



Biodiversity Studies • Wetland Delineation & Assessment • Habitat Management • GIS Mapping • Permitting • Forestry

Wildlife Survey Results
CPV Towantic Energy Center Facility
Woodruff Hill Road
Oxford, Connecticut

Prepared by:

A handwritten signature in blue ink that reads "Eric Davison".

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July 14, 2015

1.0 INTRODUCTION

A wildlife survey was conducted on and adjacent to the site of the proposed CPV Towantic Energy Center facility by biologist Eric Davison of Davison Environmental, LLC during the spring of 2015. The wildlife survey satisfies requirements as noted in Docket 192B Decision and Order issued on May 14, 2015 by the Connecticut Siting Council. Specifically, the survey was focused on three guilds – birds, amphibians and reptiles. All species observed during this survey are listed in Table 1.

1.1 Study Area

The study area included the two parcels where the 785 MW dual-fuel combined cycle electric generating facility is proposed along the northeast terminus of Woodruff Hill Road (“the site”, hereinafter), as well as parcels 4, 5 and 6 of the Woodruff Hill Industrial Park subdivision located approximately 0.3 mile west of the Waterbury-Oxford Airport in Oxford, Connecticut. These three parcels are located on the west side of Woodruff Hill Road and are proposed as temporary laydown sites for use during construction of the facility. The area of the wildlife survey, which included the project parcels and laydown parcels, totaled approximately 52 acres. This area is referred to as the “study area” hereinafter and is illustrated on the enclosed Wildlife Habitat Map.

In some instances, observations of species were made beyond the study area when such observations were necessary to understand the importance of the study area relative to the migratory or seasonal movements of a given species. Specifically, vernal pool surveys were conducted beyond the study area in order to identify vernal pools that lie within approximately 750 feet, and birds heard singing beyond the study area were also noted. When species were observed outside the study area only, they are so noted in the wildlife inventory (Table 1).

1.3 Survey Methods

Field surveys were conducted in 2015 on April 16 and 23; May 4, 6, 11, 16, 17, 20, 27 and 28; and June 4, 9, 13, 16 and 20. The primary biologist Eric Davison was present on all field survey days. On April 16, May 4, May 11, May 27 and May 28, Mr. Davison was accompanied by one to two additional observers experienced at identifying reptiles and amphibians in the field. All told, the total effort expended includes 23 person days of survey effort.

Survey methods for amphibians and reptiles included cover searching (turning of rocks, logs and other surface debris), visually searching for egg masses, dip-netting for larvae and audial surveys for calling frogs and toads.

Survey methods for birds included audial and visual surveys during late May and early June when the majority of migratory birds have returned to Connecticut for the breeding season.

Targeted box turtle surveys were conducted during May and June and included visual surveys concentrated in low dense vegetation where box turtles bask on sunny days during the spring. Basking surveys were conducted using multiple observers, with a significant amount of effort expended in May prior to groundcover vegetation becoming dense and obstructing visual surveys. In late May and early June, surveys shifted to humid, rainy and unsettled weather when box turtles, particularly nesting females, are highly active.

2.0 STUDY AREA CHARACTERISTICS

The study area includes a variety of upland and wetland habitat types illustrated on the Wildlife Habitat Map and described in Sections 2.2 and 2.3. The study area lies at the terminus of Woodruff Hill Road in north Oxford. The landscape is characterized by light commercial, industrial and residential development. The study area lies on the southern slope of Woodruff Hill, a ridgeline that straddles the Middlebury and Oxford Town lines. The elevation of the site ranges from 810 feet to 860 feet above sea level.

From a regional perspective, the site lies within the Southwest Hills Ecoregion as defined by Dowhan and Craig (1976). The Southwest Hills Ecoregion is considered a coastal upland region lying within 25 miles of Long Island Sound and characterized by low, rolling to locally rugged hills of moderate elevation, broad areas of upland, and local areas of steep and rugged topography. Elevations are generally greater than 250 feet and less than 750 feet. The avifauna and herpetofauna of this ecoregion are not considered distinct, as the species present can be found throughout much of the State.

2.1 Wetland Habitats

Study area wetlands include three habitat types; forested wetland, wet meadow and shrub-scrub wetlands. Forested wetlands, also known as wooded swamps, are the most abundant wetland type in Connecticut and have a vegetational community which is characterized by a forest canopy at least 20 feet tall. Forested wetlands present in the study area consist of those with a saturated as opposed to seasonally flooded hydrology and predominately occur on gentle to moderate slopes. Wet meadows are dominated by persistent and non-persistent grasses, sedges, rushes, and other herbaceous grass-like plants. Scrub-shrub wetlands are dominated by woody vegetation, shrubs with some scattered stunted trees, less than 20 feet in height.

2.1a Wetland 1

Wetland 1 is a dense glacial till hillside seep wet meadow with scattered shrubs characterized by a relatively narrow clearing surrounded to the north and south by mature upland forest. Water is conveyed west, originating at a stone wall cut at the edge of a large open field. This wetland terminates as it approaches the Woodruff Hill cul-de-sac. Evidence of mechanical compaction in the form of tire ruts is prevalent throughout this wetland along with disturbed wetland soil profiles. Common species include jewelweed (*Impatiens capensis*), tussock sedge (*Carex stricta*), sensitive fern (*Onoclea sensibilis*), northern arrowwood (*Viburnum recognitum*) and the invasive non-native multiflora rose (*Rosa multiflora*) and reed canarygrass (*Phalaris arundinacea*).

2.1b Wetland 2

The majority of Wetland 2 is located outside of the study area. Wetland 2 is predominately forested but contains wet meadow habitat under an overhead electrical distribution right-of-way (ROW) running north/south along the northwest site boundary. Evidence of mechanical compaction in the form of tire ruts and gravel surfaces is prevalent throughout this utility ROW resulting in shallow ponded water. Wetland 2 generally drains east to west across a moderately west-facing slope, formed in dense glacial till. The forested portions of the wetland are dominated by red maple (*Acer rubrum*) in the tree layer and spicebush (*Lindera benzoin*) in the shrub layer. The wet meadow plant community is similar to that of Wetland 1 and includes jewelweed, tussock sedge, sensitive fern, northern arrowwood and the invasive non-native multiflora rose and reed canarygrass.

