were generally identified by their vocalizations. Table 2 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 2: Avian Study Plot Two – Woods Road in Upland Forest

Common Name	Scientific Name	No.	Habitat Identified In
Blue Jay	<i>Cyanocitta cristata</i>	1	Deciduous Upland Forest
Cardinal	<i>Cardinalis cardinalis</i>	1	Deciduous Upland Forest
Eastern Wood-Pewee	<i>Contopus virens</i>	1	Deciduous Upland Forest
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	2	Deciduous Upland Forest
Mockingbird	<i>Mimus polyglottos</i>	1	Deciduous Upland Forest
Ovenbird	<i>Seiurus aurocapillus</i>	1	Deciduous Upland Forest
Red-eyed Vireo	<i>Vireo olivaceus</i>	1	Deciduous Upland Forest
Tufted Titmouse	<i>Baeolophus bicolor</i>	1	Deciduous Upland Forest
Veery	<i>Catharus fuscescens</i>	1	Deciduous Upland Forest
Wood Thrush	<i>Hylocichla mustelina</i>	1	Deciduous Upland Forest

Plot Three

Plot Three was established at the edge of Wetland 5 along the eastern property boundary. The birds in this area were heavily concealed by vegetation and were primarily identified by their vocalizations.

Table 3 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 3: Avian Study Plot Three – Upland and Wetland Forest Edge

Common Name	Scientific Name	No.	Habitat Identified In
Blue Jay	<i>Cyanocitta cristata</i>	2	Deciduous Upland Forest
Crow	<i>Corvus brachyrhynchos</i>	3	Wetland Forest
Eastern Wood-Pewee	<i>Contopus virens</i>	1	Wetland Forest
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	2	Deciduous Upland Forest
Ovenbird	<i>Seiurus aurocapillus</i>	1	Deciduous Upland Forest
Wood Thrush	<i>Hylocichla mustelina</i>	1	Wetland Forest

Plot Four

Plot Four was established on a hill under the transmission line ROW to the east of the Property. The location of Plot Four enabled the visual identification of avifauna within the majority of the ROW on the subject Property as well as the auditory identification of avifauna within the nearby upland forest. Table 4 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 4: Avian Study Plot Four – Hilltop under Transmission Line ROW

Common Name	Scientific Name	No.	Habitat Identified In
Blue Jay	<i>Cyanocitta cristata</i>	2	Deciduous Upland Forest
Blue-winged Warbler	<i>Vermivora pinus</i>	1	ROW
Baltimore Oriole	<i>Icterus galbula</i>	2 (Male and Female)	Deciduous Upland Forest
Brown-headed Cowbird	<i>Molothrus ater</i>	1	ROW/Upland Forest Edge
Cardinal	<i>Cardinalis cardinalis</i>	1	Deciduous Upland Forest
Catbird	<i>Dumetella carolinensis</i>	1	Scrub/Shrub at ROW edge
Fish Crow	<i>Corvus ossifragus</i>	1	ROW
House Finch	<i>Carpodacus mexicanus</i>	1	Deciduous Upland Forest
House Wren	<i>Troglodytes aedon</i>	1	ROW
Mourning Dove	<i>Zenaida macroura</i>	4	Perched on ROW structures
Pine Warbler	<i>Dendroica pinus</i>	1	ROW
Robin	<i>Turdus migratorius</i>	1	ROW

Plot Five

Plot Five was established within the upland forest ±200 feet east of Route 77 proximate to a large ledge outcropping. The birds in this area were again heavily concealed by vegetation and were primarily identified by their vocalizations. Table 5 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 5: Avian Study Plot Five – Upland Forest near Ledge Outcropping

Common Name	Scientific Name	No.	Habitat Identified In
Baltimore Oriole	<i>Icterus galbula</i>	1	Deciduous Upland Forest
Brown-headed Cowbird	<i>Molothrus ater</i>	4	Deciduous Upland Forest
Downy Woodpecker	<i>Picoides pubescens</i>	1	Deciduous Upland Forest
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	1	Deciduous Upland Forest
Mourning Dove	<i>Zenaida macroura</i>	1	Deciduous Upland Forest
Northern Flicker	<i>Colaptes auratus</i>	1	Deciduous Upland Forest
Ovenbird	<i>Seiurus aurocapillus</i>	1	Deciduous Upland Forest
Red-Bellied Wood Pecker	<i>Melanerpes erythrocephalus</i>	1	Deciduous Upland Forest
Robin	<i>Turdus migratorius</i>	1	Deciduous Upland Forest
Tufted Titmouse	<i>Baeolophus bicolor</i>	2	Deciduous Upland Forest
White-breasted Nuthatch	<i>Sitta carolinensis</i>	1	Deciduous Upland Forest
Wood Thrush	<i>Hylocichla mustelina</i>	3	Deciduous Upland Forest

Plot Six

Plot Six was established on a woods road approximately 200 feet north of Stepstone Hill Road. The birds in this area were heavily concealed by vegetation and were primarily identified by their vocalizations. Table 6 details the birds that were identified, the number of individuals identified and the habitat they were identified in.

Table 6: Avian Study Plot Six – Woods Road in Upland Forest

Common Name	Scientific Name	No.	Habitat Identified In
Baltimore Oriole	<i>Icterus galbula</i>	2	Deciduous Upland Forest
Red-Bellied Wood Pecker	<i>Melanerpes erythrocephalus</i>	1	Deciduous Upland Forest
Tufted Titmouse	<i>Baeolophus bicolor</i>	1	Deciduous Upland Forest
House Wren	<i>Troglodytes aedon</i>	1	Deciduous Upland Forest
Goldfinch	<i>Carduelis tristis</i>	1	Deciduous Upland Forest
Cardinal	<i>Cardinalis cardinalis</i>	1	Deciduous Upland Forest
Brown-headed Cowbird	<i>Molothrus ater</i>	1	Deciduous Upland Forest
Grackle	<i>Quiscalus quiscula</i>	1	Deciduous Upland Forest
Catbird	<i>Dumetella carolinensis</i>	1	Deciduous Upland Forest

Master Bird List

Table 7 contains all of the bird species that were identified on the Property during the avian study. Special habitat features for each species are given below as detailed in the book *New England Wildlife: Habitat, Natural History, and Distribution*. Most of the birds observed on the Property are common in New England.

Table 7: Master Bird List Including Special Habitat Features

Common Name	Scientific Name	Special Habitat features
Baltimore Oriole	<i>Icterus galbula</i>	Tall deciduous trees for nesting
Blue-winged Warbler	<i>Vermivora pinus</i>	Old fields with scattered shrubs and small trees, commonly near water.
Blue Jay	<i>Cyanocitta cristata</i>	Almost anywhere trees are found in grassy areas; prefers to nest in conifer thickets in mixed woodlands
Brown-headed Cowbird	<i>Molothrus ater</i>	Open fields, actively grazed pasture lands, mowed grassy areas
Cardinal	<i>Cardinalis cardinalis</i>	Nests in thick underbrush or shrubs
Catbird	<i>Dumetella carolinensis</i>	Low, dense shrubby vegetation
Brown-headed Cowbird	<i>Molothrus ater</i>	Open fields, actively grazed pasture lands, mowed grassy areas.
Crow	<i>Corvus brachyrhynchos</i>	Open areas for foraging
Downy Woodpecker	<i>Picoides pubescens</i>	Dead or living trees greater than 6 in dbh for nesting.
Eastern Wood-Pewee	<i>Contopus virens</i>	Open deciduous or mixed forests or forest edge
Fish Crow	<i>Corvus ossifragus</i>	None listed
Goldfinch	<i>Carduelis tristis</i>	Open weedy fields and marshes with thistle and other composites or cattails, and scattered woody growth for nesting
Grackle	<i>Quiscalus quiscula</i>	Open areas with open water for foraging adjacent to graves or woodlots for nesting and roosting
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Deciduous forest edge, tree cavities
House Finch	<i>Carpodacus mexicanus</i>	Developed areas with open ground
House Wren	<i>Troglodytes aedon</i>	Thickets and cavities for nesting in trees with a minimum diameter breast height of 10 inches.
Mockingbird	<i>Mimus polyglottos</i>	Low, dense woody vegetation, elevated perches, a variety of persistent edible fruits
Mourning Dove	<i>Zenaida macroura</i>	Open country with some bare ground and seed-producing vegetation
Northern Flicker	<i>Colaptes auratus</i>	Cavity nest sites in large trees (preferably dead or dying) in open woodlands or along forest edges.
Ovenbird	<i>Seiurus aurocapillus</i>	Large area of contiguous mature deciduous or mixed forest interior habitat
Pine Warbler	<i>Dendroica pinus</i>	Open pine forests. Pitch pine is preferred, but other species of pine are used as well

