APPENDIX F – SPECIES INFORMATION

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ECOLOGICAL ASSESSMENT REPORT

KILLINGLY ENERGY CENTER

LAKE ROAD, KILLINGLY, CONNECTICUT

August 2016

Killingly Energy Center
an NTE Energy Project

REMA

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1.0 INTRODUCTION

NTE Connecticut, LLC (NTE) plans to develop the Killingly Energy Center (KEC), an approximately 550-megawatt combined cycle electric generating facility and related electrical interconnection switchyard on an approximately 73-acre site in Killingly, Connecticut (the KEC Site). Approximately 63 acres north of Lake Road will be the location of the generating facility (the Generating Facility Site), and the approximately 10-acre parcel south of Lake Road (the Switchyard Site) will be the location of the associated utility switchyard.

This *Ecological Assessment Report* presents the results of the site-wide inventory of habitats, flora, and fauna, conducted by REMA Ecological Services, LLC (REMA). Specifically, this report describes the various vegetative cover types at the KEC Site, and presents inventory lists of flora and fauna (see Attachments C and E). While wetland and watercourse resources, and their vegetative cover types, are not described in detail in this document,[1] amphibian surveys at the site's man-made pond (i.e., Wetland Unit A1) and at the amphibian breeding pool (a.k.a. vernal pool habitat) embedded within Wetland Unit B are presented and the results discussed in view of the proposed development (see Section 4.0).

Breeding bird studies were conducted at the site using a point census method (see Section 5.0), and targeted searches for two "Connecticut-listed" reptiles, the eastern box turtle (*Terrapene c. carolina*) and the wood turtle (*Glyptemys insculpta*), were also conducted. The avian, amphibian, and reptile surveys, as well as our observations of mammals utilizing the site's habitats were combined into a master wildlife inventory (see Attachment E). Targeted searches for "Connecticut-listed" lepidopterans (i.e., two moth species and a butterfly), were also conducted. The results of that survey, while briefly mentioned and discussed herein, are submitted separately.[2]

Site visits for the purpose of natural resource surveys at the site commenced on February 4, 2016 and were completed on August 3, 2016. Two REMA staff, and one associate, with expertise in botany, wildlife, and entomology logged in excess of 114 hours in the field during the aforementioned nearly six-month period.

[1] A detailed description and inventory of the site's regulated wetlands and watercourses can found in our *Wetlands Report: Existing Conditions*, dated July 2016, and submitted separately.
[2] See Final Report: Invertebrate Survey, dated August 2016.

2.0 PROJECT OVERVIEW

The project area encompasses roughly 73 acres of mostly undeveloped land in Killingly, Connecticut. The site is located west of Alexander Lake and Interstate 395, and few hundred feet south and east of the Quinebaug River (see Figure 1, Attachment A). An Eversource electric transmission right-of-way abuts the site to the south east.

NTE Connecticut, LLC is seeking approvals to develop the Killingly Energy Center (KEC), an approximately 550-MW combined cycle electric generating facility and related electrical interconnection switchyard. At the Generating Facility Site the proposal calls for the disturbance of about 24 acres of mostly wooded uplands. At the Switchyard Site, proposed development will result in the disturbance of approximately 4 acres of land including post-agricultural land and an open field.

3.0 ECOLOGICAL COMMUNITIES

3.1 Regional Context

The Town of Killingly is located within the *Northern Hills - Central Hardwoods - White Pine Zone* of the *Northeast Hills Ecoregion* (Dowhan and Craig 1976).[3] An ecoregion is:

> *"An area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern and the presence or absence of certain indicator species and species groups."*

This interior ecoregion has minimal coastal influence. Bedrock is primarily metamorphic, complexly folded into north-trending belts. Elevations within the region are over 400 feet above mean sea level (asml). Eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) are important evergreen forest constituents, and forests also include many oaks (*Quercus* sp.) and hickories (*Carya* sp.).

[3] Dowhan, J.J. and R.J. Craig. 1976. Rare and endangered species of Connecticut and their habitats. Natural Resources Center, Dept. of Environmental Protection, 137 p.

3.2 Upland Vegetative Cover Types

Plant communities can be classified into *cover types* at any particular site, by considering plant species composition and site characteristics on a scale large enough to integrate minor differences. Whitlock et al. (1994) define a *cover type* as follows:

> *"A portion of a wetland or upland system that contains a uniform plant community composition and structure or that is influenced by one hydrologic regime. A distinct change in either hydrologic or vegetation characteristics indicates a change in cover types*." (Emphasis added.)

The cover type approach of ecosystem classification is well-suited to use as a rapid method of *habitat* survey. This method assumes that *vegetation structure* is a key factor influencing the type of fauna that a vegetation community is able to support. The vegetative *cover types* associated with the overall site are described below.

The upland cover type section complements the narrative already submitted (June 2016) describing cover types in each of the wetland units (i.e., Wetland Units A1, A2, A3, B, C, D, E, and X), and the site's location and landscape setting. This report begins by describing the upland cover types (habitats) used by wildlife on the site. The following report sections present and discuss the results of the pond and vernal pool surveys, the avian and herptile surveys, and general wildlife surveys and assessments of the site. The attachments include vegetative cover type figures, inventories for fauna and flora, as well as selected photographs.

3.2.1 Upland Cover Type Descriptions

Upland cover type descriptions include vegetation structure, plant species composition, soil properties, and other habitat features such as rock outcrops or woody debris. Each cover type is depicted in the A series of the annotated photo-record (see Attachment B). The locations of the cover type units are shown in Figure 2 (see Attachment A). The base map for this figure is an April 2016 aerial photo.

Topographic maps, and summer aerial photographs, were also used to draw cover type boundaries on the map. The 12 mapping units are listed below in Table 1. The letters in the labels for the cover type units on the map correspond to basic categories of vegetation structure (G for grassland, S for shrubland/sapling thicket, and F for Forest).

This is the same type of system used by the Natural Wetland Inventory (NWI) System, and by Metzler and Barrett (2006) in *The Vegetation of Connecticut, A Preliminary Classification.* Modifiers are abbreviations for dominant species, community maturity, or an important habitat feature. They may be combined. For example *UFo* is the map code for oak-dominated upland forest. *UFeo* is the code for a mixed evergreen-hardwood forest, with oaks as the dominant hardwood.

Table 1: Dominant Upland Vegetative Cover Types at KEC Site

Classification	Cover Type Description	Cover Type Mapping Unit*
Grassland	Moist, managed field	**UGm**
	Successional field	**UGs**
	Dry field	**UGd**
Shrub/Sapling Thicket	Deciduous thicket	**USd**
	Evergreen sapling thicket	**USe**
	Japanese knotweed stand	**USj**
Upland Forest	Immature hardwood forest	**UFi**
	Moist deciduous forest	**UFm**
	Moist hemlock forest	**UFmh**
	Highland hemlock forest	**UFh**
	Oak forest	**UFo**
	Moist evergreen-oak forest	**UFeo**

** See Figure 2 (Attachment A)*

The vegetation inventory (see Attachment C) includes all plant species observed and identified, primarily on May 20, May 26, and July 21, 2016. The inventory also indicates whether a species is invasive, and whether it occurs in wetlands or uplands, in forest, shrubland, or grassland. Each species is also assigned to a broad abundance category. Vegetation data were collected predominately by REMA plant ecologist Sigrun Gadwa, supplemented by observations made by ecologist/wildlife biologist George Logan, during avian and herpetological surveys.