2.1c Wetland 3

Wetland 3 is a small hillside seep wetland system that has experienced high levels of anthropogenic activity. Wetland 3 is generally located at the confluence of the Eversource Energy ROW and Woodruff Hill Road cul-de-sac. As such, the hydrology and nature of Wetland 3 has been highly altered from previous filling activities associated with maintenance and upgrading of this electrical transmission ROW, resulting in disturbed wetland soil profiles, surface compaction and altered vegetation communities. This wetland receives hydrology from the surrounding uplands to the north and east via seasonal overland flow and groundwater exfiltration, as well as a PVC pipe conveying flows from a dug drainage swale located along the east side of Woodruff Hill Road. Common plant species include spicebush, the invasive purple loosestrife (*Lythrum salicaria*), bebb willow (*Salix bebbiana*) and soft rush (*Juncus effuses*).

2.1d Wetland 8

Wetland 8 is a small, isolated, forested wetland located north of the laydown area within Lot 6. This wetland system originates from a seep outbreak within a localized depression. Wetland 8 generally flows west transitioning to upland forest as the topography becomes more moderate. Dominant plants include red maple, spicebush, multiflora rose, winterberry (*Ilex verticillata*), skunk cabbage (*Symplocarpus foetidus*) and the invasive non-native Japanese barberry (*Berberis thunbergii*) and Asiatic bittersweet (*Celastrus orbiculatus*).

2.1e Wetland 9

Wetland 9 is a forested hillside seep wetland that focuses to a narrow intermittent stream channel. This wetland system flows east to west eventually draining across the utility ROW then into Vernal Pool 1. Wetland areas within the cleared ROW consist of a mix of scrub-shrub and wet meadow habitats. This wetland system continues off-site to the west draining into a large and complex forested wetland system. Dominant plants include red maple, Japanese barberry, spicebush, multiflora rose, winterberry, skunk cabbage and Asiatic bittersweet.

2.1f Wetland 10

Wetland 10 consists of a small dug drainage swale formed in disturbed/compacted soils. As a result, ponded water accumulates within the swale for short durations, particularly after a storm event. The wetland generally drains south to north. Dominant vegetation is classified as emergent with intermixed scrub-shrub species. This historically artificially constructed wetlands is located within a proposed laydown area interior to Lot 5. Dominant plants include pussy willow (*Salix discolor*), cattail (*Typha latifolia*), winterberry and the invasive non-native multiflora rose.

2.2 Upland (non-wetland) Habitats

2.2a *Mixed Hardwood Forest*

Upland habitats consist of mixed hardwood forest, shrubland (managed utility line ROW) and old field. Mesic mixed hardwood forest is the dominant habitat type in the study area. The forest consists of relatively young second growth with a moderately open tree canopy and a dense shrub layer. Common tree species include red maple, cherry (*Prunus serotina*), black oak (*Quercus velutina*), white oak (*Quercus alba*) and black birch (*Betula lenta*). Common shrub species include spicebush and the invasive multiflora rose and Japanese barberry. Common herbaceous species include sensitive fern (*Onoclea sensibilis*), Pennsylvania sedge (*Carex pensylvanica*), hay-scented fern (*Dennstaedtia punctilobula*) and Canada mayflower (*Maianthemum canadense*).

2.2b *Shrubland (managed utility line ROW)*

A section of Eversource Energy managed ROW lies within the study area. The vegetation is dense and dominated by brambles (*Rubus sp.*), grapevine (*Vitis sp.*), goldenrods (*Solidago sp.*), autumn olive (*Elaeagnus umbellata*), sumac (*Rhus sp.*), winterberry, spicebush and the invasive, non-native multiflora rose, Asiatic bittersweet and mugwort (*Artemisia vulgaris*).

2.2c *Old Field*

Old field habitat includes areas that are more frequently mowed, referred to as *early old field* and areas that are less frequently mowed, referred to as *late old field*. Early old field habitat is dominated by non-woody grasses, sedges, wildflowers and forbs. Late old field is dominated by herbaceous vegetation interspersed with woody shrubs and small trees. Old field occurs throughout the site as well as within the laydown parcels.

2.3 Disturbed Habitats

A significant portion of the study area (23 of the 43 acres, or 43%) was historically disturbed which negatively affected the value of these areas for wildlife. The extent of this disturbed habitat is illustrated on the Wildlife Habitat Map. These areas were subject to land disturbance by heavy machinery. This included filling, grading and smoothing of the ground surface which resulted in severe compaction of the soil. While land disturbances such as agriculture, vegetation removal, topsoil stripping and scarification are often beneficial for early-successional habitat specialists (e.g., box turtle), significant disturbance of the land can negatively affect the habitat of terrestrial and particularly fossorial (i.e., burrowing) species. Additionally, the vegetation that developed in these areas post-disturbance consists predominately of non-native invasive species, particularly autumn olive, multiflora rose and cool-season grasses. These plants form dense monocultures resulting in low vegetative structural diversity which negatively affects nesting bird habitat.

These disturbed habitats generally had low wildlife diversity. They were dominated by a few early-successional generalists that favor altered habitats and supported relatively few high conservation priority species.

3.0 RESULTS

A total of 51 birds, five reptiles and 12 amphibians were observed within or adjacent to the study area. In order to evaluate the study area's value for species of high-conservation priority as opposed to common species and habitat generalists, the wildlife inventory was prioritized based on conservation status (see Tables 1 and 2). Species that are included either on *Connecticut's List of Endangered, Threatened and Special Concern Species* (2010) or classified as *Species of Greatest Conservation Need* (SGCN) by *Connecticut's Wildlife Action Plan*¹ (WAP, in prep.) were considered to be species of high conservation priority. The WAP was created to establish a framework for proactively conserving Connecticut's fish and wildlife, including their habitats. SGCN fall into three categories in descending order of significance from *most important* to *very important* and finally, *important*. A summary of the SGCN observed is provided in Table 2. A total of 25 SGCN were observed during the survey, 23 of which were observed within the study area. These include five *most important* species, eight *very important* species and 12 *important* species. Two SGCN, the black-billed cuckoo and prairie warbler, were observed adjacent to but not within the study area. The five *most important* species are all birds, three of which are "possible"² breeders in the study area; the woodcock, wood thrush and blue-winged warbler.