Common Name	Scientific Name	Special Habitat features
Red-Bellied Wood Pecker	Melanerpes erythrocephalus	Relatively open areas with snags and lush herbaceous ground cover
Red-eyed Vireo	Vireo olivaceus	Deciduous trees. A fairly continuous canopy rather than presence of an understory.
Robin	Turdus migratorius	Conifers for early nests
Scarlet Tanager	Piranga olivacea	Mature or pole-sized deciduous or mixed woodlands
Tufted Titmouse	Baeolophus bicolor	Nesting cavities in deciduous or mixed woods
Veery	Catharus fuscescens	Moist woodlands and thick understory of low trees and shrubs
White-breasted Nuthatch	Sitta carolinensis	Natural tree cavities for nesting, preferable in trees with a diameter breast height of 12 in.
Wood Thrush	Hylocichla mustelina	Mature, moist deciduous or mixed forests with closed canopies

■ 2. Vernal Pool Monitoring

Vernal Pool 1

This small pool occurs within Wetland 1 (flags #1 through #12) in the western portion of the Property and extends from the transmission line ROW to Route 77. The pool is approximately 75 feet long and 20 feet wide and is characterized by a cigar-shaped depression with water-stained leaves. It is sparsely vegetated in the forest with few arching shrubs and downed limbs and has a dense herbaceous layer in the ROW. Water contained in the pool completely dried before viable vernal pool species could complete the aquatic phase of their life cycle during the 2005 season and did not contain enough water during the spring migration for obligate species to utilize the pool during the 2006 season. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 8 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 8: Vernal Pool Study – Vernal Pool 1 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (in)	Inspection Date
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	4 - 8	5/11/05
Mosquito		Numerous larvae	4 - 8	5/11/05
Caddisflies		Not reported	4 - 8	
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	< 4	5/19/05
n/a*	n/a	n/a	Dry	5/27/05
n/a	n/a	n/a	<0.5	3/30/06
n/a	n/a	n/a	<1	4/6/2006
n/a	n/a	n/a	<1	4/14/06
n/a	n/a	n/a	10	4/28/06
n/a	n/a	n/a	2	5/11/06
n/a	n/a	n/a	12	5/26/06
n/a	n/a	n/a	7	6/12/06

Common Name	Scientific Name	No. Of Individuals	Depth (in)	Inspection Date
n/a	n/a	n/a	Dry	6/22/06

* Not any

Vernal Pool 2

Vernal Pool 2 occurs within Wetland 2 (flags # 13 through 22) located in a southwest portion of the Property. During the 2005 and 2006 seasons this vernal pool habitat consisted of small shallow pools of water on the Property and a large 100 foot long by 60 foot wide seasonally inundated pond along the Property boundary and on the adjacent residential property to the south. The shallow fragmented pools of water observed on the Property during the 2005 season dried before obligate vernal pool species were unable to complete the aquatic phase of their lifecycle and did not become inundated during the 2006 season. The large pool maintained a sufficient amount of water through both the 2005 and 2006 season to allow vernal pool species to complete the aquatic development phase of their lifecycle. Habitat characteristics within the vernal pool habitat consist of mature trees with large buttresses, tree throws, tree snags, arching shrubs and fallen tree limbs. A large ledge wall and talus slope is located northeast of wetland. Egg masses observed within the large pool during both seasons were typically attached to fallen branches and arching shrubs. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 9 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 9: Vernal Pool Study – Vernal Pool 2 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (± in)	Inspection Date
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	24	5/11/05
Mosquito		Numerous larvae	24	5/11/05
Caddisflies		Numerous larvae	24	5/19/05
Spotted turtle	<i>Clemmys guttata</i>	1	24	5/19/05
Spotted salamander	<i>Ambystoma maculatum</i>	50 ± egg masses	22	5/19/05
Spotted salamander	<i>Ambystoma maculatum</i>	1 larvae	22	5/19/05
Marbled salamander	<i>Ambystoma opacum</i>	1 larvae	22	5/19/05
Wood frog	<i>Rana sylvatica</i>	1 adult	22	5/19/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	22	5/19/05
Predaceous diving beetle		Numerous larvae	22	5/19/05
Mosquito		Numerous larvae	22	5/19/05
Wood frog	<i>Rana sylvatica</i>	Numerous larvae	17	5/27/05
Mosquito		Numerous larvae	17	5/27/05
Spotted turtle	<i>Clemmys guttata</i>	3 basking	14	6/3/05
Marbled salamander	<i>Ambystoma opacum</i>	1 larvae	14	6/3/05
n/a*	n/a	n/a	<1	6/30/05
Wood frog	<i>Rana sylvatica</i>	Chorusing	ND**	3/30/06
Turtle (unidentified)		1 basking	ND**	3/30/06
Wood frog	<i>Rana sylvatica</i>	20 ± egg masses	22	4/6/06
Spotted salamander	<i>Ambystoma maculatum</i>	10 ± egg masses	22	4/6/06

Common Name	Scientific Name	No. Of Individuals	Depth (± in)	Inspection Date
Wood frog	<i>Rana sylvatica</i>	16 ± egg masses	21	4/14/06
Spotted salamander	<i>Ambystoma maculatum</i>	15 ± egg masses	21	4/14/06
Wood frog	<i>Rana sylvatica</i>	4 ± egg masses	20	4/28/06
Spotted salamander	<i>Ambystoma maculatum</i>	8 ± egg masses	20	4/28/06
Spotted salamander	<i>Ambystoma maculatum</i>	5-10 egg masses	22	5/11/06
Wood frog	<i>Rana sylvatica</i>	5 ± egg masses	25	5/26/06
Spotted Salamander	<i>Ambystoma maculatum</i>	5 ± egg masses	25	5/26/06
Green frog	<i>Rana clamitans</i>	1 Adult	25	5/26/06
Spotted salamander	<i>Ambystoma maculatum</i>	Larvae 1 egg mass	24	6/12/06
Marbled salamander	<i>Ambystoma opacum</i>	Larvae	24	6/12/06
Wood frog	<i>Rana sylvatica</i>	tadpoles	24	6/12/06
Fairy shrimp	<i>Anostraca.</i>		24	6/12/06
n/a	n/a	n/a	20	6/22/06

* Not any, **Not determined

Vernal Pool 3

This large pool occurs within Wetland 3 (flags #118 through #137) in the southeastern portion of the Property under the transmission line ROW and extending into the forest. The pool is approximately 150 feet long and 40 feet wide and is characterized by a large depression with water-stained leaves. It is sparsely vegetated in the forest with few arching shrubs and downed limbs and has a dense herbaceous layer in the ROW. Water contained in the pool completely dried before viable vernal pool species could complete the aquatic phase of their life cycle during the 2005 season. The pool did not contain water during the spring 2006 migration and as such obligate species were unable to utilize the pool. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 13 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 13: Vernal Pool Study – Vernal Pool 3 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (± in)	Inspection Date
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	8 – 12	5/11/05
Wood frog	<i>Rana sylvatica</i>	1 adult	8 – 12	5/11/05
Green frog	<i>Rana clamitans</i>	2	8 – 12	5/11/05
Eastern American toad	<i>Bufo americanus</i>	2	8 – 12	5/11/05
Spotted turtle	<i>Clemmys guttata</i>	1	8 – 12	5/11/05
Mosquito larvae		Many larvae	8 – 12	5/11/05
n/a*	n/a	n/a	dry	5/20/05
n/a	n/a	n/a	dry	3/28/06
n/a	n/a	n/a	dry	4/6/06
n/a	n/a	n/a	dry	4/14/06
n/a	n/a	n/a	14-19	4/28/06

Common Name	Scientific Name	No. Of Individuals	Depth (± in)	Inspection Date
n/a	n/a	n/a	dry	5/11/06
n/a	n/a	n/a	10	5/26/06
n/a	n/a	n/a	5	6/12/06
n/a	n/a	n/a	dry	6/22/06

* Not any

Vernal Pool 4

This large pool dominates the area identified as Wetland 4 (flags #138 through #156) located in a central portion of the Property. The pool is approximately 200 feet long and 60 feet wide and is characterized by a large basin-depression with water-stained leaves. It is sparsely vegetated with few arching shrubs along the perimeter and contains many downed limbs with little herbaceous vegetation within its interior. Water contained in the pool completely dried before viable vernal pool species could complete the aquatic phase of their life cycle during the 2005 season. Although the pool was sufficiently inundated during the 2006 season, no obligate vernal pool species were observed. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 14 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 14: Vernal Pool Study – Vernal Pool 4 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (in)	Inspection Date
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	24	5/11/05
Green frog	<i>Rana clamitans</i>	2	24	5/11/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	12	5/20/05
Spotted salamander	<i>Ambystoma maculatum</i>	14 egg masses	12	5/20/05
backswimmer		Numerous	12	5/20/05
Predacious diving beetle		Numerous	12	5/20/05
Waterstrider		Numerous	12	5/20/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	6	5/27/05
n/a*	n/a	n/a	Empty	6/3/05
n/a	n/a	n/a	13	4/14/06
n/a	n/a	n/a	28	4/28/06
n/a	n/a	n/a	21	5/11/06
n/a	n/a	n/a	25	5/26/06
n/a	n/a	n/a	24	6/12/06
n/a	n/a	n/a	12	6/22/06