Inventory intensity was sufficient to characterize cover types, but some of the late-blooming asters and grasses could not be identified to species. Within large apparently homogeneous upland areas survey routes were spaced far enough apart that infrequent species could have been missed. However, inventory intensity was much more robust

in the areas of the proposed development both on the Generating Facility Site and the Switchyard Site, and less in the areas that would be protected, such as the northwestern ridgeline in the Generating Facility Site or the southern forested section of the Switchyard Site.

3.2.1.1 Grasslands

The grassland cover type currently occupies a small proportion of the site, less than five percent of the site's 73 acres, although the proportion was much higher in the past when the site was actively farmed, based on review of archived aerial photographs. For instance, the 1990 aerial shows roughly 11 acres of the Generating Facility Site and roughly 3.5 acres of the Switchyard Site being open, non-forested habitat. Abandonment of agriculture in most of these areas took place in the early to mid-1980s, except for the two grassy fields, described below, which are still mowed.

Mapping Unit UGm: The two fields on either side of Lake Road, have been regularly maintained by mowing, and soils are level and moist (see Photos A-1, A-2, and A-11 and A-2, Attachment B). The USDA-NRCS soils map does not split the upland field soils out from the adjacent wetland mapping unit. Vegetation is dense and grasses are dominant, including orchard grass (*Dactylis glomerata*), timothy (*Phleum pretense*), deer tongue grass (*Dichanthelium clandestinum*), fescues (*Festuca* sp.) and bent grasses (*Agrostis* sp.). Grasses are intermixed with European madder (*Rubia tinctorum*), common cinquefoil (*Potentilla simplex*), Queen Anne's lace (*Daucus carota*), daisy fleabane (*Erigeron annuus*), common milkweed (*Asclepias syriaca*), and clovers (*Trifolium* sp.).

South of Lake Road, first year seedlings of woody species are also present, along the field edges and some in the field interior as well: white meadowsweet (*Spiraea alba*), black cherry (*Prunus serotine*), white ash (*Fraxinus americana*), and red maple (*Acer rubrum*), and autumn olive (*Elaeagnus umbellata*). The field east of the existing house on the Generating Facility Site is mowed more often, but does have some pasture juniper (*Juniperus communis*). Along field edges, rough-stem (*Solidago rugosa*), tall (*S. altissima*), and grass-leaved goldenrod (*S. graminifolia*), St. John's wort (*Hypericum perforatum*), some golden alexander (*Zizia aurea*), and white vervain (*Verbena urticifolia*) are also present, along with seedlings of invasive Asiatic bittersweet (*Celastrus orbiculatus*) and desirable shade-intolerant shrubs. No yellow-

glooming false indigo (*Baptisia tinctoria)* was observed, the host plant for several state-listed insect species, including the Frosted Elfin (*Callophrys irus*), a butterfly listed as "Threatened." However, two milk snakes (*Lampropeltis Triangulum*) were observed in the southern field.

Mapping Unit UGs: This successional grassland cover type is dominated by forbs rather than grasses (see Photos A-5). The west-most field south of Lake Road, is savannah-like. Expanses of dense, clonal wrinkle-leaved goldenrod (*Solidago rugosa*) grow among low-density clonal, immature black locust trees (*Robinia pseudoacacia*). Minor herbs and vines include common milkweed, white vervain, deer tongue grass, motherwort (*Leonurus cardiaca*), and cow vetch (*Vicia cracca*), clovers, golden alexander (*Zizia aurea*), and virgin's bower (*Clematis virginiana*). Few woody seedlings are becoming established in the stand of dense goldenrod.

Mapping Unit UGd: A non-forested, grassy cover type also occupies much of the dry, infertile hillside between the existing house and the pond (see Photos A-3 and A-4). Fine bladed fescues and bent grasses are dominant, but in portions of these clearings have mats of *Polytrichum* moss, patches of bare soil, and drought-tolerant herbs like Canada cinquefoil (*Potentilla canadensis*), hawkweed (*Hieracium* sp.), and plantain-leaved pussy toes (*Antennaria plantaginifolia*), but no false indigo (*Baptisia tinctoria).* Small insect and mammal burrows were observed in bare soil, and the remains of a turquoise Calosoma beetle (a caterpillar hunter).

3.2.1.2 Shrublands and Sapling Thickets

This successional cover type has developed both north and south of Lake Road as farming operations ceased in a given field, but occupies less than 15 percent of the KEC site. Dense woody thickets, very difficult for people to move through, have a deeply shaded, sparse herb stratum. Three types are readily separated: *USd* (broad-leaf deciduous) and *USe* (dominated by evergreens, mostly white pine. *USj* is a monoculture of Japanese knotweed (*Fallopia japonica*) (technically a 2- to 3- meter tall herb), without any low herb stratum, found southerly of stone-walled barn at the Switchyard Site. Although multiflora rose (*Rosa multiflora*) thickets are widespread in Connecticut, this thorny invasive rose is not common at this site, although it occurs in low abundance in the southern portion of Wetland Unit A2. Thickets provide nesting

and feeding habitat for songbirds, especially those with palatable leaves and ample foliage insects. Catbirds were the most common bird in this cover type.

Mapping Unit USd: Both north and south of Lake Road and next to the fields, soils are moist and fertile (see Photos A-7, A-8 and A-16). Thickets of tall shrubs occupy adjacent former fields. They are dominated by invasive glossy buckthorn (*Frangula alnus*), Morrow's honeysuckle (*Lonicera morrowii*), and autumn olive, intermixed with some native spicebush (*Lindera benzoin*), *highbush blueberry (Vaccinium corymbosum), and saplings of red maple, black locust (Robinia pseudoacacia*), and black cherry *(Prunus serotina*). Vine cover is high, with both Asiatic bittersweet and fox grape (*Vitis labrusca*) present.

The small suite of shade-tolerant herb species is typical of early successional woody communities with moist soil: Swann's sedge (*Carex swanii*), bristly dewberry (*Rubus hispidus*), white avens (*Geum canadense*), Virginia creeper (*Parthenocissus quinquefolia*), bittersweet and Japanese barberry (*Berberis* thunbergii) seedlings, common sorrel, stunted rough-stem goldenrod, occasional garlic mustard (*Alliaria petiolata*), and sensitive fern (*Onoclea sensibilis*) (adjacent to wetland).

North of Lake road, a deciduous woody thicket borders the residential site yard to the west. It does not include buckthorn, but autumn olive and black cherry saplings are both dominants. Saplings of black birch (*Betula lenta*) and red maple are also locally common. Asiatic bittersweet is well established and is overwhelmingly dominant in the sparse herb stratum. Deciduous thicket occurs as a mosaic with white pine thicket on the abandoned fields in this area, north of Lake Road.