3.1 State-Listed Species

Two state-listed species were observed on the site, the American kestrel and eastern box turtle. The American kestrel inhabits a wide variety of open to semi-open habitats including meadows, grasslands, deserts, early old field successional communities, open parkland, agricultural fields, and both urban and suburban areas; regardless of dominant vegetation form present. The breeding territories are characterized by either large or small patches covered by short ground vegetation, with taller woody vegetation either sparsely distributed or lacking altogether with suitable nest trees and perches required. Typical breeding habitat in the northeast or midwest is large (>25 ha) pasture or recently fallowed field, with 1 or few isolated large dead trees for nesting and several potential perches (Smallwood and Bird, 2002).

A single American kestrel was observed on April 16th at the southern end of the site near the Spectra Energy access drive. The bird was observed only briefly around 9:00 am before flying away. The bird was not observed again during repeated checks of the field throughout the day on April 16th, as well as on subsequent visits. Therefore, the bird was considered a migrant only, not a nester. Migration through this area is not unexpected, as kestrel often migrate across open expanses and hilltops, particularly near airports.

A single eastern box turtle was observed on the site. Box turtle are widespread throughout the low-lying portions of Connecticut. They favor old field habitat and deciduous forest ecotones, including powerline cuts and logged over woodland (Klemens, 1993). Box turtles utilize different habitat types at different times of the year (Dodd, 2001). Early-successional habitats are generally inhabited during months with moderate temperate while forested habitats are utilized during the heat of the summer as well as for hibernation (Erb, 2011). The study area's early-successional habitats (shrubland, old field), mixed hardwood forest and forested wetlands represent suitable habitat for the eastern box turtle.

¹ *Connecticut's Wildlife Action Plan*, formerly known as *Connecticut's Comprehensive Wildlife Conservation Strategy* (2005) is currently under revision by the CTDEEP. Portions of the plan, such as the SGCN list, have been released in draft form and have been used in this report.

² A "possible" breeder as defined by Bevier (1994) includes observation of bird (male, female or singing male) within suitable habitat during the breeding season.

Table 2: Wildlife inventory, CPV Towantic Energy project, Woodruff Hill Road, Oxford

Common Name	Scientific Name	CS	Common Name	Scientific Name	CS
Amphibians					
American toad	<i>Bufo americanus</i>		pickerel frog (OS)	<i>Rana palustris</i>	
dusky salamander	<i>Desmognathus fuscus</i>	IM	redback salamander	<i>Plethodon cinereus</i>	
four-toed salamander (OS)	<i>Hemidactylum scutatum</i>		red-spotted newt	<i>Notophthalmus viridescens</i>	IM
green frog	<i>Rana clamitans</i>		spotted salamander	<i>Ambystoma maculatum</i>	IM
grey treefrog	<i>Hyla versicolor</i>	IM	spring peeper	<i>Pseudacris crucifer</i>	
wood frog	<i>Rana sylvatica</i>	IM	two-lined salamander (OS)	<i>Eurycea bislineata</i>	
Reptiles					
brown snake	<i>Storeria dekayi</i>		painted turtle (OS)	<i>Chrysemys picta</i>	
eastern box turtle	<i>Terrapene carolina</i>	VI, SC	garter snake	<i>Thamnophis sirtalis</i>	
snapping turtle	<i>Chelydra serpentina</i>				
Birds					
American crow	<i>Corvus brachyrhynchos</i>		northern flicker	<i>Colaptes auratus</i>	VI
American goldfinch	<i>Carduelis tristis</i>		northern oriole	<i>Icterus galbula</i>	IM
American kestrel	<i>Falco sparverius</i>	MI, SC	ovenbird	<i>Seiurus aurocapillus</i>	IM
American redstart	<i>Setophaga ruticilla</i>		pileated woodpecker	<i>Dryocopus pileatus</i>	
American robin	<i>Turdus migratorius</i>		prairie warbler (OS)	<i>Dendroica discolor</i>	MI
black and white warbler	<i>Mniotilta varia</i>	IM	red-bellied woodpecker	<i>Melanerpes carolinus</i>	
black-billed cuckoo (OS)	<i>Coccyzus erythrophthalmus</i>	VI	red-eyed vireo	<i>Vireo olivaceus</i>	
black-capped chickadee	<i>Parus atricapillus</i>		red-shouldered hawk	<i>Buteo lineatus</i>	
blue Jay	<i>Cyanocitta cristata</i>		red-tailed hawk	<i>Buteo jamaicensis</i>	
blue-winged warbler	<i>Dendroica fusca</i>	MI	rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	IM
brown creeper (OS)	<i>Certhia americana</i>	IM	ruby-throated hummingbird	<i>Archilochus colubris</i>	
brown-headed cowbird	<i>Molothrus ater</i>		scarlet tanager	<i>Piranga olivacea</i>	VI
chestnut-sided warbler	<i>Dendroica pensylvanica</i>	VI	song sparrow	<i>Melospiza Melodia</i>	
chipping sparrow	<i>Spizella passerina</i>		tree swallow	<i>Tachycineta bicolor</i>	
common yellowthroat	<i>Geothlypis trichas</i>		tufted titmouse	<i>Parus bicolor</i>	
downy woodpecker (OS)	<i>Picoides pubescens</i>		turkey vulture	<i>Cathartes aura</i>	
eastern bluebird	<i>Sialia sialis</i>		veery	<i>Catharus fuscescens</i>	IM
eastern towhee	<i>Pipilo erythrophthalmus</i>	VI	white-breasted nuthatch	<i>Sitta carolinensis</i>	
European starling	<i>Sturnus vulgaris</i>		wild turkey	<i>Meleagris gallopavo</i>	
field sparrow	<i>Spizella pusilla</i>	VI	willow flycatcher	<i>Empidonax traillii</i>	IM
gray catbird	<i>Dumetella carolinensis</i>		wood duck (OS)	<i>Aix sponsa</i>	
great-blue heron (OH)	<i>Ardea herodias</i>		wood thrush	<i>Hylocichla mustelina</i>	MI
great-crested flycatcher	<i>Myiarchus crinitus</i>		woodcock	<i>Scolopax minor</i>	MI
indigo bunting	<i>Passerina cyanea</i>	VI	yellow warbler	<i>Dendroica petechia</i>	
mourning dove	<i>Zenaida macroura</i>		yellow-throated vireo	<i>Vireo flavifrons</i>	
northern cardinal	<i>Cardinalis cardinalis</i>				
OH – observed overhead; OS – observed or heard offsite only; Wildlife Action Plan Conservation Status (CS): VI – very important; MI – most important; IM – important SC – state-listed species of special concern					