* Not any

Vernal Pool 5

Vernal pool 5 is located within Wetland 5 (flags # 92 through 117) along the eastern Property boundary. At the beginning of the spring 2005 and 2006 seasons the majority of Wetland 5 was inundated with shallow water. As the 2005 and 2006 seasons progressed the large inundated area dissipated to small isolated pools both on and off the Property. Small pools on the Property dried before viable vernal pool species could complete the aquatic phase of their life cycle. Wood frog tadpoles were observed in the shallow pool on the Property before it dried. A remaining small pool on the adjacent residential property to the east maintained a sufficient amount of water through the growing season to allow vernal pool species to complete the aquatic development phase. The remaining small pool off the Property is 400 ± square feet with many arching shrubs and broken limbs and a thick layer of organic material on the bottom. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 12 details the species that were identified in the remaining area of inundation just off of the Property, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 12: Vernal Pool Study – Vernal Pool 5 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (in)	Inspection Date
Spotted Salamander	<i>Ambystoma maculatum</i>	3 egg masses	28	5/20/05
Fingernail clams		Numerous	28	5/20/05
Marbled Salamander	<i>Ambystoma opacum</i>	1 larvae	28	5/20/05
Spotted Salamander	<i>Ambystoma maculatum</i>	1 egg mass	26	5/27/05
Fingernail clams		Numerous	26	5/27/05
Wood Frog	<i>Rana sylvatica</i>	3 tadpoles	24	6/3/05
n/a*	n/a	n/a	24	6/30/05
n/a	n/a	n/a	9	4/14/06
n/a	n/a	n/a	14	4/28/06
n/a	n/a	n/a	3	5/11/06
n/a	n/a	n/a	6	5/26/06
n/a	n/a	n/a	8	6/12/06
Green frog	<i>Rana clamitans</i>	3 adult	18	6/22/06
Wood frog	<i>Rana sylvatica</i>	2 adult 1 tadpole	18	6/22/06

*Not any

Vernal Pool 6

The pool is located in the northern end of the Property within Wetland 6 (flags # 60 through 91). This pool receives flow from an intermittent watercourse that conveys water from a pond located on an adjacent residential property to the north. The pool is characterized by a shallow ±125-foot by ±45-foot basin-shaped depression with numerous fallen branches, arching shrubs and a thick layer of organic material. Egg masses observed within the pool were moderate to large in size, typically attached to submerged branches and arching shrubs. This pool maintained a sufficient amount of water

through the 2005 and 2006 growing season to allow vernal pool species to complete the aquatic development phase of their lifecycle. The forest canopy parts over the center of the pool allowing patches of broken sunlight to reach the surface. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 11 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 11: Vernal Pool Study – Vernal Pool 6 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Depth (in)	Inspection Date
Spotted salamander	<i>Ambystoma maculatum</i>	Several egg masses	18	5/11/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	18	5/11/05
Green frog	<i>Rana clamitans</i>	1 adult	18	5/11/05
Mosquito		Numerous larvae	18	5/11/05
Spotted salamander	<i>Ambystoma maculatum</i>	± 60	18	5/19/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	18	5/19/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	14	5/27/05
Wood frog	<i>Rana sylvatica</i>	Numerous tadpoles	14	6/3/05
Spotted salamander	<i>Ambystoma maculatum</i>	3 larvae	14	6/3/05
Dragonfly		Several larvae	14	6/3/05
Water scavenger beetle		Several larvae	14	6/3/05
n/a*	n/a	n/a	4	6/30/05
Wood frog	<i>Rana sylvatica</i>	3 egg masses	18	4/14/06
Spotted salamander	<i>Ambystoma maculatum</i>	5 egg masses	18	4/14/06
Spotted salamander	<i>Ambystoma maculatum</i>	100 + egg masses	18	4/28/06
Wood frog	<i>Rana sylvatica</i>	Many	18	4/28/06
Northern water snake	<i>Nerodia sipedon</i>	2	18	4/28/06
Spotted salamander	<i>Ambystoma maculatum</i>	50 egg masses	18	5/11/06
Wood frog	<i>Rana sylvatica</i>	10 egg masses	18	5/11/06
Spotted salamander	<i>Ambystoma maculatum</i>	30 egg masses	20	5/26/06
Spotted salamander	<i>Ambystoma maculatum</i>	20 egg masses	20	6/12/06
Fairy shrimp	<i>Anostraca</i>	Numerous	20	6/12/06
Green frog	<i>Rana clamitans</i>	1 adult	18	6/22/06
Wood frog	<i>Rana sylvatica</i>	2 adult	18	6/22/06
Spotted salamander	<i>Ambystoma maculatum</i>	1 egg mass (hatched)	18	6/22/06

* Not any

Vernal Pool 7

The pool is located in the northern end of Wetland 7 (flags # 23 through 59) and extends north off of the Property. A small stone dam impounds seasonal intermittent watercourse flows within the interior

of the wetland to form the vernal pool within a 25 foot by 160 foot area. The pool is sparsely vegetated with few arching shrubs and herbaceous aquatic plants. Egg masses observed within the pool were small to moderate in size, typically not attached to vegetation and resting on the bottom of the pool. This pool maintained a sufficient amount of water through the growing season during the 2005 and 2006 seasons to allow vernal pool species to complete the aquatic development phase of their lifecycle; however, no vernal pool species were observed within the pool during the 2006 season. This pool does not have a permanent inlet or outlet. No finfish were observed during any of the inspections. Table 10 details the species that were identified, the number of individuals that were identified, the depth of the pool, and the date of the finding.

Table 10: Vernal Pool Study – Vernal Pool 7 (2005 & 2006)

Common Name	Scientific Name	No. Of Individuals	Pool Depth (in)	Inspection Date
Spotted salamander	<i>Ambystoma maculatum</i>	Several egg masses	12	5/11/05
Spring peeper	<i>Pseudarctis crucifer</i>	Several egg masses	12	5/11/05
Spotted salamander	<i>Ambystoma maculatum</i>	Several egg masses	6 - 12	5/19/05
Green frog	<i>Rana clamitans</i>	4 adults	6 – 12	5/19/05
Spotted salamander	<i>Ambystoma maculatum</i>	1 larvae	7	5/27/05
Spring peeper	<i>Pseudarctis crucifer</i>	1 tadpole	5	6/3/05
n/a*	n/a	n/a	3	6/30/05
n/a	n/a	n/a	3	4/14/06
n/a	n/a	n/a	12	4/28/06
n/a	n/a	n/a	7	5/11/06
n/a	n/a	n/a	10	5/26/06
n/a	n/a	n/a	5	6/12/06
n/a	n/a	n/a	5	6/22/06

* Not any

■ 3. Mammal and Herpetofauna NEWild™ Evaluation

A mammal and herpetofauna evaluation was conducted to determine possible amphibian, reptile and mammal species that may be utilizing the habitats found on the Property. Potential species were identified with the use of NEWild™ computer software program. Species suggested by the NEWild™ program were researched for accuracy and special habitat needs. Table 15 lists the potential mammal, reptile and amphibian species that may be found on the Property and the special habitat features that they require as described in the book *New England Wildlife: Habitat, Natural History, and Distribution* (species typed in bold print were directly observed during on-site investigations).

Eastern Box Turtle (*Terrapene c. carolina*), a Connecticut Species of Special Concern, was identified by the database as a potential species that may utilize the Property. Box turtles favor old field habitat and deciduous forest areas, including power line cuts and logged woodland. During the various inspections of the Property, no live evidence of Eastern Box Turtle was observed, however a deceased specimen was recovered from the forest immediately south of Wetland 3 near Route 77. No previous identification of this species on the Property has been documented nor listed in Connecticut Department of Environmental Protection (“CTDEP”) Natural Diversity Data Base (“NDDB”).

Brown Thrasher (*Toxostoma rufum*), a Connecticut Species of Special Concern, was identified by the database as a potential species that may utilize the Property. Brown Thrasher prefers open areas with patches of bare ground on which to feed and nest in suburban and rural areas, particularly in brushy thickets and woodland edges. This type of habitat is limited to the area under the overhead transmission lines as a result of vegetation management activities. No evidence of Brown Thrasher was observed during the various inspections of the property. In addition, no previous identification of this species on the Property has been documented nor listed in CTDEP NDDB.