Mapping Unit USe: The upland evergreen thicket, is a very low diversity cover type of closely spaced white pine saplings, occupying and abandoned agricultural field in the southwestern section of the Generating Facility Site (see Photos A-13 and A-14). There are many dead branches due to insufficient light. Some trees are pole-size but the overall structure is that of a dense thicket. White pine can seed into idle fields, and form a dense stand of seedlings which matures into an overly dense sapling stand. Soil acidity is higher than in the deciduous thickets, and woody debris is common, lying on the ground, a food source for assorted fungi. Herb cover is sparse. Canada mayflower (*Maianthemum canadense*) is one species that can tolerate ground-level conditions in this cover type. Evergreen thickets do have value for the cover they provide to birds and mammals during inclement weather.

Mapping Unit USj: Japanese knotweed, thrives in the moist, fertile well-drained soil of the former farm fields, south of Lake Road (i.e., Switchyard Site), and has spread to occupy over 2,000 square feet (see Photos A-11 and A-12). Also, the beginning of a knotweed stand was observed between the residential yard and the field to the east, but it only occupies about 100 square feet at this time, and is not yet dense. The extent to which this species excludes other herbs and tree and shrub seedlings is a major reason for its priority invasive status. However, because it tolerates partial shade, it is closely associated with mature sugar maples and the woody other species described for the thicket cover type. Japanese knotweed stands are a productive nectar source in late summer, and do provide dense cover for species such as snakes.

3.2.1.3 Upland Forests

The forest cover type occupies more than 80% of the site. Red maple swamp is a major forest type, already discussed in the *Wetlands Report: Existing Conditions* (June 2016). Aside from species composition, factors separating the different forest types include soil moisture levels, depth to bedrock, and land use history (time since last logging). Several tree species, like black birch and red maple, are common in multiple forest types. Others are indicator species for a particular community, such as eastern hemlock.

Mapping Unit UFm: Lowland forest occupies moist, moderately well-drained soils on the lower slopes of the site's prominent ridges, and adjacent to each of the three wetland systems north of Lake Road (i.e., Wetland Units A2, A3, and B) (see Photos A-20, through A-22). Along Lake Road it also occurs in hedgerows bordering the moist fields or thickets (former fields). Hedgerows include widely spaced sugar maples, white ashes, and shagbark hickories (*Carya ovata*). Valuable habitat features of hedgerows include a few large trees (dens/shelter for bats and other mammals). Old stone walls, and piles of old barn siding or other farm debris, also provide cover for wildlife, including snakes (e.g., brown snake).

Within forests this cover type has a suite of characteristic tree species, including sugar maple (*Acer saccharum*), red maple, shagbark hickory, and black birch, as well as understory trees: ironwood, witch hazel (*Hamamelis virginiana*), shadbush (*Amelanchier* sp.), and pagoda dogwood (*Cornus alternifolia*). Red oak, pin oak (*Q. palustris*), and green ash (*Fraxinus pennsylvanica*) are also occasional. White pine and

hemlock seedlings and small saplings may be common in the understory. At this site, this cover type consists mostly of moderate to small-size trees, under 14 inches diameter-at-breast height (DBH), for example, along the edges of Wetland Unit A2.

Ferns are typically dominant in the herb stratum, hay-scented fern (*Dennstaedtia punctilobula)* and New York fern (*Thelypteris noveboracensis*). The forest floor of second growth forest also has assorted other herbs, like fragrant_bedstraw (*Galium trifidum*), sedges in the "laxi" tribe (Laxiflorae), partridgeberry (*Mitchella repens*), woodland oat grass (*Danthonia spicata*), Jack-in-the-pulpit (*Arisaema triphyllum*), and dwarf ginseng (*Panax trifolius*). Patches of fine-bladed Penn sedge (*Carex pensylvanica*) also grow in some forests, like the western hillside, south of Lake Road. This community is closest to the "sugar maple – New York fern" community described by Metzler and Barrett (2006) in the *Vegetation of Connecticut, A Preliminary Classification*. Uncommon herb species are often found in this cover type, but not at this site, where level to gently sloping, fertile soils had mostly been farmed in the past.

Mapping Units UFo and UFeo: Oak is the dominant deciduous tree genus on the drier hillsides. All four common species are present, northern red (*Quercus rubra*), black (*Q. velutina)*, white (*Q. alba*), and scarlet (*Q. coccinea*). Black birch is also common in this community, and shadbush (*Amelanchier* sp.) is occasional. Some stands consist largely of deciduous trees, mapped as *UFo* (see Photos A-23 through A-26), whereas others are mixed oak and evergreen (mostly white pine) and are mapped as *UFeo* (see Photos A-27 through A-30). Oaks are only of moderate size elsewhere, on the mid to upper slopes of the eastern and western ridges; they were likely logged in the past, and used as pasture until the early 1900s.

A mature example of this mixed white pine-oak (*UFeo*) community occupies the upper slopes of the central hill, between Wetland Units A1/A2, to the east and Wetland Unit A3, to the west. Another mature example of mixed white pine-oak forest occurs on the crest of the western ridge, within the Generating Facility Site, intermixed with hemlock, especially in the sapling stratum.

In the understory of an oak or mixed oak-white pine forest, a suite of ericaceous species (mountain laurel [*Kalmia latifolia*], pink azaleas [*Rhododendron periclymenoides*], huckleberry [*Gaylussacia baccata*], and several low-bush blueberry [*Vaccinium* sp.]) is expected. They do all occur at this site, but are sparser than in

many sites. Species in the sparse herb stratum include spotted wintergreen (*Chimaphila maculata*), Penn sedge, and a few other unidentified sedges, hayscented fern (*Dennstaedtia punctilobula*), Canada mayflower, and Christmas fern (*Polystichum acrostichoides*), and a small panic grass (*Dicanthelium dichotomum*). The understory and herb stratum of a mixed oak-white pine stand is low to moderate in density. In addition to the understory species listed above, white pine saplings are important in the shrub stratum. The hillsides and flat summits supporting these cover types were logged and perhaps grazed in the past. In the *Vegetation of Connecticut, A Preliminary Classification* (Metzler and Barrett 2006) the closest description is that for the *"Northern red oak, black oak, blue ridge blueberry community"*

Mapping Unit UFmh: When mature hemlock is dominant in a lowland forest, as it is on the broad terrace to the west of Wetland Unit A3 (Generating Facility Site), the mapping unit is labeled *UFmh* (see Photo A-32). This is because light levels are lower, and acidic hemlock needles cover the ground, creating a more acidic soil. Herbaceous cover is moderately high, and species include cinnamon fern (*Osmunda cinnamomea*), star flower (*Trientalis borealis*), Canada mayflower, several clubmosses (*Lycopodium* sp.), and bristly dewberry. Red oak, red maple, and white pine commonly grow within lowland hemlock stands.

Mapping Unit UFh: Another cover type dominated by Northern hemlock occupies drier, higher elevation soil on the far western side west side of the site, including some rock outcrops and portions of the summit, as well as upper slopes, and the northwestern plateau (see Photos A-31 and A-33). Oaks and white pine are associated to varying degrees. In areas where hemlock forest forms a dense monoculture, there is little understory other than hemlock seedlings and saplings, but in gaps between the evergreens, the same ferns and wildflowers appear as in the *UFo* unit, described below. Star flower is characteristic.