Table 2: Total species observed and their SGCN status according to the WAP

Guild	Total Species	Wildlife Action Plan Conservation Status			
		MI	VI	IM	Total WAP
Amphibians	12	0	0	5	5
Reptiles	5	0	1	0	1
Birds	51	5	7	7	19
KEY: MI-most important; VI-very important; IM-important					

The turtle was a female found basking within the Algonquin Gas ROW near the Spectra Energy security fence on May 16th. The turtle was marked for future identification using a file to create a triangular notch on the R1 marginal scute. The turtle’s age was greater than 20 years based on the annular rings on the carapace which were visible but too worn to count. The turtle weighed 795 grams, which suggests she was gravid. Multiple searches were conducted in and around the location of this turtle on subsequent visits but she was never observed again. Despite intensive searching throughout the study area during optimal weather and seasonal timing, no other box turtle were observed. The low density of box turtle is consistent with two key characteristics: (1) the presence of glacial till (as opposed to glacial outwash) geomorphology; and (2) the site’s high elevation (>800 feet) at which box turtle are generally absent or present at low densities³. Box turtles are rare at this elevation and robust populations (ca. greater than <1 turtle/hectare) have never been observed in Connecticut at this elevation to the best of my knowledge.

3.2 Amphibians

Twelve (12) amphibian species were observed. Suitable amphibian breeding habitat in the study area is limited, as most amphibians require seasonally flooded wetlands for successful breeding and wetlands within the study area generally have a saturated (as opposed to flooded) hydroperiod. Only three of the 12 species were observed breeding within the study area; spotted salamander, American toad and dusky salamander. Other than a few spotted salamanders which unsuccessfully bred in two decoy vernal pools (see section 3.5), amphibian breeding was restricted to American toad which utilized shallow flooded ditches in the Eversource Energy ROW and dusky salamander which inhabited the hillside seepage wetlands on Lot 6 of the proposed laydown area.

3.3 Reptiles

A total of four reptiles were observed within the study area; box turtle, snapping turtle, brown snake and garter snake. A fifth species (painted turtle) was observed crossing Woodruff Hill Road just south of the study area. A crushed snapping turtle shell was observed along the Spectra Energy driveway; no live animals were found. Multiple brown snake and garter snake were observed throughout the disturbed old field habitat.

³ The elevation of the site ranges from 810’ to 860’. This represents the elevational extreme for box turtle occurrence in CT. Box turtle are widely distributed to an elevation of 500’ but become scarce and localized above 700’ (Klemens, 1993: 189). In Klemens (1990), of 87 box turtle sites 85% were located below 500’.

3.4 Birds

Fifty-one (51) bird species were observed within or immediately adjacent to the study area. Birds present include those that favor early-successional habitat (shrubland, old field), forests and edge habitats (i.e., habitat ecotones). The majority of birds observed are associated with non-forested early-successional habitats (ROW shrublands and old field). Additionally, the majority of birds designated as SGCN are associated with early-successional habitats.

3.5 Vernal Pools

Calhoun and Klemens (2002) provides the following operational definition of vernal pools:

*Vernal pools are seasonal bodies of water that attain maximum depths in the spring or fall, and lack permanent surface water connections with other wetlands or water bodies. Pools fill with snowmelt or runoff in the spring, although some may be fed primarily by groundwater sources. The duration of surface flooding, known as hydroperiod, varies depending upon the pool and the year; vernal pool hydroperiods range along a continuum from less than 30 days to more than one year. Pools are generally small in size (<2 acres), with the extent of vegetation varying widely. They lack established fish populations, usually as a result of periodic drying, and support communities dominated by animals adapted to living in temporary, fishless pools. In the region, they provide essential breeding habitat for one or more wildlife species including Ambystomid salamanders (*Ambystoma* spp., called “mole salamanders” because they live in burrows), wood frogs (*Rana sylvatica*), and fairy shrimp (*Eubranchipus* spp.).*

Vernal pool physical characteristics can vary widely while still providing habitat for indicator species. “Classic” vernal pools are natural depressions in a wooded upland with no hydrologic connection to other wetland systems. Manmade depressions such as quarry holes, old farm ponds and borrow pits can also provide similar habitat. Often, vernal pools are depressions or impoundments within larger wetland systems. These vernal pool habitats are commonly referred to as “cryptic” vernal pools.

Several species of amphibians depend on vernal pools for reproduction and development. These species are referred to as indicator vernal pool species, and their presence in a wetland during the breeding season helps to identify that area as a vernal pool.

This vernal pool assessment makes an important distinction between wetlands in which indicator species may breed and those wetlands where they breed *and* successfully develop. A common phenomena is for breeding (i.e., mating and egg laying) to occur in bodies of water such as road ruts or temporary puddles where development and metamorphosis of larvae is unsuccessful. Such areas are referred to as “decoy vernal pools” as reproductive efforts are unsuccessful. In their guidance on best development practices for conserving pool breeding amphibians, Calhoun and Klemens (2002) specifically note the negative impact associated with ruts: “*Site clearing can cause water-filled ruts. These ruts intercept amphibians moving toward the vernal pool and may induce egg deposition. Often these ruts do not hold water long enough to allow development of amphibians and therefore acts as “sinks” that result in populations declines.*”

No vernal pools occur within the study area but two decoy vernal pools do occur on the site. Please refer to the Vernal Pool Analysis Map provided in the Figures Attachment. These pools are illustrated on both the Wildlife Habitat Map and Vernal Pool Analysis Map, labeled “western decoy pool” and “eastern decoy pool”. The eastern decoy pool consists of a soil test pit excavation previously designated as Wetland 4. The western decoy pool is located west of Wetland 4, also within a former soil test pit excavation. Both of these features are discrete shallow excavations created by a backhoe. Due to their small size, shallow depth

and location within an upland (i.e., non-wetland) area, they do not maintain a hydrology sufficient to support successful amphibian breeding.