Jefferson Salamander (*Ambystoma jeffersonianum*), a Connecticut Species of Special Concern, was identified by the database as a potential species that may utilize the Property. Jefferson Salamander requires vernal pools for breeding habitat and prefers deciduous forests with steep rocky areas with rotten logs and heavy duff layers. This type of habitat is present in the southwest corner of the Property and extends onto the adjacent residential property to southwest. No evidence of Jefferson Salamander was observed during the various inspections of the Property. In addition, no previous identification of this species on the Property has been documented nor listed in CTDEP NDDB.

Table 15: New England Wildlife Database Search of Possible Amphibians, Reptiles and Mammals Anticipated * To Use the Property

Common Name	Scientific Name	Special Habitat features
American Black Duck	<i>Anas rubripes</i>	Inhabits a wide variety of coastal and freshwater habitats
American Kestrel	<i>Falco sparverius</i>	Nest Cavities in trees with diameter breast height greater than 12 in, and elevated perches from which to sight prey.
Black Rat Snake	<i>Elaphe o. obsoleta</i>	None listed.
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Low, dense, shrubby vegetation.
Black-capped Chickadee	<i>Poecile atricapillus</i>	Comparatively open sites near deep woods, and dead standing trees larger than 4 in diameter breast height for nesting and feeding.
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	An abundant supply of arthropods.
Blue-spotted salamander	<i>Ambystoma laterale</i>	Wooded swamps, ponds, marshes, ditches or semi -permanent water for breeding; relatively open or forested aquatic sites.
Bobcat	<i>Lynx rufus</i>	Dense hardwood and softwood understories with high hare densities and slopes less than 5 percent. Prefers to den in rock crevices, under windfalls, brush piles, or hollow logs.
Broad-winged Hawk	<i>Buteo platypterus</i>	Forests with openings
Brown Thrasher	<i>Toxostoma rufum</i>	Low, dense, woody vegetation for nesting and cover.

Common Name	Scientific Name	Special Habitat features
Brown-headed Cowbird	<i>Molothrus ater</i>	Open fields, actively grazed pasture lands, mowed grassy areas.
Canada Warbler	<i>Wilsonia Canadensis</i>	Forest with dense understory, especially along streams, bogs, swamps, or moist areas.
Cardinal	<i>Cardinalis cardinalis</i>	Nests in thick underbrush or shrubs
Carolina Wren	<i>Thryothorus ludovicianus</i>	Low, brushy vegetation
Catbird	<i>Dumetella carolinensis</i>	Low, dense shrubby vegetation
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Trees and shrubs that produce fruit and berries.
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Early second-growth deciduous woodlands with dense vegetation 1 to 3 meters tall for nesting and foraging.
Chipping Sparrow	<i>Spizella passerine</i>	None listed.
Common Yellowthroat	<i>Geothlypis trichas</i>	Moist areas with dense, herbaceous vegetation mixed with shrubs and small trees.
Cooper's Hawk	<i>Accipiter cooperii</i>	Mature coniferous or deciduous woodlands in otherwise open or semi-open country.
Coyote	<i>Canis latrans</i>	Open or semiopen country for hunting, sunny well-drained secluded den sites formerly used by foxes and porcupines, also in hollow logs, rocky caves, or in excavated burrows.
Crow	<i>Corvus brachyrhynchos</i>	Open areas for foraging.
Deer Mouse	<i>Peromyscus maniculatus</i>	Down logs, rotting stumps, tree cavities, exposed rocks (stone walls, boulders and ledge).
Eastern American Toad	<i>Bufo a. americanus</i>	Needs shallow water for breeding.
Eastern Bluebird	<i>Sialia sialis</i>	Low cavities for nesting and perches for foraging
Eastern Box Turtle	<i>Terrapene c. Carolina</i>	Old fields, powerline clearings, ecotones with sandy soils favored, seldom far from water. (Found dead specimen on subject property)
Eastern Chipmunk	<i>Tamias striatus</i>	Cover in the form of decaying stumps and logs, rock piles and outcrops, and stone walls; elevated perches for observation and vocalization activities. Activity is centered around burrow locations.
Eastern Cottontail	<i>Sylvilagus floridanus</i>	Brush piles, stone walls, dens or burrows for year-round protection from storms and cold weather. Interspersion of herbaceous and shrubby cover important.
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>	Suitable cover or loose soil for egg laying.
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	Aquatic habitats
Eastern Screech-Owl	<i>Otus asio</i>	Cavities for nesting and roosting

Common Name	Scientific Name	Special Habitat features
Ermine	<i>Mustela erminea</i>	Plentiful small mammal prey and dense brushy cover
Four-toed Salamander	<i>Hemidactylum scutatum</i>	Acidic wet woodlands with sphagnum mats. Prefers sandy * acid woods adjacent to red maple swamps in Connecticut. (Soil material is loamy on subject property).
Fox Sparrow	<i>Passerella iliaca</i>	Dense shrubby undergrowth
Goldfinch	<i>Carduelis tristis</i>	Open weedy fields and marshes with thistle and other composites or cattails, and scattered woody growth for nesting
Grackle	<i>Quiscalus quiscula</i>	Open areas with open water for foraging adjacent to graves or woodlots for nesting and roosting
Gray Treefrog	<i>Hyla versicolor</i>	Aquatic sites for breeding
Great Blue Heron	<i>Ardea herodias</i>	Open water or wetland habitats, forested wetlands or tall trees near water in areas free from human disturbance.
Green Frog	<i>Rana clamitans melanota</i>	Riparian areas
Green Heron	<i>Butorides virescens</i>	Wooded wetlands, shallow water bodies for feeding.
Hooded Warbler	<i>Wilsonia citrine</i>	Low, dense deciduous woody vegetation.
House Wren	<i>Troglodytes aedon</i>	Thickets and cavities for nesting in trees with a minimum diameter breast height of 10 inches
Indigo Bunting	<i>Passerina cyanea</i>	High song perches, thick weeds or shrubs, open areas at forest edges, old fields.
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Requires temporary ponds with deep leaf litter in upland deciduous forest with some portion of the wetland bordered by forest and isolated from urbanization or disturbance.
Long-tailed Weasel	<i>Mustela frenata</i>	Open woods and woodland edges. Prefers to be near water. Uses or enlarges previously excavated small burrows or natural holes in crevices for dens; areas of abundant prey.
Marbled Salamander	<i>Ambystoma opacum</i>	Requires temporary ponds, vernal pools, or fishless swamps in wooded areas for breeding.
Masked Shrew	<i>Sorex cinereus</i>	High humidity, ground cover especially leaves, rotten logs, herbaceous vegetation.
Mockingbird	<i>Mimus polyglottos</i>	Low, dense woody vegetation, elevated perches, a variety of persistent edible fruits
Northern Black Racer	<i>Coluber c. constrictor</i>	Thrive in areas that are periodically cleared or mowed
Northern Brown Snake	<i>Storeria d. dekayi</i>	Prefers disturbed areas
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>	Usually associated with deciduous forest. Rocky hillsides, talus slopes.
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	Low vegetation, loose leaf litter, high humidity
Painted Turtle	<i>Chrysemys picta</i>	Aquatic habitat with basking structures and areas of open water

Common Name	Scientific Name	Special Habitat features
Raccoon	<i>Procyon lotor</i>	Ground dens, usually abandoned woodchuck burrows or culverts in areas lacking in tree dens. Prefers hollow trees. Dens are usually located in trees 10 feet or more above ground and commonly located near water.
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Large trees for nesting and perching.
Robin	<i>Turdus migratorius</i>	Conifers for early nests
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Edges of mature deciduous forest with dense brush or sapling stands.
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Plants that provide tubular nectar-bearing (especially red) flowers such as honeysuckle, lantana, gilia and trumpet vine.
Ruffed Grouse	<i>Bonasa umbellus</i>	Drumming sites (logs or stone walls), in relatively dense hardwood saplings, small poles or brushy escape cover, hardwood stands for nesting and feeding, sunny openings for dusting.
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>	Dense Brushy dry cover (Noted during a vernal pool investigation)
Song Sparrow	<i>Melospiza melodia</i>	Moist areas with brushy vegetation
Spotted Salamander	<i>Ambystoma maculatum</i>	Mesic woods with fish-free permanent, semi permanent or ephemeral water for breeding.
Turkey Vulture	<i>Cathartes aura</i>	Mixed farmland and forest, which provides the best opportunity to forage on both domestic and wild carrion.
Veery	<i>Catharus fuscescens</i>	Moist woodlands and thick understory of low trees and shrubs
Virginia Opossum	<i>Didelphis virginiana</i>	Dry to wet wooded areas; commonly found in wet woods near rivers and swamps, less often in wooded uplands or cultivated fields. Common near human habitation, here they are attracted to garbage
White-footed Mouse	<i>Peromyscus leucopus</i>	Down logs rotting stumps, tree cavities, exposed rocks (stone walls, boulders and ledge).
White-tailed Deer	<i>Odocoileus virginianus</i>	Dense cover for winter shelter, adequate browse.
Wild Turkey	<i>Meleagris gallopavo</i>	Forests with mast-producing trees, forest openings, and dense coniferous or mixed forests for roosting. (Found feathers during vegetation survey).
Wood Frog	<i>Rana sylvatica</i>	Prefers temporary woodland pools, backwaters of slow-moving streams.
Woodland Vole	<i>Microtus pinetorum</i>	Uses variable depths of leaf litter, duff or grass; moist well-drained soils
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Low, dense shrubby vegetation