On a few partly shaded boulders and outcrops, common polypody and evergreen wood fern (*Dryopteris intermedia*) were noted, Penn sedge patches were occasional, and a few forest wildflowers in the lily family were noted: Solomon's seal (*Polygonatum* sp.); false Solomon's seal (*Maianthemum racemosum*); and Canada mayflower. Overhangs, crevices, and cliff faces are in themselves habitat features of this cover type, too widely dispersed to map separately, but important for fauna and for mosses and lichens. Where the bedrock is acidic and crystalline, as it is at this site, the

Connecticut Department of Energy and Environmental Protection (CTDEEP) classifies sunny open rock outcrops as critical habitats, but not shaded rocky habitats (this is in contrast to rocky habitats on sub-acidic basalt or limestone rocks, which are classified as critical habitats). The low herbaceous diversity observed on the shaded outcrops of the eastern and western ridges is consistent with this cover type not meeting the classification criteria for a critical habitat.

Mapping Unit UFi: This cover type consists of immature forest, at the "pole" stage, with trees under 8 inches in diameter, growing in areas that were fields 30 years ago (e.g., per the 1986 CTDEEP aerial photo), such as the rectangular area to the west of Wetland Unit A2 (see Photos A-17). Most stands have a relatively uniform structure, with most trees the same age. The herb stratum is similar to that described for the thicket cover type, with laxi sedges (*Carex plantaginea*), Swann's sedge, white avens, Virginia creeper, garlic mustard, and hay-scented fern. Red maples and black birches are dominant because they are efficient colonizers of fields, but sugar maple, and oaks and white pines are present as well. The proportion of invasives is much lower in the immature forests in the northern portion of the site, than in the thicket cover type, near Lake Road at the Generating Facility Site. The moist, immature forest at the base of the northwestern hill (the location of the cemetery) also has few invasive shrub and vine species.

3.3 Discussion

From a habitat standpoint, upland vegetation at this site provides varied structure, from dense thickets to mature white pine/oak forest, with a substantial evergreen component, and ample rocky habitat features. The upland habitats complement the diverse wetland habitats discussed in the *Wetlands Report: Existing Conditions* (June 2016), and it supports good avian diversity. However, none of the upland habitats reviewed is in itself a noteworthy vegetation community, with significant uncommon to rare species, or the potential for them. As noted above, the rock outcrops on the ridges have sparse herbs because they are largely shaded by trees (i.e., *UFo*, *UFh*, and *UFeo*). Shaded rock outcrops are not regarded as a CTDEEP critical habitat, with elevated likelihood of rare species. REMA noted that, as discussed in *Natural Disturbance and Patch Dynamics* (Picket and White 1985), some uncommon plant species, such as marginal wood fern (*Dryopteris marginalis*), were persisting on the small rocky gaps of the eastern ridge, presumably by means of gap colonization following small-scale

disturbances. However, normal forest diversity has not recovered in the maturing forests, following large scale disturbance by past farming, logging, and rock-quarrying. The viburnums, ericaceous species, and even dogwoods, are sparser than expected.

4.0 POND & VERNAL POOL SURVEYS

4.1 Overview

Two potential amphibian breeding areas were identified in February of 2016, during initial reconnaissance field investigations at the KEC Site. Specifically, these were the man-made pond (i.e., Wetland Unit A2), and a small flooded portion of Wetland Unit B (see Figure 2, Attachment A).

Investigations at the man-made pond began on February 4, and again on February 19, 2016, when it was still covered with ice (see Photos B-1, B-9 through B-13, Attachment B). During the surveys, smallmouth bass (*Micropterus dolomieu*), a few large tadpoles (i.e., green frog [*Lithobates clamitans*]), and a variety of aquatic invertebrates were identified.

REMA returned to the pond on March 11, 2016, because movement of wood frogs (*Lithobates sylvaticus*) to other amphibian breeding habitats had been documented in the region. However, no amphibian breeding activity was observed (see Photo B-2).

In the early evening of March 24, 2016, six minnow traps were set at the man-made pond. These were placed in a variety of microhabitats within the pond, including an area on the western shore with much submerged large woody debris (LWD). These traps were pulled out the next morning (i.e., March 25, 2016) and their contents were examined (see Photos B-15 through B-20). In all, 73 smallmouth bass were trapped, ranging from about 1.5 to 2.75 inches in length (total length: snout to tail). In addition, one backswimmer (*Notonecta sp.*) was trapped. The size of the minnow trap entrance hole would not allow larger fish to enter, but two or three larger adult fish, presumably also smallmouth bass, were observed on several occasions. No amphibian egg masses had been observed to date, but two spring peepers (*Pseudacris c. crucifer*) were heard calling from the pond. On March 31, 2016, no amphibian egg masses were observed during a perimeter viewing of the pond.

On April 13, 2016, a formal count of egg masses took place at the two amphibian breeding pools. The small embedded vernal pool habitat within Wetland Unit B held up to 12 inches of water at the time of the survey. The survey was conducted at the edge of the pool, without entering its core due to the presence of over 3 feet of organics. However, the water was very clear, not covered with pollen, and conditions were optimal for an egg mass count. A raft of 25-30 wood frog egg masses was observed in 9 to 10 inches of water, while five more egg masses were found in a couple of other locations. All of the wood frogs had hatched and most of the larvae were still present at or near the hatched egg masses (i.e., foraging had not begun). Additionally, a total of 22 spotted salamander (*Ambystoma maculatum*) egg masses were observed in two distinct clusters in about 8 to 9 inches of water (see Photos B-23 through B-25, Attachment B). Several spring peepers were observed at the breeding pool during the survey.

The man-made pond was also investigated from its perimeter on the same date (i.e., April 13, 2016) as the survey at the Wetland Unit B breeding pool. A filamentous alga bloom somewhat obscured potential egg masses, but a minimum of 18 spotted salamander egg masses were counted. No wood frog egg masses were observed (see Photos B-21 and B-22).

REMA returned to the KEC Site on May 4, 2016, to again count spotted salamander egg masses at the man-made pond, while floating with a kayak, in order to not disturb the silty/organic substrate, which would obscure any egg masses. Most of the egg masses previously observed could not be found, and the few that were found had been predated, presumably by fish, or other predaceous invertebrates (see Photos B-28 through B-30). REMA also visited Wetland Unit B's vernal pool habitat and recounted the spotted salamander egg masses (see Photos B-26, and B-27). One additional egg mass was found, likely missed during the April 13, 2016 survey. The wood frog hatchlings had dispersed throughout the pool and were observed feeding.

The man-made pond was visited on May 20, and June 4, 2016, but no additional herptile activity was observed, except for a few spring peepers neomorphs at the pond perimeter (see Photo D-8). Also, gray tree frogs (*Hyla versicolor*) were heard calling near the pond, but also throughout the KEC Site, near wetlands. In the evening of June

12, 2016[4], a flashlight survey of the pond was conducted and five minnow traps were set. During the survey five adult smallmouth bass (size class: +/- 5 to 7 inches), several adult and juvenile green frogs, and seven crayfish (*Cambarus* sp.) (size class: +/- 3 to 5 inches) were observed. The following morning (June 13, 2016), the minnow traps were pulled. Thirty-seven smallmouth bass and one bull frog (*Lithobates catesbeianus*) tadpole had been trapped.