Both pools had a low number of egg masses from a single vernal pool indicator species, the spotted salamander (*Ambystoma maculatum*). Neither pool had successful development of salamander larvae. On May 4th, the eastern decoy pool (Wetland 4) contained three spotted salamander (*Ambystoma maculatum*) egg masses and the western decoy pool contained nine spotted salamander egg masses. Both pools began to dry quickly and by May 16th, the western pool had dried completely and in the eastern pool, two of the three egg masses had desiccated due to exposure. By May 16th, the remaining single egg mass could not be found (and likely desiccated). By May 27th the eastern pool was completely dry.

Two vernal pools were observed adjacent to the study area with the *critical terrestrial habitat* zones (100ft-750ft from the pool as defined by Klemens and Calhoun, 2002) of these pools encompassing a portion of the study area. Vernal Pool 1 is a cryptic vernal pool embedded within a large forested wetland located west of laydown parcels 5 and 6. Pool 2 is a detention basin that receives stormwater runoff from the Spectra Energy facility.

Table 2: Vernal pool egg mass count summary

Pool	Total Egg Masses	
	Wood Frog	Spotted Salamander
1	117*	24
2	27	72
*Indicates that count included a large communal egg masses raft and therefore the total is approximate.		

In order to assess these pools qualitatively, the methodology described in *Best Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States* (Calhoun and Klemens, 2002, a.k.a. the BDP) was used. This assessment methodology utilizes a three-tiered rating system, with the tier designation determined by examining the biological value of the pool in conjunction with the condition of the habitat surrounding the pool, which is the area used by vernal pool amphibians during the non-breeding season. The higher the species diversity and abundance coupled with an undeveloped and forested landscape surrounding the pool, the higher the tier rating. Tier 1 pools are considered the highest quality pools, while Tier 3 are the lowest.

Based on the BDP methodology, both Vernal Pool 1 and Vernal Pool 2 are Tier 1 or high-quality pools. It should be noted, however that due to the fact that Vernal Pool 2 is a detention basin, it may not provide long-term habitat for vernal pool wildlife. Because its primary function is to capture and treat stormwater runoff, the water quality and maintenance regime may not be compatible with good quality amphibian habitat.

4.0 DISCUSSION

4.1 Summary of Findings

A survey of amphibian, reptile and bird biodiversity was conducted on and adjacent to the site of the proposed CPV Towantic Energy plant on Woodruff Hill Road in Oxford, Connecticut. The following summarizes the findings of this wildlife survey:

1. Field surveys were conducted from April through June, totaling 23 person days. This represents a significant level of survey effort for a study area of this size.
2. A total of 51 birds, five reptiles and 12 amphibians were observed within or adjacent to the study area.

3. Twenty-three (23) of these species (45%) are classified by the State Wildlife Action Plan as *species of greatest conservation need* (SGCN).
4. Two state-listed species were observed during the study, the American kestrel and eastern box turtle. The kestrel was present only temporarily during migration and did not breed in the study area. A single eastern box turtle was observed within the Algonquin Gas ROW, consistent with the predicted low population levels for a study area at this elevation.
5. No vernal pools occur within the study area. However, the study area lies within the *critical terrestrial habitat zone* (Calhoun and Klemens, 2002) of two vernal pools. Both vernal pools are Tier I or high-quality pools.
6. Overall, the areas of proposed activity (the site and laydown parcels) had a lower diversity of wildlife than the surrounding portions of the study area. This can be attributed to the history of site disturbance which has degraded the habitat as well as the lack of overall habitat diversity present, particularly the lack of long-hydroperiod wetlands.

4.2 Impacts and Recommendations

Potential impacts to the 25 observed *species of greatest conservation need* that may result from the project are summarized in Table 3. Of the 25 SCGN, no impact is predicted to seven species. The remaining 18 species will be affected by a loss of habitat resulting from the project. One of these species, the woodcock, was observed only within the proposed development area. The remainder of the species were observed both within and beyond the development area.

Many of the species for which habitat will be lost are shrubland birds. For these species, the optimal shrubland habitat will not be directly impacted. This is due to the fact that the shrubland habitat located within the areas proposed for development was degraded as a result of historic site activities (see Section 2.3) and consist predominately of olive-dominated monoculture. This degraded shrubland habitat is of lower quality than the shrubland located within the Eversource Energy managed ROW outside of the development area. This conclusion is based on the density⁴ and diversity of birds present, which is higher in the managed ROW shrublands.

Vernal Pools 1 and 2 will see a loss of forested habitat within the *critical terrestrial habitat* (CTH) zones as a result of the proposed project. For Vernal Pool 1, the undeveloped land in the CTH will be reduced from 99% to 88%. For Vernal Pool 2, the total undeveloped land in the CTH will be reduced from 92% to 80%. While this increase in developed land will reduce available terrestrial (non-breeding) habitat for vernal pool indicator species, the level of development within the CTH for both pools remains below 25% and therefore the development complies with the guidelines of the BDP manual.

Several measures imposed under various approvals will protect against the direct loss of wildlife during construction. These include:

1. A condition that all tree clearing will take place from August 16th through April 30th. This will protect the vast majority of nesting birds (and summer roosting bats) from direct impact during the breeding season; and

⁴ Estimated based on the number of singing males.

2. Targeted turtle sweeps prior to construction (after the installation of perimeter exclusion fencing prior to November 1 or after April 1) to search for and remove eastern box turtle (and other low mobility reptiles and amphibians) from the construction area as required in the CTDEEP’s 401 Water Quality Certification Programmatic General Permit (PGP) approval conditions. These sweeps should be conducted according to the protocol outline in the *Box Turtle Protection Plan* (see Appendix C). The PGP required that pre-construction sweeps occur daily for a period of two weeks. However, given the fact that only a single box turtle was observed within the study area, this level of pre-construction effort is excessive. Therefore, it is recommended that an initial survey conducted one day prior to barrier installation, followed by one week (five consecutive days) of sweeps after installation and prior to construction, and periodic sweeps during construction as detailed in the implementation schedule of Appendix C should be a sufficient level of effort to protect against incidental take of box turtle.