*Species in bold were observed on the Property

IV. Discussion and Conclusions

Wildlife habitats associated with the Property were assessed by conducting field inventories to identify herpetofauna, avian, and mammal species present, taking into account the habitat conditions present within each resource area. Habitat variables considered in this wildlife evaluation included the size of the vegetative communities, the plant cover types present, the degree of habitat disturbance,

interspersion of cover types, the abundance and diversity of fruit and seed-bearing plants, the size (average diameter) and abundance of tree snags and ground debris and surrounding land uses. These vegetative communities were evaluated in providing cover, foraging, and breeding habitats. The results of the field inventories and assessment of the wildlife conditions indicate that most of the Property contributes relatively high value wildlife habitat.

The proposed Stepstone Substation development location is occupied by deciduous forest habitat. The proposed access drive will generally follow an existing maintenance drive, thereby minimizing disturbances. Although the proposed Substation development will affect the forest habitat, the majority of this habitat cover type will remain intact in the future as no additional development is proposed on the ±38-acre Property beyond the utility usage. The numerous wetland and vernal pool habitats on the property will remain unaffected by the proposed project. In addition, the majority of upland habitat adjoining and supporting these vernal pool habitats will not be affected by the proposed development. Proposed Substation and access drive development areas are located within and in proximity to existing utility corridors occupied by overhead electrical transmission lines. These corridors generally extend off the Property in a northeast to southwest direction for numerous miles. Therefore, the proposed development is not anticipated to have a significant impact on wildlife due to the remaining undisturbed habitat and immediate proximity to similar habitats that will allow for natural relocation of potential wildlife from the development zone. As a result, no long-term impacts on wildlife are anticipated from the proposed development activities at the subject Property. In addition, since the facility will be unmanned, wildlife should not be adversely affected during its operation.

Featherfoil, a Connecticut Species of Special Concern, was identified on the subject Property during the wildlife habitat survey. Featherfoil is an aquatic plant typically occurring in shallow water in ponds and slow streams. The population on the Property occurs in a shallow pool within Wetland 4 (flags #60 through #91) located in the northern portion of the Property. The population is approximately 500 feet from the proposed development activities. It is not anticipated that this species will be affected by construction activities associated with the proposed Substation.

The Property is within a listed area as shown on the Connecticut Department of Environmental Protection (“CTDEP”) Natural Diversity Data Base (“NDDB”) map. Information obtained from the CTDEP indicates that state species concern species Virginia snakeroot (*Aristolochia serpentaria*) was found to occur atop rock ledges a few feet from Route 77 under the 115 kV transmission line. Subsequent documentations indicate that the species had been covered by a wood chip pile approximately 5 years ago and only one individual plant was found. The area under the 115kV line as well as the entire ±38-acre Property was searched intensively on June 21, 2005 by a VHB botanist. Virginia snakeroot was not found on the property or in the formerly documented location.

Evidence of Eastern Box Turtle (*Terrapene c. carolina*), a Connecticut Species of Special Concern, was observed on the Property. During the various inspections of the Property, no live evidence of Eastern Box Turtle was observed, however a deceased specimen was recovered from the forest immediately south of Wetland 3 near Route 77. Box turtles favor old field habitat and deciduous forest areas, including power line cuts and logged woodland. No previous identification of this species on the Property has been documented nor listed in Connecticut Department of Environmental Protection (“CTDEP”) Natural Diversity Data Base (“NDDB”).

Seven vernal pools were found on the Property to contain the necessary physical and biological characteristics to be conclusively classified as vernal pool habitats during the 2005 and 2006 season. Pools 1, 3, and 4 were observed to have either dried out before obligate vernal pool species could develop to a point where they could survive outside of the pool or were not inundated during the spring migration and therefore were not utilized by obligate vernal pool species. Pools 2, 5, 6 and 7 retained water for a duration long enough to produce viable obligate vernal pool species. Hydrologic conditions within vernal pools can change substantially from one year to the next. For example, vernal pools observed to dry out too early for successful completion of amphibian life cycle this year may sustain sufficient inundation during seasons of higher precipitation. Pools which do not sustain sufficient inundation to allow for the full development of juvenile amphibians into adults are generally considered to provide less significant vernal pool habitat than those that do not sustain proper inundation. However, none of the vernal pools on the Property will be directly impacted by the proposed Substation or access road and the majority of their bordering uplands will also remain unaffected.

Appendix A

Wildlife Habitat Evaluation Checklists

VHB WILDLIFE HABITAT EVALUATION CHECKLIST
COVER TYPE: Deciduous Upland Forest

Project Number: 41033.00	Project Name: Stepstone Road Substation
Date: Various – May and June 2005	Observer: Lisa Standley, Jeff Peterson, Sara Fusco

Topography		Soils/Substrate	
Groundwater elevation	Variable	Substrate type/soil	Glacial Till/ Charlton-Hollis Hollis-charlton Hollis-Rock Outcrop Sutton Udorthents, smoothed
Depressions	Hill/Valley topography	Depth to bedrock	Several ledge outcroppings
Vernal pools	Yes (see vernal pool habitat type)	Burrows present (size)	None observed
Rocks or boulders	Yes	Depth of leaf litter	1 - 2 inch

Plant Community

Stratum	Dominant Species	
Trees	black oak scarlet oak red oak beech red maple tulip poplar shagbark hickory white oak black birch black cherry sugar maple green ash	<i>Quercus velutina</i> <i>Quercus coccinea</i> <i>Quercus rubra</i> <i>Fagus grandifolia</i> <i>Acer rubrum</i> <i>Liriodendron tulipifera</i> <i>Carya ovata</i> <i>Quercus alba</i> <i>Betula lenta</i> <i>Prunus serotina</i> <i>Acer Saccharum</i> <i>Fraxinus pennsylvanica</i>
Shrubs	mountain laurel huckleberry early low blueberry partridgeberry green briar sassafras mapleleaf viburnum saspirilla ground pine	<i>Kalmia latifolia</i> <i>Gaylussacia baccata</i> <i>Vaccinium vacillans</i> <i>Mitchella repens</i> <i>Smilax rotundifolia</i> <i>Sassafras albidum</i> <i>Viburnum acerifolium</i> <i>Aralia hispida</i> <i>Lycopodium obscurum</i>
Herbaceous	Canada may flower sedge jack-in-the-pulpit doll's eyes enchanter's nightshade	<i>Maianthemum canadense</i> carex pennsilvatica <i>Arisaema triphyllum</i> <i>Actaea pachypoda</i> <i>Circaea quadrisulcata</i>
Average DBH:	Greater than 10 inches	
% Canopy Closure:	60 – 70 %	

VHB WILDLIFE HABITAT EVALUATION CHECKLIST
COVER TYPE: Deciduous Upland Forest (Continued)

Comments:	Vegetation in upland transmission line ROW:	
	red cedar	<i>Juniperus virginiana</i>
	sugar maple	<i>Acer rubrum</i>
	tree of heaven	<i>Ailanthus altissima</i>
	winged sumac	<i>Rhus copallina</i>
	Russian olive	<i>Elaeagnus angustifolia</i>
	Japanese honeysuckle	<i>Lonicera japonica</i>
	Virginia creeper	<i>Parthenocissus quinquefolia</i>
	beggar tick	<i>Bidens sp.</i>
	multiflora rose	<i>Rosa multiflora</i>
	mountain laurel	<i>Kalmia latifolia</i>
	sweetfern	<i>Comptonia peregrina</i>
	grape	<i>Vitis sp.</i>
	black raspberry	<i>Rubus occidentalis</i>
	strawberry	<i>Fragaria virginiana</i>
	ruff-stemmed goldenrod	<i>Solidago arguta</i>
	whorled loosestrife	<i>Lysimachia quadrifolia</i>
	Common Cinquefoil	<i>Potentilla simplex</i>
	Sedge	<i>Carex pensylvatica</i>
	Deer-tongue grass	<i>Panicum clandestinum</i>
	Blue toadflax	<i>Linaria canadensis</i>
	wild carrot	<i>Daucus carota</i>