By the next visit to the KEC Site on July 21, 2016, for the purpose of observing the amphibian breeding habitats, the embedded vernal pool at Wetland Unit B, was not found with any inundation. Wood frog neomorphs would be expected to have emerged from this pool before the pool went "dry," based on typical wood frog reproductive behavior, and observations at other pools with similar hydroperiods in the region, which also had dried up by the end of June of 2016. However, due to the moderate-drought that was experienced in May through July 2016 in the region, it is not likely that this was a successful reproductive year for spotted salamanders, except in semi-permanent pools or pools with more than 2 feet of seasonal inundation.

During the amphibian breeding pool investigations, an off-site pool was encountered. This is a small, fishless impoundment, of the seasonal stream that flows out of Wetland Unit B. This small pond, holds up to three feet of water, and is about 100 feet upstream of the Quinebaug River, and about 400 feet downstream of the KEC Site. On March 25, 2016, about 20 wood frog egg masses were observed via a perimeter survey, but no spotted salamanders (see Photos B-14 and B-31). It is possible that spotted salamanders laid egg masses at this pond in April, but no further surveys were performed to confirm.

4.2 Discussion

The embedded vernal pool habitat of Wetland Unit B is the only viable on-site habitat for the breeding and reproduction of wood frogs and spotted salamanders, which are considered obligate "vernal pool" amphibians. While spotted salamander egg masses were observed at the man-made pond (i.e., Wetland Unit A1), predation by fish, green and bullfrogs, and other predators (e.g., crayfish), preclude successful reproduction. In fact, the pond is an "ecological sink" or "trap," which due to the surrounding suitable

[4] This was also the night when an owl call-back survey was conducted (see section on avian surveys).

terrestrial habitat and the favorable hydroperiod attracts spotted salamanders to a poor quality habitat for breeding, with only a slight possibility of reproductive success. However, the pond appears to be suitable breeding habitat for green frogs, to a lesser extent for bull frogs, and also to spring peepers.

The Wetland Unit B embedded vernal pool habitat, does not appear to have optimal hydrology for the reproduction of spotted salamanders, yet even if reproduction fails every other year for these mole salamanders, a sizeable population will persist at the Generating Facility Site, and its environs, for these long-lived amphibians[5].

Development will not encroach more than about 430 feet from the edge of the vernal pool habitat in Wetland Unit B, as measured from the toe of the proposed fill slope, for the electric generation facility. A significant amount of suitable terrestrial habitat will remain in the vicinity of this breeding habitat for the terrestrial phase for both of the obligate vernal pool amphibians. Dispersal and connectivity corridors will remain significantly intact, including connectivity with the documented off-site vernal pool habitat, thus continuing to support metapopulations dynamics.

5.0 AVIAN SURVEYS

5.1 Overview

Avian diversity at the KEC Site was assessed using several methodologies. First, the point-census method of inventory was employed, following a protocol for breeding bird surveys often used in Connecticut (i.e., Modified Ontario Method). The point census took place during early mornings in June 2016. Second, an owl call-back survey was conducted during evening hours, also in June 2016. Third, avians were inventoried by REMA staff during multiple visits, while gathering baseline natural resource data, and during the delineation of wetland boundaries, at the beginning of the 2016 growing season. While the bulk of breeding bird surveys took place during June 2016, avians were observed at the KEC Site during a sixth month period (February to July), and included early spring migrants.

[5] Adult spotted salamanders live 15 to 20 years, with some recorded as old as 30 years.

5.2 Breeding Bird Survey

5.2.1 Introduction

At the KEC Site, breeding bird diversity and relative abundance was measured using a point count census. Point counts have become one of the standard methods for counting birds (Hagan et al. 1997).[6] The specific method used at the KEC Site was adapted from the CTDEEP protocol for forest bird surveys. The CTDEEP surveys are based on standard procedures developed by Daniel Welsh[7] of the Canadian Wildlife Service. This point count method (called the Ontario Method) is being used in large-scale monitoring programs for forest birds in Ontario, Canada, and throughout the Northeast, including Connecticut.

While the Ontario Method is used to survey large tracts of forestland, it can also be successfully adapted for use with any habitat type and habitat size as long as the standardized procedures are used. Thus, researchers can to a certain degree compare the results to those from other parts of the State or other parts of the country.

5.2.2 Procedures

Several points along one or more transect are established in such a way that the area of interest can be covered spatially and qualitatively (i.e., covering all habitat types). Points are typically not closer than 250 to 300 feet from each other. When forest-interior birds are being surveyed the Ontario Method calls for each point to be at least 100 meters (i.e., 330 feet) from an edge habitat or from open water, but this is not possible in all areas that are surveyed.

Each point is surveyed according to the following procedures:

1. The point is visited early in the morning. All surveys are completed between 5:30 and 9:30 a.m. If feasible, one survey takes place in the first half of this period (5:30 - 7:30), and the other in the second half (7:30 – 9:30).

[6] Hagan, J.M., McKinley, P.S., Meehan, A.L., and Grove, S.L. 1997. Diversity and abundance of landbirds in a northeastern industrial forest. J. Wildl. Manag. 61: 718-735)
[7] Welsh, D.A. 1995. An overview of the forest bird monitoring program in Ontario, Canada. USDA Forest Service Gen. Tech. Rep. PSW-GTR-149.

2. The point is visited twice during the breeding season. Preferably, both visits are in June after the passage of migrants and before the frequency of singing declines markedly. Every attempt is made for one visit to be between June 1 and June 15 and the other between June 16 and June 30. Visits to the same survey point are spaced by at least 6 to 8 days. No survey takes place after July 15, since in a normal year most birds are not defending territories in late July and August.

3. Surveys are not conducted when weather conditions substantially reduce the number of birds that are detected. Counts are not attempted when it is raining or when there are strong winds.

4. Counts may begin as soon as the observer reaches the point, but a three-to-four-minute acclimation period is typically observed to reduce observer influence on birds.

5. A compass is used to orient the data sheet (see example in Attachment D) so that the top of the sheet is facing at a known direction.

6. All birds heard or seen are counted during a 10-minute observation period. A stopwatch is used to time observations, and the starting time is marked on the data sheet. Weather conditions and temperature are recorded on the data sheet after the 10-minute observation period.

7. The relative positions of birds are mapped on the standard data sheet (see Attachment D). Locations and movements are indicated over the course of the observation period.

8. The species of each individual are indicated using standard AOU codes (e.g., AMCR for American Crow).

9. The positions of the birds in the first and second halves of the observation period shall be recorded. This helps to track the movements of individual birds so that they are not double counted. Birds that are heard or seen during the first half of the observation period shall be indicated with the superscript "1." Birds that are heard or seen during the second half of the observation period shall be indicated with the superscript "2."

10. Whenever two or more individuals of the same species are observed together this is indicated using standard symbols provided in the data sheet. Also, the appropriate symbols are used that distinguish males, females, singing and non-singing birds, territorial disputes and other information.