Table 3: Potential project impacts to SGCN, CPV Towantic, Woodruff Hill Road, Oxford

Common Name	Scientific Name	CS	Potential Project Impacts
Amphibians			
dusky salamander	<i>Desmognathus fuscus</i>	IM	None predicted; no activity proposed within this species habitat
grey treefrog	<i>Hyla versicolor</i>	IM	Loss of terrestrial non-breeding habitat
wood frog	<i>Rana sylvatica</i>	IM	Loss of terrestrial non-breeding habitat
red-spotted newt	<i>Notophthalmus viridescens</i>	IM	Loss of terrestrial non-breeding habitat
spotted salamander	<i>Ambystoma maculatum</i>	IM	Loss of terrestrial non-breeding habitat
Reptiles			
eastern box turtle	<i>Terrapene carolina</i>	VI, SC	Potential loss of overwintering habitat in the forested portions of the site adjacent to (south) of the Algonquin Gas Line
Birds			
American kestrel	<i>Falco sparverius</i>	MI, SC	None predicted; species was observed as a migrant only
black and white warbler	<i>Mniotilta varia</i>	IM	Loss of mixed hardwood forest breeding habitat
black-billed cuckoo (OS)	<i>Coccyzus erythrophthalmus</i>	VI	Non predicted; species was observed beyond the study area
blue-winged warbler	<i>Dendroica fusca</i>	MI	Loss of lower value old field habitat; high quality habitat present in the adjacent ROW where not disturbance is proposed
brown creeper (OS)	<i>Certhia americana</i>	IM	Non predicted; species was observed beyond the study area
chestnut-sided warbler	<i>Dendroica pensylvanica</i>	VI	None predicted; species was present in the shrubland ROW areas only and not within the portions of the study area proposed for development
eastern towhee	<i>Pipilo erythrophthalmus</i>	VI	Loss of suitable forest/old field ecotone breeding habitat
field sparrow	<i>Spizella pusilla</i>	VI	Loss of suitable old field breeding habitat
indigo bunting	<i>Passerina cyanea</i>	VI	Loss of suitable old field breeding habitat
northern flicker	<i>Colaptes auratus</i>	VI	None predicted; species was observed primarily outside of the areas proposed for development
northern oriole	<i>Icterus galbula</i>	IM	Loss of suitable forest/old field ecotone breeding habitat
ovenbird	<i>Seiurus aurocapillus</i>	IM	Loss of mixed hardwood forest breeding habitat
prairie warbler (OS)	<i>Dendroica discolor</i>	MI	Non predicted; species was observed beyond the study area
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	IM	Loss of mixed hardwood forest breeding habitat
scarlet tanager	<i>Piranga olivacea</i>	VI	Loss of mixed hardwood forest breeding habitat
veery	<i>Catharus fuscescens</i>	IM	Loss of mixed hardwood forest breeding habitat
willow flycatcher	<i>Empidonax traillii</i>	IM	Loss of suitable old field breeding habitat
wood thrush	<i>Hylocichla mustelina</i>	MI	Loss of mixed hardwood forest breeding habitat
woodcock	<i>Scolopax minor</i>	MI	Loss of suitable old field breeding habitat
OS – observed or heard offsite only;			
Wildlife Action Plan Conservation Status (CS): VI – very important; MI – most important; IM – important			
SC – state-listed species of special concern			

While winter tree removal is the best way to reduce direct impacts to the greatest number of species (particularly birds and bats), there is the potential to impact hibernating box turtle which can be crushed by heavy machinery in their hibernacula. The only observed box turtle (female R1), was observed beyond the development area but within approximately 120 feet of the grading limits. Therefore, this turtle may potentially hibernate within the development area.

In order to prevent turtles and other wildlife from entering the site post-construction, it is recommended that the perimeter security fence be buried to a depth of 12 inches and have a maximum mesh size of 2 inches.

The proposed laydown area lies within the CTH habitat of Vernal Pool 1. Installation of erosion and sediment control measures, if installed during the amphibians' inactive period (November to March), should be constructed in a syncopated manner to allow for amphibian passage to the vernal pool during the spring. Post-construction, restoration of forest cover within the laydown areas should be considered to restore habitat for vernal pool indicator species and other forest dwelling wildlife.

The primary impacts associated with a project of this scale are: (1) permanent habitat loss; and (2) temporary disturbance associated with noise from construction activities. With respect to permanent loss of habitat, this is an unavoidable consequence of land development. No mitigation options are available for habitat loss, except for reducing the overall size of the development which is not considered a viable alternative given the scale of the Project. Moreover, based on the results of this study no critical habitats (i.e., rare or unique) or significant populations of rare or notable species will be directly impacted.