Wildlife Habitat Features

Tree cavities (number, diameter)	Several (typically in trees with DBH > 10 inches)
Dead logs (number, diameter)	Numerous (various diameters)
Rocks, boulders	Numerous (talus slop east of Wetland 2)
Evidence of wildlife usage	Observed in upland forest and ROW: Baltimore Oriole, Blue Jay, Blue-winged Warbler, Brown-headed Cowbird, Brown-headed Cowbird, Cardinal, Catbird, Catbird, Crow, Downy Woodpecker, Eastern Box Turtle (dead specimen), Eastern Chipmunk, Eastern Wood-Pewee, Fish Crow, Goldfinch, Grackle, Great Crested Flycatcher, House Wren, Mockingbird, Mourning Dove, Northern Flicker, Ovenbird, Pine Warbler, Red-Bellied Wood Pecker, Red-eyed Vireo, Robin, Rufous-sided Towhee, Scarlet Tanager, Tufted Titmouse, Veery, White-breasted Nuthatch, White-tailed deer, Wild Turkey, Wood Thrush

**VHB WILDLIFE HABITAT EVALUATION CHECKLIST
COVER TYPE: Palustrine Wetland Forest**

Project Number: 41033.00	Project Name: Stepstone Road Substation
Date: Various – May and June 2005	Observer: Lisa Standley, Jeff Peterson, Sara Fusco

Topography		Soils/Substrate	
Groundwater elevation	Commonly at or just below the soil surface	substrate type/Soil	Glacial Till/Leicester Ridgebury, Leicester and Whitman
Depressions	Observed in every wetland	Depth to bedrock	Typically > 60 inches below the soil surface
Vernal pools	Yes (see vernal pool habitat description)	Burrows present (size)	None observed
Rocks or boulders	Yes	Depth of leaf litter	> 1 inch

Plant Community

Stratum	Dominant Species	
Trees	American elm black birch ironwood pin oak red maple red oak shagbark hickory sycamore tulip poplar	<i>Ulmus americana</i> <i>Betula lenta</i> <i>Carpinus caroliniana</i> <i>Quercus palustris</i> <i>Acer rubrum</i> <i>Quercus rubra</i> <i>Carya ovata</i> <i>Platanus occidentalis</i> <i>Liriodendron tulipifera</i>
Shrubs	highbush blueberry mountain laurel pepperbush spicebush swamp azela winterberry	<i>Vaccinium corymbosum</i> <i>Kalmia latifolia</i> <i>Clethra alnifolia</i> <i>Lindera benzoin</i> <i>Rhododendron viscosum</i> <i>Ilex Verticillata</i>
Herbaceous	beggar-tick cinnamon fern false hellebore fowl mana grass fringed sedge marsh blue violet marsh fern meadow-rue New York fern rice cutgrass royal fern sensitive fern skunk cabbage sphagnum moss Virginia chain fern water horehound	<i>Bidens frondosa</i> <i>Osmunda cinnamomea</i> <i>Veratrum viride</i> <i>Glyceria striata</i> <i>Carex crinita</i> <i>Viola cucullata</i> <i>Thelypteris thelypteroides</i> <i>Thalictrum pubescens</i> <i>Thelypteris noveboracensis</i> <i>Leersia oryzoides</i> <i>Osmunda regalis</i> <i>Onoclea sensibilis</i> <i>Symplocarpus feotidus</i> <i>Sphagnum</i> <i>Woodwardia virginica</i> <i>Lycopus virginicus</i>

**VHB WILDLIFE HABITAT EVALUATION CHECKLIST
COVER TYPE: Palustrine Wetland Forest (Continued)**

Average DBH:	Greater than 10 inches	
% Canopy Closure:	Typically greater than 60 % (with the exception of areas under the transmission line and areas dominated by vernal pool habitat)	
Comments:	Vegetation in wetland area under power lines	
	gray dogwood steplebush pepperbush bristly dewberry deer-tongue grass spotted joe-pye weed lurid sedge Canada rush soft rush beggar-tick mad-dog skullcap sensitive fern royal fern bladder sedge sedge cinnamon fern	<i>Cornus racemosa</i> <i>spirea tomentosa</i> <i>clethra acuminata</i> <i>Rubus hispidus</i> <i>Dichanthelium clandestinum</i> <i>Eupatorium dubium</i> <i>Carex lurida</i> <i>Juncus canadensis</i> <i>Juncus effuses</i> <i>Bidens frondosa</i> <i>Scutellaria lateriflora</i> <i>Onoclea sensibilis</i> <i>Osmunda regalis</i> <i>Ccarex intumescense</i> <i>Carex scoparia</i> <i>Osmunda cinnamomea</i>

Wildlife Habitat Features

Tree cavities (number, diameter)	Several observed (generally in trees with DBH > 10 inches)
Dead logs (number, diameter)	Many logs, broken branches and tree throws throughout
Rocks, boulders	Many large rocks within wetland and watercourse areas
Evidence of wildlife usage	Observed in wetland forest and ROW: Red-eyed vireo, Crow, Eastern Wood-Pewee, Wood Thrush, Wood frog, Green frog, White-tailed Deer (See vernal pool species observed in Vernal Pool Habitat section)

**VHB WILDLIFE HABITAT EVALUATION CHECKLIST
COVER TYPE: Vernal Pool**

Project Number: 41033.00	Project Name: Stepstone Road Substation
Date: Various – May and June 2005	Observer: Lisa Standley, Jeff Peterson, Sara Fusco

Topography		Soils/Substrate	
Groundwater elevation	Commonly at or just below the soil surface	substrate type/Soil	Glacial Till/Leicester Ridgebury, Leicester and Whitman
Depressions	Observed in every wetland	Depth to bedrock	Typically > 60 inches below the soil surface
Vernal pools	7 vernal pool areas	Burrows present (size)	None observed
Rocks or boulders	None observed	Depth of leaf litter	> 1 inch

Plant Community

Stratum	Dominant Species	
Trees	red maple pin oak	<i>Acer rubrum</i> <i>Quercus palustris</i>
Shrubs	pepperbush spicebush swamp azalea highbush blueberry	<i>Clethra alnifolia</i> <i>Lindera benzoin</i> <i>Rhododendron viscosum</i> <i>Vaccinium corymbosum</i>
Herbaceous	Featherfoil	<i>Hottonia inflata</i>
Average DBH:	2 inches	
% Canopy Closure:	25 - 65 %	
Comments:		

Wildlife Habitat Features

Tree cavities (number, diameter)	None observed
Dead logs (number, diameter)	Many downed limbs
Rocks, boulders	None observed
Evidence of wildlife usage	Wood frog, Spotted Turtle, Spotted Salamander, Marbled Salamander, Spring peeper, Green frog, Eastern American toad

This report was prepared by:

Dean Gustafson – Mr. Gustafson is a Professional Soil Scientist and Senior Wetland Scientist with Vanasse Hangen Brustlin (VHB), and has 17 years of experience with a wide variety of wetland environmental issues. His areas of expertise include wetland delineation and evaluation, permit preparation, local, state and federal regulatory coordination and wetland mitigation.

Sara Fusco – Ms. Fusco is a Soil Scientist/Wetland Scientist at Vanasse Hangen Brustlin. Her areas of expertise include wetland delineation, wetland assessments, wildlife habitat investigations and permit preparation.

This report was reviewed by:

Lisa Standley, PhD – Dr. Standley is a Senior Wetland Ecologist/ Botanist, and a Senior Associate at Vanasse Hangen Brustlin. As Managing Director of Environmental Services, her responsibilities include establishing corporate standards for wetland delineation, wetland functional assessments, and wildlife habitat investigations, as well as supervision and coordination of environmental permitting at local, state and federal levels. She serves as project manager for major interdisciplinary projects, coordinating environmental investigations, engineering, traffic studies, and public participation.

Exhibit 3

SHPO Determination Letter



Connecticut Commission on Culture & Tourism

June 23, 2005

Historic Preservation
& Museum Division

Ms. Amanda Carroll
Northeast Utilities System
PO Box 270
Hartford, CT 06141-0270

59 South Prospect Street
Hartford, Connecticut
06106

Subject: 115-kV Substation
Stepstone Hill Road and Route 77
Guilford, CT

(v) 860.566.3005
(f) 860.566.5078

Dear Ms. Carroll:

The State Historic Preservation Office has reviewed the above-named project. This office expects that the proposed undertaking will have no effect on historic, architectural, or archaeological resources listed on or eligible for the National Register of Historic Places.