11. Only one observer at a time shall record observations. This helps the observer to track individual birds.

While this method provides more objective information, than would be gained during informal observations, and useable results on diversity and relative abundance of breeding birds, certain limitations to this methodology remain:

1. The tallies are only a relative measure of bird abundance and do not express the total population of birds using a given area, just the number that was counted during a time interval.

2. Comparing one species with another can be problematic, because some species have different detention rates. For example, quiet and shy species are harder to see or hear.

3. The method tallies birds without doing much to distinguish individuals. For instance, if the data show that 25 rose-breasted grosbeaks were detected during the first and second dates in June, it does not mean that these were the same individuals.

5.2.3 Results

In all, 14 avian census points (i.e., AP-1 through AP-14) were established at the KEC Site (see Figure 3, Attachment A; see Photos C-1 through C-14, Attachment B). The majority (i.e., 12 points) were set up at the Generating Facility Site, while two points were established at the Switchyard Site. Of the total points, eight (i.e., AP-1 through AP-6, AP-13, and AP-14) were located in habitats that would be cleared for the proposed development of the site. The coverage of avian census points was complete enough to characterize sufficiently breeding avian usage of the entire site, with a possible exception of the northernmost section.[8]

The surveys were conducted at least twice at each of the established points, on three separate dates. On June 4, 2016, surveys took place at eight of the avian census points between 5:57 a.m. and 8:11 a.m. On June 10, 2016, all 14 points were visited between 5:58 a.m. and 8:17 a.m.[9] Finally, on June 19, 2016, breeding birds were counted at eight points between 6:12 a.m. and 8:30 a.m. The weather was suitable for avian point counts on all of the June 2016 dates.

[8] It is estimated that the area with low coverage is roughly 4.5 acres in size.
[9] On June 10th, 2016, George Logan of REMA was assisted by field biologist Jonathan Trouern-Trend, who also conducted the lepidopteran surveys for REMA at this site. Mr. Trouern-Trend also completed the avian surveys on June 19th, 2016.

Table A (see Attachment D) compiles all of the data from the breeding bird survey using the Ontario Method at the KEC Site.[10] It also includes all other birds observed during five site visits spanning June 4, to June 19, 2016, but not while conducting surveys at the 14 established points. Attachment D also includes a bar graph depicting avian usage at the site, with notes on the most abundant and most notable species. In all, 582 individual bird observations were made of 72 species.

As seen on the aforementioned bar graph, the most abundant bird species at the KEC Site, and specifically the Generating Facility Site, is the ovenbird (*Seiurus aurocapilla*) (see Photo C-17, Attachment B), with 60 total observations, almost twice as many as the next most abundant species, the blue jay (*Cyanocitta cristata*). Both of these species have two of the loudest songs and vocalizations of breeding birds in Connecticut, which may partially be responsible for the high numbers in the survey. These two bird species also illustrate the Generating Facility Site's habitats. The ovenbird is a denizen of closed-canopy forests, while blue jays prefer forest edges and do not venture deep into maturing forest. The first is considered a forest interior specialist, while the blue jay is a forest edge generalist. The KEC Site is characterized both by maturing forest and by forest edges.

Two different groups of birds emerge from the data. The first is comprised of seven species that make up 151 of the 582 individual bird sightings (i.e., 25.9%). These are considered amongst the most abundant bird species in Connecticut (Bevier 1994)[11]: mourning dove (*Zenaida macroura*), blue jay, American crow (*Corvus brachyrhynchos*), black-capped chickadee (*Poecile atricapillus*), American robin (*Turdus migratorius*), and northern cardinal (*Cardinalis cardinalis*). They are species that are well adapted to a variety of habitats, including forest edges, small woodlots, rural landscapes, and suburbia.

The second group is composed of four species that make up 134 of the 582 individual bird sightings (i.e., 23.0%). These are all considered forest-interior bird species: red-eyed vireo (*Vireo olivaceous*), wood thrush (*Hylocichla mustelina*), ovenbird, and scarlet tanager (*Piranga olivacea*). These species are well adapted to forest interiors

[10] With the exception of one example of the Point Count Location Mapping data sheet (see Attachment C) the other field data sheets are not included. They can be provided upon request.
[11] Bevier, L.R. 1994. The Atlas of Breeding Birds in Connecticut. State Geological and Natural History Survey of Connecticut. Department of Environmental Protection. Bulletin No. 113.

and are not often found in small woodlots. They are sensitive to parasitism by brown-headed cowbirds (*Molothrus ater*), also observed at the site, which are typically found at forest edges. Thus these forest-interior birds are most often found several hundred feet away from forest edges, in deeper woods, and are somewhat sensitive to habitat fragmentation.

5.3 Owl Call-back Survey

In the evening of June 12, 2016, REMA conducted an "owl-call back survey," at two stations, one at the Generating Facility Site, and one at the Switchyard Site (see Figure 3, Attachment A). The surveys were conducted between a half an hour after sunset and a half hour before midnight.

Some of the methodologies put forth in Takats et al. (2001)[12] were employed, including silent listening and playback. At each station a period of silent listening (roughly 10 minutes) preceded broadcasting recordings of owl vocalizations. Playback used digital recordings (Audubon Birds Pro), played through a Bose SoundLink Mini II Wireless Speaker, which produces clear and loud sound without distortion.

Three 12-minute periods of alternating broadcasts and silent listening were used, for each of the three possible owl species, starting with the smaller eastern screech owl (*Megascops asio*), then the barred owl (*Strix varia*), and finally, the great-horned owl (*Bubo virginianus*).

At the Generating Facility Site, REMA confirmed the presence of a breeding pair of barred owls. These had been heard vocalizing in the woods (i.e., Wetland Unit A3) as early as February of 2016, and had been also sighted at the small man-made pond (Wetland Unit A1) in May and June. At the Switchyard Site REMA observed one eastern screech owl, within the southern wooded section, adjacent to the Eversource electric transmission right-of-way.

[12] Takats, D.L, C.M Francis, G.L. Holroyd, J.R. Duncan, K.M Mazur, R.J. Cannings, W. Harris, D. Holt. 2001. Guidelines for Nocturnal Owl Monitoring in North America. Beaverhill Bird Observatory and Bird Studies Canada, Edmonton, Alberta. 32 pp.

5.4 Discussion

The clearing of woodland at the Generating Facility Site, will decrease the abundance of forest-interior bird species, such as wood thrush, ovenbird, scarlet tanager, veery (*Catharus fuscescens*), Louisiana waterthrush (*Parkesia motacilla*), and black-throated green warbler (*Setophaga virens*). The new forest edge created by the proposed development shall also push the zone of influence by the parasitic brown-headed cowbird further into the interior of the Generating Facility Site's upland and wetland forested habitats. However, the northern and northwestern sections of the site, which includes the western bedrock dominated ridge, as well as the eastern forested ridge, will continue to provide suitable habitat for all the aforementioned species, with the possible exception of the Louisiana waterthrush, a wetland-depended species, observed breeding within Wetland Unit A3, which may be displaced.[13]

From a regional perspective all of the forest-interior species observed at the site, as well as other forest and forest edge specialists such as eastern wood pewee (*Contopus virens*), rose-breasted grosbeak (*Pheucticus ludovicianus*), and pine warbler (*Setophaga pinus*), are secure within their Connecticut range. None of these species are "listed" in Connecticut (i.e., endangered, threatened, special concern), and their IUCN[14] conservation status is "Least Concern" (LC). Moreover, within close proximity to the KEC Site, even immediately to the west, but also to the west of the Quinebaug River, are hundreds of acres of protected or undeveloped forest land with much interior or "core" forest, which undoubtedly support all of the forest-interior avians observed at the site. This includes the Natchaug State forest (see Figure 4, Attachment A).