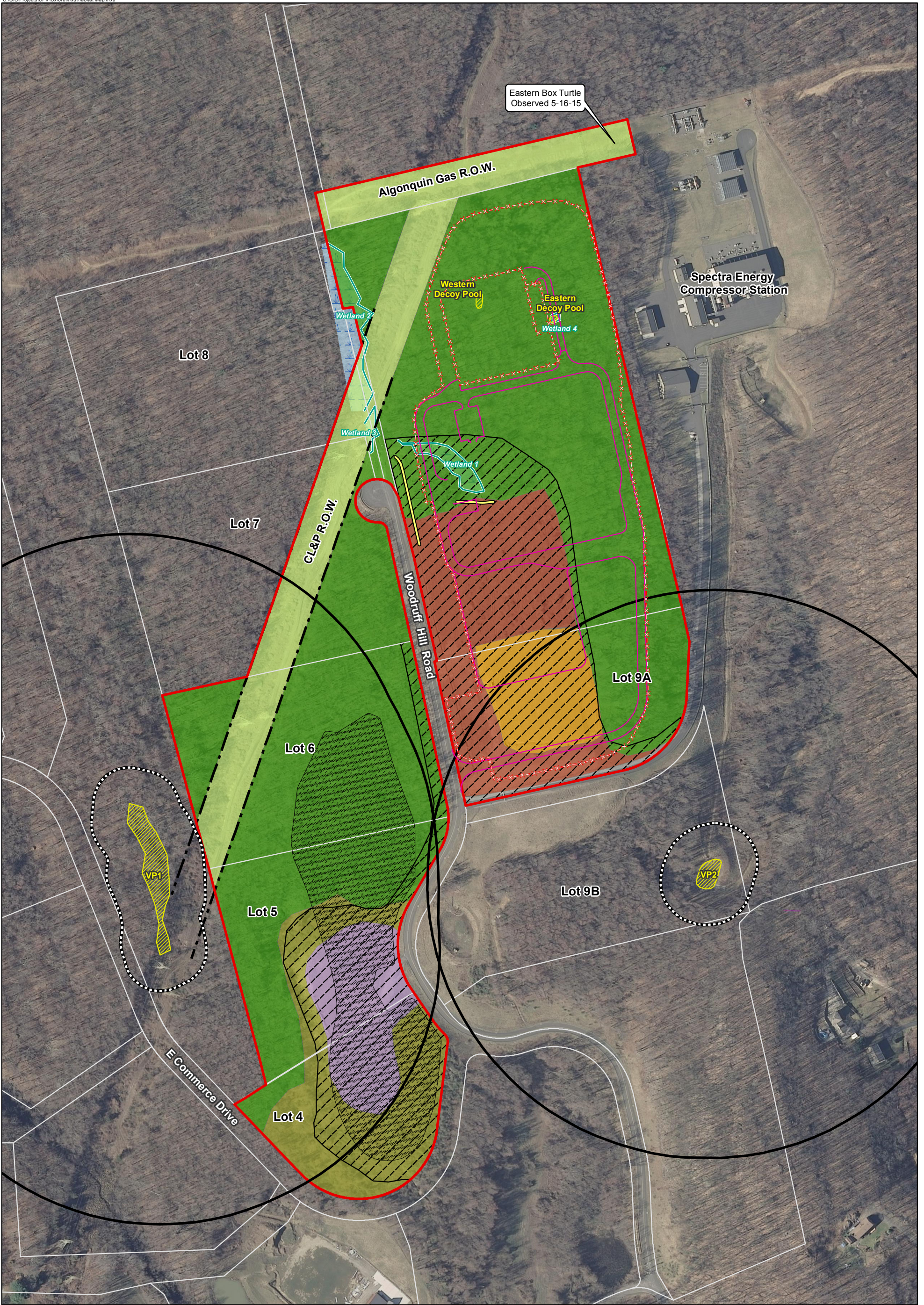
Because of the scale of the project, the noise associated with construction activity may affect wildlife adjacent to the construction area. This is particularly true for species that are intolerant of human disturbance. Such temporal impacts are greatest during the active wildlife season from March through November. Therefore, any activities conducted outside of this season will minimize disturbance to wildlife adjacent to the construction area. Post-construction, the species diversity present within the habitats adjacent to the site would be expected to recover to near pre-construction levels, as has already been demonstrated and observed within habitats surrounding the adjacent Spectra Energy site.

5.0 REFERENCES

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FIGURES

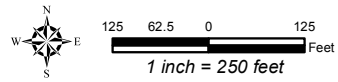
- Wildlife Habitat Map
- Vernal Pool Analysis Map



- Legend**
- Study Area
 - Property Line
 - CL&P 110' R.O.W.
 - Proposed Fence
 - Proposed Access Drive
 - Proposed Laydown Area (+/-6.9 acres)

- Habitat Type**
- Autumn Olive-Dominated Shrubland
 - Early Old Field
 - Early Old Field / Unvegetated
 - Late Old Field
 - Mixed Hardwood Forest
 - Shrubland (managed ROW)
 - Drainage Ditch
 - Delineated Wetland Boundary
 - Wetland Area
 - Vernal Pool
 - 100'-750' Critical Terrestrial Habitat Area
 - 100' Vernal Pool Envelope
 - Disturbed Habitat

Wildlife Habitat Map
 Proposed CPV Towantic Energy Center
 Woodruff Hill Road
 Oxford, Connecticut





Vernal Pool 1 - Total 100'-750' Critical Terrestrial Habitat Area: ±53.61 acres
Proposed Disturbed Area in CTH: ±6 acres

Existing Critical Terrestrial Habitat Areas:

Developed	±0.63 acres	1%
Undeveloped	±52.98 acres	99%

Proposed Critical Terrestrial Habitat Areas:

Developed	±6.63 acres	12%
Undeveloped	±46.98 acres	88%

No Impact to 100' Vernal Pool Envelope (+/-3.3 acres)

Vernal Pool 2 - Total 100'-750' Critical Terrestrial Habitat Area: ±43.43 acres
Proposed Disturbed Area in CTH: ±5.32 acres

Existing Critical Terrestrial Habitat Areas:

Developed	±3.45 acres	8%
Undeveloped	±39.98 acres	92%

Proposed Critical Terrestrial Habitat Areas:

Developed	±8.77 acres	20%
Undeveloped	±34.66 acres	80%

No Impact to 100' Vernal Pool Envelope (+/-1.4 acres)

Legend

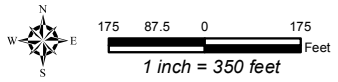
- Study Area
- Property Line
- CL&P 110' R.O.W.
- Proposed Fence
- Proposed Access Drive
- Proposed Laydown Area (+/-6.9 acres)

- Drainage Ditch
- Delineated Wetland Boundary
- Wetland Area
- Vernal Pool
- 100'-750' Critical Terrestrial Habitat Area
- 100' Vernal Pool Envelope

- Existing Critical Terrestrial Habitat Type**
- Developed
 - Undeveloped

Vernal Pool Analysis

Proposed CPV Towantic Energy Center
 Woodruff Hill Road
 Oxford, Connecticut



APPENDIX 1: Habitat Photos



Photo 1: western decoy vernal pool in a dry condition



Photo 2: eastern decoy vernal pool (a.k.a. Wetland 4) in a dry condition



Photo 3: mixed hardwood forest, eastern portion of site



Photo 4: managed Eversource Energy ROW, proposed laydown area Lot 6; note dense vegetation



Photo 5: early old field habitat, southern end of site looking south (historically disturbed)



Photo 6: late old field habitat, north end of site (historically disturbed)



Photo 7: dense autumn olive monoculture, disturbed habitat within Lots 4 and 5



Photo 8: Algonquin Gas ROW where the single eastern box turtle was observed near Spectra Energy



Photo 9: Vernal Pool 1 in April



Photo 10: disturbed and scarified areas of Lots 4 and 5, looking north

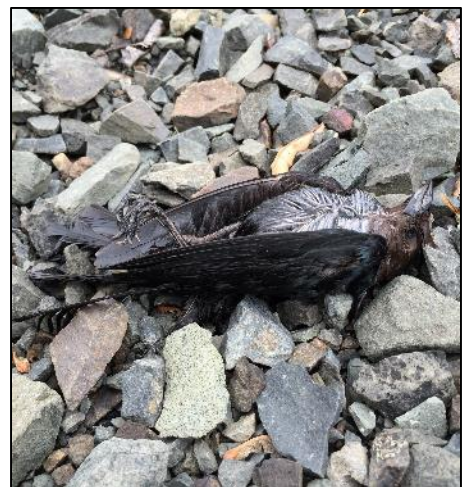
APPENDIX 2: Wildlife Photos



Photos 11-13: four-toed salamander; two-lined salamander (rare xanthic coloration); grey treefrog