This office appreciates the opportunity to have reviewed and commented upon the proposed undertaking.

We recommend that the responsible agency provide concerned citizens with the opportunity to review and comment upon the proposed undertaking in accordance with the National Historic Preservation Act and the Connecticut Environmental Policy Act.

For further information please contact Dr. David A. Poirier, Staff Archaeologist.

Sincerely,

J. Paul Loether
Division Director and Deputy
State Historic Preservation Officer

Exhibit 4

Noise Analysis

Proposed Northeast Utilities Stepstone Substation

Stepstone Hill Road
Guilford, Connecticut

Prepared for



**Connecticut
Light & Power**

The Northeast Utilities System

Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**
Middletown, Connecticut

July 2006

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Executive Summary

The purpose of the noise analysis is to evaluate the potential noise impacts associated with the proposed Stepstone Substation to be located on Connecticut Light and Power Company property north of Stepstone Hill Road and east of Route 77 (Durham Road) in Guilford, Connecticut. This noise analysis evaluated the existing and future build sound levels. Existing condition sound levels were determined by a noise monitoring program. The project-generated sound levels were calculated using manufacturer's sound data for a transformer and the principles of acoustical propagation of sound over distance. The build condition sound levels were calculated by using noise addition of existing condition and project-generated sound levels.

In order to provide a thorough analysis of the project area, fourteen nearby noise receptor locations were identified at or beyond the property boundaries. These receptor locations were selected based on land use considerations, and represent the most sensitive locations (i.e., the residential neighbors) that may experience changes in sound levels due to the proposed project.

The build sound levels were compared to the Town of Guilford's Noise Control Ordinance and the Connecticut Department of Environmental Protection's noise control regulations. The results of the noise analysis demonstrate that the proposed development would not increase existing sound levels emanating from the property. In addition, the Stepstone Substation would not violate applicable daytime and nighttime noise control standards.

Noise Impact Analysis

Introduction

The purpose of this noise analysis is to evaluate the potential noise impacts associated with the proposed Stepstone Substation (the “Substation”) to be located on Connecticut Light and Power Company (“CL&P”) property north of Stepstone Hill Road and east of Route 77 in Guilford, Connecticut (the “Property”). This noise analysis evaluated the existing condition and build condition sound levels. The sound levels were compared to the Town of Guilford’s Noise Control Ordinance and the Connecticut Department of Environmental Protection’s (CTDEP) noise control regulations (Regulations of Connecticut State Agencies (RCSA), Title 22a, Section 22a-69-1 to 22a-69-7.4).

Impact Criteria

The Town of Guilford and the CTDEP have developed noise impact criteria that establish noise thresholds deemed to result in adverse impacts. The noise analysis for the Substation used these criteria to evaluate whether the proposed development will generate sound levels that result in adverse impacts.

Town of Guilford Criteria

Guilford recently adopted a Noise Control Ordinance that provides regulations for residential, commercial and industrial uses. The Substation would be located within a residential zone. The noise level standards for a noise source within a residential zone, as established in the Town of Guilford Noise Control Ordinance, are presented in Table 1.

Table 1
Town of Guilford Noise Level Standards (L₉₀ dBA)

	Receptor Zone			
	Industrial	Commercial	Residential (Daytime)	Residential (Nighttime)
Residential Emitter:	62	55	55	45

Source: Town of Guilford Noise Control Ordinance, August 16, 2006.

Connecticut DEP Criteria

The CTDEP’s noise control regulations identify the limits of sound that can be emitted from specific premises and what activities are exempt. The noise control regulations (Title 22a, §§ 22a-69-1 to 22a-69-7.4) are contained in the Regulations of Connecticut State Agencies (RCSA). This policy states that a source located in a “Class A Noise Zone” shall not emit noise exceeding the levels stated in Table 2 at the adjacent Noise Zones. The noise zone standards presented in Table 1 are L₉₀, which is discussed in the Background section.

Table 2
Noise Zone Standards (L₉₀ dBA)

	Receptor Noise Zone			
	C	B	A (Daytime)	A (Nighttime)
Class A Emitter to:	62	55	55	45

Source: Control of Noise (Title 22a, Section 22a-69-1 to 22a-69-7.4), Regulations of Connecticut State Agencies, June 1978.

A Class C land use is defined as generally industrial where protection against damage to hearing is essential, and the necessity for conversation is limited. The land use for Class B is defined as generally commercial in nature, where human beings converse and such conversations are essential to the intended use of the land. The land use in Class A is defined as generally residential where human beings sleep or areas where serenity and tranquility are essential to the intended use of the land. The proposed Substation would be classified as a Class C land use. However, because the Property is located in an area of Guilford zoned for residential uses (and surrounding land uses are solely residential in nature), the type of emitter and each receptor location used in this analysis was classified as a Class A. Note that the CTDEP noise zone standards are consistent with those noise standards established in Guilford’s Noise Control Ordinance.

Background

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work, or recreation. How people perceive sound depends on several measurable physical characteristics. These factors include:

- Intensity - Sound intensity is often equated to loudness.
- Frequency - Sounds are comprised of acoustic energy distributed over a variety of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hertz. Pure tones have all their energy concentrated in a narrow frequency range.

Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from the threshold of hearing (0 dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall level. Research indicates the following general relationships between sound level and human perception:

- A 3 dB increase is a doubling of acoustic energy and is the threshold of perceptibility to the average person.
- A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

The human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as A-weighted (dBA) is used to evaluate environmental noise levels.

A variety of sound level indicators can be used for environmental noise analysis. These indicators describe the variations in intensity and temporal pattern of the sound levels. The indicators used in this analysis are defined as follows:

- L_{max} is the maximum A-weighted sound level measured during the time period.
- L_{10} is the A-weighted sound level, which is exceeded for 10 percent of the time during the time period.
- L_{90} is the A-weighted sound level, which is exceeded for 90 percent of the time during the time period. The L_{90} is generally considered to be the background sound level. It should be noted that the L_{90} eliminates the highest 10 percent of the sound levels that occur in the study area.

Table 3 presents a list of common indoor and outdoor sound levels.

Table 3
Indoor and Outdoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μ Pa)	-	Sound Level (dBA)	Indoor Sound Levels
	6,324,555	-	110	Rock Band at 5 m
Jet Over-Flight at 300 m		-	105	
	2,000,000	-	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		-	95	
	632,456	-	90	Food Blender at 1 m
Diesel Truck at 15 m		-	85	
Noisy Urban Area—Daytime	200,000	-	80	Garbage Disposal at 1 m
		-	75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	-	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		-	65	Normal Speech at 1 m
	20,000	-	60	
Quiet Urban Area—Daytime		-	55	Quiet Conversation at 1 m
	6,325	-	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		-	45	
	2,000	-	40	Empty Theater or Library
Quiet Suburb—Nighttime		-	35	
	632	-	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		-	25	Empty Concert Hall
Rustling Leaves	200	-	20	
		-	15	Broadcast and Recording Studios
	63	-	10	
		-	5	
Reference Pressure Level	20	-	0	Threshold of Hearing

μ PA MicroPascals describe pressure. The pressure level is what sound level monitors measure.

dBA A-weighted decibels describe pressure logarithmically with respect to 20 μ Pa (the reference pressure level).

Source: Highway Noise Fundamentals, Federal Highway Administration, September 1980.

Methodology

This noise analysis evaluated the sound levels from the proposed Substation. The existing condition sound levels were determined by noise monitoring. The project-generated sound levels were calculated using manufacturer's sound data and the principles of acoustical propagation of sound over distance. The build condition (i.e., future conditions once the Substation is operable) sound levels were calculated by using noise addition of existing condition and project-generated sound levels.

Noise monitoring was conducted to determine the existing sound levels in the vicinity of the Property. Noise monitoring was conducted at two locations during the weekday daytime and nighttime periods:

- The CL&P property line along Route 77 (Durham Road), and
- A nearby residential area southeast of the proposed Stepstone Substation.

The monitoring data was used to establish existing conditions and represent the areas that may experience the greatest noise impact associated with the Substation.

A Type I noise analyzer was used to measure sound levels during the two evaluated time periods. The noise measurements were conducted during the daytime (7 a.m. to 10 p.m.) and nighttime periods (10:00 p.m. to 7:00 a.m.) to represent the background sound levels that would occur near the proposed Stepstone Substation. The sound measurements included typical sources, such as mechanical equipment, daily operations, and vehicle traffic.

The project-generated sound levels were calculated for each receptor location based on manufacturer provided reference sound level data. The only significant noise source at the Substation would be a new 47-Megavolt-Ampere ("MVA") bulk power transformer. The manufacturer's sound level data for the transformer were projected to specific receptor locations using the properties of sound propagation for soft ground terrain.