6.0 LISTED SPECIES

6.1 Overview

In a response to a query of the CTDEEP Natural Diversity Database (NDDB), dated March 8, 2016, several species were identified as potentially occurring at the KEC Site

[13] REMA has observed this species in several riparian habitats in Connecticut, which would not be considered "core" forested habitat (i.e., small woodlots). However, actual fledgling activity, observed at the KEC Site, was not observed at some of these smaller woodlots, with disturbance nearby.
[14] International Union for Conservation of Nature.

or the immediate vicinity. The CTDEEP list included three invertebrate species (i.e., one butterfly and two moths),[15] as well as three vertebrate species. These are the wood turtle, the eastern box turtle (*Terrapene c. carolina*), and the Red bat (*Lasiurus borealis*), all Species of Special Concern.

An acoustic bat survey was conducted by Tetra Tech wildlife biologists, targeting the federally and state-listed northern long-eared bat (*Myotis septentrionalis*) (NLEB). While NLEB was not detected, several other bat species were detected as potentially foraging or roosting at the site. Of the five bat species detected, four species – the eastern red bat, hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and little brown bat (*Myotis lucifugus*) – are "listed" in Connecticut. Based on the presence of the "Connecticut-listed" bat species at the site the Tetra Tech report recommends that tree clearing at the KEC Site not occur in the months of June and July in order to avoid the pup season for the bat species.

One Connecticut *Species of Special Concern*, the broad-winged hawk (*Buteo platypterus*), was observed by REMA at the site. The sightings were on separate days and in separate areas. One sighting was at the Switchyard Site, within the deciduous forest to the southwest of Wetland Unit D, while the other was just off-site, about 80 to 100 feet to the west of the Generating Facility Site's western property boundary, again in predominately deciduous forest.

Broad-winged hawks are often observed within wetlands and riparian areas, feeding on a variety of prey: small birds, amphibians, and a variety of insects, and they are typically found in large blocks of unfragmented habitat, such as that at this site and its environs. However, no indication of nesting was encountered within the KEC Site. With the abundance of suitable habitat in the vicinity of the site, and also remaining, post-development, with the site, breeding habitat for this species is secure.

[15] The results of a lepidopteran survey conducted by REMA associate Jonathan Trouern-Trend, dated August 2016, is submitted separately. It concludes that no State-listed lipedopterans occur at the KEC Site.

6.2 Reptile Surveys

6.2.1 Overview

REMA conducted reptile surveys at the KEC Site including targeted searches for the two "Connecticut-listed" reptiles (i.e., wood turtle, Eastern box turtle) that have been documented by the CTDEEP as potentially occurring in the site vicinity.

Cover searches for reptiles, including the aforementioned turtle species, took place at the KEC Site in the morning hours of May 26, June 10 and June 13, 2016. Also, off-site cover searches, specifically targeting wood turtle, were conducted in the afternoon of July 21, 2016, along the Quinebaug River riparian corridor.

The "listed" turtles were not encountered at the site or its immediate vicinity[16]. However, other reptiles, particularly snake species, were encountered at the KEC Site, including milk snake (*Lampropeltis t. triangulum*), brown snake (*Storeria dekayi*), and ring-neck snake (*Diadophis punctatus edwardsii*) (see Photos D-8 and D-11).

6.2.2 Eastern Box Turtle (Terrapene c. carolina)

Habitat on this site is suitable for eastern box turtle, particularly the eastern forested ridge at the Generating Facility Site, and the woods immediately adjacent to Wetland Units A1 and A2 and also adjacent to the eastern portions of Wetland Unit A3 (see Figure 2, Attachment A). Most of the Switchyard Site contains suitable habitat for this species. The maintained Eversource electric transmission right-of-way in close proximity to the KEC Site, increases the likelihood that box turtles utilize the subject site.

This omnivorous species with a patterned, orange, yellow, or tan carapace forages in both forested, meadow, and scrub-shrub habitats, although it is most often observed in open habitats, along field edges and power lines. Box turtles feed on a variety of invertebrates, fungi, and some plant matter, especially berries. Invertebrates are plentiful under forest leaf litter. Moist or mesic habitats are preferred. More ground-level food is typically available in moist habitats, especially snails, a preferred food.

[16] At the Switchyard Site, cover searching extended into the Eversource electric transmission right of way, immediately off-site and to the east.

Because box turtles are sensitive to desiccation (physiologically they are more similar to an aquatic turtle), foraging in dry habitats is typically limited to the dewy morning hours in hot weather, and they often rest in the shade of a shrub during the midday period.

Hibernation occurs in a variety of places, including soft wetland or transitional soils, crevices between rocks, rotting stumps, and burrows in sandy soils (Dodd 2001[17], Claussen 1991[18], and unpublished recent data from Southern CT State University). During hot summer spells they will typically rest in moist "forms" under leaf litter or buried in topsoil, with perhaps only the head visible.

Home ranges are well-defined and quite variable in size and shape (Dodd 2001) based on radio-telemetry studies, mark recapture, and thread tracking studies. The core foraging area may be less than an acre in size, although they make exploratory forays, and travel longer distances to nesting areas and hibernation sites. Home range diameters of males in the Maryland study by Olson (1989)[19] study averaged 100.6 meters (i.e., 332 feet), that of females 112.8 meters (i.e., 372 feet). Turtles may also leave a core foraging range to travel to a choice season foraging area such as a mulberry tree dropping its fruit or a field of wild strawberries.

This is a "Special Concern" species because many formerly robust Connecticut populations are either extinct or remnants. Box turtles are long-lived in a natural setting, typically over 45 years and up to 100 years, but juvenile and egg survivorship is low, egg clutches are small, and egg fertility is low. Although they can typically meet their foraging needs in a moderately fragmented landscape, adult mortality rates increase, due to road kill, mower kill, and other causes.

Assessment: Based on the moderate level of search effort under favorable conditions, REMA concludes that it is *likely* that eastern box turtles occur at site, given the availability of habitats and the landscape context.

[17] Dodd, C.K., Jr. 2001. North American Box Turtles: A Natural History. University of Oklahoma Press.
[18] Claussen, D.L., M.P. Daniel, S. Jiang, and N. A. Adams. 1991. Hibernation in the Eastern Box Turtle (*Terrapene c. carolina*) J. of Herpetology. 25: 334-341.
[19] Olson, R. E. 1989. Notes on evaporative water loss in terrestrial chelonians. Bull. Maryland Herpetological Society. 25: 49-57.