Photos 14-16: American toad breeding pool; red-spotted newt (eft phase); eastern box turtle (R1 female)



Photos 17-19: American toad; brown and garter snakes under debris; dead male brown-headed cowbird

APPENDIX 3: Box Turtle Protection Plan

Eastern Box Turtle Protection Plan

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act, is known to occur on or within the vicinity of the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection (“CTDEEP”) Wildlife Division and follow protocols developed from previous rare species consultations and state-approved protection plans. This protection plan is valid until one year from the date of CTDEEP’s letter, which is currently March 12, 2016 although an updated letter would be anticipated following submission of this Wildlife Survey report to CTDEEP, which would establish a new date from which the one-year period would be calculated for additional Natural Diversity Data Base review if construction has not been initiated.

It is of the utmost importance that the Contractor complies with the requirement for the installation of protective measures and the education of its employees and subcontractors performing work on the project site if work will occur during the Eastern Box Turtle’s active period (approximately April 15th to October 15th). Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly and will provide an education session on Eastern Box Turtle prior to the start of construction activities. The Contractor shall contact Eric Davison at least 5 business days prior to the pre-construction meeting. Mr. Davison can be reached by phone at (860) 803-0938 or via email at ericdavison@gmail.com.

The proposed recommended Eastern Box Turtle protection program consists of several components: isolation of the project perimeter; targeted searches of the project area prior to construction, periodic inspection and maintenance of isolation structures; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and reporting.

1. Isolation Measures & Erosion and Sedimentation Controls

- a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. No permanent erosion control products or reinforced silt fence will be used on the CPV Towantic project. Temporary erosion control products will use either erosion control blankets and fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) or netting composed of planar woven natural biodegradable fiber to avoid/minimize wildlife entanglement.
- b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to possible migrating/dispersing herpetofauna, shall be performed by the Contractor following clearing activities and prior to any earthwork. The Environmental Monitor will inspect the work zone area prior to and following erosion control barrier installation to ensure the area is free of eastern box turtles and the barrier is satisfactorily installed. The intent of the barrier is to segregate the majority of the work zone and isolate it from foraging/migrating/dispersing turtles. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs and locations of staging/material storage areas, etc. In those circumstances, the barriers will be positioned to deflect migrating/dispersal routes away from the work zone to minimize potential encounters with turtles.

- c. The fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.
- d. The extent of the barrier fencing will be as shown on the site plans. The Contractor shall have additional barrier fencing should field or construction conditions warrant extending the fencing as directed by Davison Environmental.
- e. No equipment, vehicles or construction materials shall be stored outside of the isolation barrier fencing.
- f. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Contractor Education

- a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of eastern box turtles and emphasizing the non-aggressive nature of these turtles, the absence of need to destroy animals that might be encountered and the need to follow Protective Measures as described in Section 3 below. Workers will also be provided information regarding the identification of other turtle species that could be encountered.
- b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary “false alarms”. Encounters with any species of turtles will be documented.
- c. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report any encounters with eastern box turtle, wood turtle or other turtle species. Educational poster materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

3. Turtle Protective Measures

- a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles.
- b. If a turtle is found, it shall be immediately moved, unharmed, by carefully grasped in both hands, one on each side of the shell, between the turtle’s forelimbs and the hind limbs, and placed just outside of the isolation barrier in the same approximate direction it was walking.
- c. Special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging turtles are not harmed by construction activities.

4. Reporting

- a. Following completion of the construction project, Davison Environmental will provide a summary report to the Connecticut Siting Council and CTDEEP documenting the monitoring and maintenance of the barrier fence and erosion control measures.
- b. Any observations of eastern box turtle will be reported to CTDEEP by Davison Environmental with photo-documentation (if possible) and with specific information on the location and disposition of the animal.

5. 2015 Implementation Schedule

As conditions by the 401 Water Quality Certification issued by CTDEEP (PGP-201409826, dated March 12, 2015), the silt fence exclusion barrier must be installed “prior to the beginning or after the conclusion of the turtle hibernation period November 1 to April 1.” Following installation of the exclusion barrier, CTDEEP requires the construction area be searched for a period of two weeks prior to construction to remove turtles from within the construction limits. However, during the outer limits of this allowed timeframe (either November or April), box turtles are likely to be inactive. Klemens (1993:p192) noted that “box turtle are usually not active prior to late April nor after mid-October”. Therefore, turtle sweeps conducted during either April or October would likely be ineffective. Furthermore, if turtle sweeps were conducted during October and a turtle was re-located from its hibernaculum, the turtle would likely not have sufficient time to re-establish a new hibernaculum prior to a killing frost. Therefore, it is recommended that the exclusion barrier be installed prior to September 15th to allow for more effective search and removal of turtles from the construction zone prior to hibernation. The following implementation schedule is recommended:

1. Installation of silt fence exclusion barrier prior September 15, 2015.
2. Perform five consecutive days of turtle sweeps of the entire construction area after installation of the silt fence exclusion barrier is installed.
3. Bi-weekly inspections of the isolation barrier until box turtle hibernation starts (approximately October 15th).
4. If possible, install the silt fence exclusion barrier prior to September 15, 2015. If the silt fence exclusion barrier cannot be installed on or before September 15th, conduct five consecutive days of turtle surveys of the entire construction area from September 15 through September 20th to locate box turtles staging for hibernation. Any turtles found will be relocated from the construction zone.
5. If the silt fence exclusion barrier is NOT installed on September 20th, turtle surveys may be extended into early October depending upon weather conditions and observations (or reports) of box turtle activity from other sites in Connecticut.
6. April 15th thru October 15th, 2016 & 2017 (assumes construction completed before April 1, 2018) – Contractor will be responsible for daily inspections of the isolation barrier during construction for active box turtle period. Davison Environmental will perform periodic inspections during the turtle’s active season, performing approximately 4 inspections each year.