Finally, the existing condition and project-generated sound levels were added together to determine their potential impact on neighboring properties and conformance with the Town and State standards.



Noise Monitoring and Receptor Locations Figure 1

Receptor Locations

In order to provide a thorough analysis of the project area, fourteen noise receptor locations were identified in the vicinity of the proposed Substation. The receptor locations were selected based on proximity and land use considerations. They represent the most sensitive locations in the immediate area that may experience changes in sound levels once the Substation is in operation. These receptor locations represent the residential parcels that surround the Property. They include:

- Receptor Location 1 (R1) – Route 77 (Durham Road) to the west ,
- Receptor Location 2 (R2) – Residence across Route 77 (Durham Road) to the west,
- Receptor Location 3 (R3) – Residence at northeast corner of Route 77 (Durham Road) and Stepstone Hill Road intersection to the south,
- Receptor Location 4 (R4) – Residence on south side of Stepstone Hill Road to the south,
- Receptor Location 5 (R5) – Residence in cul-de-sac north of Stepstone Hill Road to the southeast,
- Receptor Location 6 (R6) – Residence in cul-de-sac north of Stepstone Hill Road to the southeast ,
- Receptor Location 7 (R7) – Residence in cul-de-sac north of Stepstone Hill Road to the east,
- Receptor Location 8 (R8) – Residence in cul-de-sac north of Stepstone Hill Road to the east,
- Receptor Location 9 (R9) – Residence south of Meadow Ridge Lane to the northeast,
- Receptor Location 10 (R10) – Residence on Meadow Ridge Lane to the northeast,
- Receptor Location 11 (R11) – Residence on Meadow Ridge Lane to the northeast,
- Receptor Location 12 (R12) – Residence on Bunker Hill Road to the north,
- Receptor Location 13 (R13) – Residence east of Route 77 (Durham Road) to the north, and
- Receptor Location 14 (R14) – Residence on east side of Route 77 (Durham Road) to the northwest.

Land use in the vicinity of the Property is predominately residential. The receptor and existing conditions noise monitoring locations used in the noise analysis are presented in Figure 1.

Existing Conditions

The existing sound levels in the vicinity of the Property were established by actual measurement of sound levels at two locations, including an area along Route 77 (Durham Road) to the west of the Property and the residential area located at the intersection of Little Meadow Road and Still Meadow Drive to the southwest. These

measured sound levels establish a baseline to evaluate the Substation’s sound impacts. The Route 77 measurements provide a representative sound baseline for the receptor properties located adjacent to Route 77. The measurements in the residential area provide a representative sound baseline for the receptor properties located in an area where the sound levels are not excessively influenced by the traffic along Route 77.

The noise monitoring was conducted using a Larson-Davis 824 Type I sound level analyzer and followed standard noise monitoring procedures. The noise sources included local vehicle traffic and typical neighborhood sounds.

The noise monitoring was conducted to establish the existing sound levels at the receptor locations. The sound levels were measured at each location during both the weekday daytime (7 a.m. to 10 p.m.) and weekday nighttime periods (10:00 p.m. to 7:00 a.m.) on June 22, 2005. The lowest recorded hourly L₉₀ sound levels are presented in Table 4.

Table 4
Existing Sound Levels

Measurement	Daytime SPL**	Nighttime SPL**
<u>Location*</u>	<u>L₉₀ – dBA</u>	<u>L₉₀ – dBA</u>
Along Route 77 (Durham Road) to west of proposed site	46	38
Residential Area at the intersection of Little Meadow Road and Still Meadow Drive to the southwest of the proposed site	39	38

Source: Vanasse Hangen Brustlin, Inc.

* Refer to Figure 1 for locations.

** SPL - Overall (broadband) sound pressure level. L₉₀ is the ambient (background) sound level.

Project-Generated Sound Levels

The primary source of noise from the proposed project will be the 47-MVA transformer. CL&P requires the use of state-of-the-art transformers. The maximum sound levels from the transformers are 68 dB sound pressure levels, measured immediately adjacent to the transformer. This sound level will only occur during periods of high load. The remaining time the transformer sound levels will be lower. For purposes of this analysis, a conservative assumption of 68 dB at 5 feet was used for the reference distance. The project-generated hourly sound levels were projected to each receptor location based upon the properties of sound propagation over distance, terrain, and geometry. The project-generated hourly L_{90} sound level contribution for each receptor location is presented in Table 5.

Table 5
Project Generated Sound Levels

Receptor Location	SPL* L_{90} – dBA
R1 – Route 77 (west)	27
R2 – Route 77 (west)	26
R3 – Route 77/Stepstone Hill Road (south)	22
R4 – Stepstone Hill Road (south)	14
R5 – Cul-de-sac north of Stepstone Hill Road (southeast)	15
R6 – Cul-de-sac north of Stepstone Hill Road (southeast)	16
R7 – Cul-de-sac north of Stepstone Hill Road (east)	19
R8 – Cul-de-sac north of Stepstone Hill Road (east)	14
R9 – Meadow Ridge Lane (east)	10
R10 – Meadow Ridge Lane (northeast)	11
R11 – Meadow Ridge Lane (northeast)	9
R12 – Bunker Hill Road (north)	6
R13 – East of Route 77 (north)	16
R14 – Route 77 (north)	17

Source: Vanasse Hangen Brustlin, Inc.

*SPL - Overall (broadband) sound pressure level. L_{90} is the ambient (background) sound level, present in the absence of transient noise sources.

Build Conditions

Using acoustic addition, the existing condition and project-generated sound levels were combined to determine the future build condition sound levels at each of the receptor locations. The project-generated sound levels are substantially lower than the existing sound levels due to the location of the proposed Substation in relation to the receptor locations. As a result, the project-generated sound levels do not increase the existing sound levels. When adding two sound levels where one of the sound levels is 10 decibels greater or lower than the other sound level, then acoustical addition results in no change to the higher sound level. Table 6 presents existing condition, project-generated, and build condition sound levels, as well as the most conservative noise control standard (Town or State) for each receptor.

Table 6
Build Condition Sound Levels

Receptor Location*	Daytime Sound Levels				Nighttime Sound Levels			
	Existing L90 - dBA	Project L90 - dBA	Build L90 - dBA	Noise Control Standard L90 - dBA	Existing L90 - dBA	Project L90 - dBA	Build L90 - dBA	Noise Control Standard L90 - dBA
R1 – Route 77	46	27	46	55	38	27	38	45
R2 – Route 77	46	26	46	55	38	26	38	45
R3 – Route 77/Stepstone Hill Rd	46	22	46	55	38	22	38	45
R4 – Stepstone Hill Road	39	14	39	55	38	14	38	45
R5 – Cul-de-sac north of Stepstone Hill Rd	39	15	39	55	38	15	38	45
R6 – Cul-de-sac north of Stepstone Hill Rd	39	16	39	55	38	16	38	45
R7 – Cul-de-sac north of Stepstone Hill Rd	39	19	39	55	38	19	38	45
R8 – Cul-de-sac north of Stepstone Hill Rd	39	14	39	55	38	14	38	45
R9 – Meadow Ridge Lane	39	10	39	55	38	10	38	45
R10 – Meadow Ridge Lane	39	11	39	55	38	11	38	45
R11 – Meadow Ridge Lane	39	9	39	55	38	9	38	45
R12 – Bunker Hill Road	39	6	39	55	38	6	38	45
R13 – East of Route 77	39	16	39	55	38	16	38	45
R14 – Route 77	46	17	46	55	38	17	38	45

Source: Vanasse Hangen Brustlin, Inc.

* Refer to Figure 1 for receptor locations.

The results of the noise analysis demonstrate that the Substation will generate sound levels that are substantially below the existing sound levels. Adding the Substation sound levels to the existing nighttime conditions will not result in any increases of the existing nighttime sound levels. The Town of Guilford and CTDEP noise level standards for nighttime are 45 dBA for residential zones. The build condition sound levels for the proposed Substation are well below the nighttime noise control standards.

The daytime project-generated sound levels for the Substation are the same as the nighttime sound levels. Adding the Substation sound levels to the existing daytime conditions will not result in any increases of the existing daytime sound levels. The Town of Guilford and CTDEP noise level standards for daytime are 55 dBA for residential zones. The daytime build condition sound levels are also substantially below the daytime noise control standards.

Conclusion

The results of the noise analysis demonstrate that the proposed project will not violate the applicable nighttime and daytime noise control standards at each receptor location. The noise analysis demonstrates that, upon completion and operation of the Substation, the sound levels generated by the Substation will not exceed the Town's or CTDEP's noise control standards.