6.2.3 Wood Turtle (Glyptemys insculpta)

Wood turtles are always found in association with riparian habitats, more often large perennial streams and rivers, which are bordered by forest and open meadows (Klemens 1993).[20] Wood turtles are wide-ranging, in their terrestrial phase with large riparian buffer needs, using upland forest, wetland forest, as well as shrubland and wet meadow. For example, a Wisconsin study by Harding and Bloomer (1979)[21] documented overland movement of 150 meters (495 feet) from the stream; REMA's own Connecticut field survey work of wood turtles found even further (over 900 feet) from the trunk watercourse, for example a nesting wood turtle in Meriden, about 950 feet east of Broad Brook Reservoir. Especially due to their propensity to roam far afield from their home watercourse, wood turtles are vulnerable to roadkill and pet collection.

At the KEC Site, the core habitat for wood turtle is located off-site to the west and northwest, along the Quinebaug River riparian corridor (see Photos D-1 through D-6, Attachment B). While suitable terrestrial habitat exists at the site, such as deciduous woods and open field, local topography greatly inhibits connectivity between the Quinebaug River habitats and those of the site. The Generating Facility Site's prominent western ridge blocks movement of wood turtles. Moreover, slopes immediately to the east of the Quinebaug River are too steep for wood turtle passage (see Photo D-4).

Assessment: Based on the moderate level of search effort under favorable conditions, REMA concludes that it is *not likely* that wood turtles occur at site, given the availability of habitats, and local topography.

[20] Klemens M.W. 1993. Amphibians and Reptiles of Connecticut and Adjacent Regions. State Geological and Natural History Survey of Connecticut. Bulletin No. 112.
[21] Harding J.H. and T.J. Bloomer. 1979. The wood turtle, *Clemmys insculpta*… a Natural History. Herp. Bulletin NY Herpetological Society. 15(1):9-26.

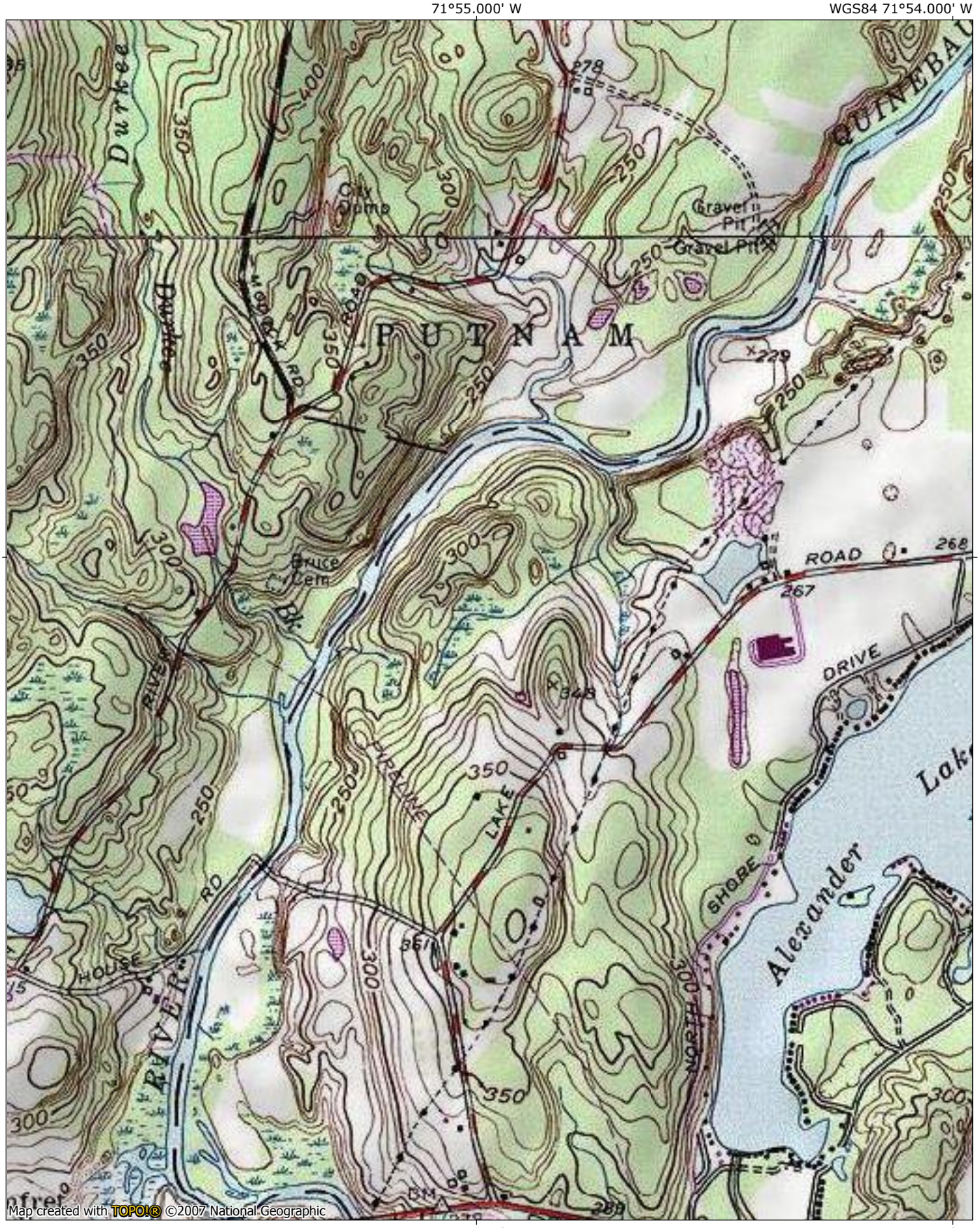
7.0 WILDLIFE INVENTORY

This section of the report synthesizes the avian, amphibian, and reptile surveys at the KEC Site, with observations made of mammal species, in the course of six months-worth of site visits, collecting baseline natural resources data. Mammal species were not specifically targeted. A full inventory would have required live trapping, which is beyond the scope of the natural resources inventories for the site. Even so, enough sign was available to produce a clear picture of mammal use at the KEC Site.

The resulting Wildlife Inventory (see Attachment E) not only lists the 109 vertebrate species observed at the site, but also lists another 44 *probable* and *possible* breeders and users of the KEC Site, based on known regional distributions, breeding bird surveys conducted in a neighboring municipality (i.e., Woodstock), and the presence and quality of habitat types and specific habitat requirements for all possible wildlife species.

ATTACHMENT A: Figures

Figure 1: Site Locus; 189 Lake Road, Killingly, CT



PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 8-8-16 ***SCALE***: NTS

Proposed Fence (Typ.)

WETLAND D

WETLAND A1

Wetland Boundary (Typ.)

WETLAND A2

WETLAND A3

WETLAND B

Cover Type ID (Typ.) (see Table 1, Ecological Assessment Report)

Permanent Disturbance Line (Typ.)

UGm
USd
UFm
UGm
USd
USe
UFi
USj
UFo
UGd
USd
USe
UFm
UFeo
USe
USd
UFeo
UFo
USe
UFm
USd
UFi
USe
USd
UFmh
UFo
UFi
UFm
UFeo
UFeo (m)
UFmh
UFeo (m)
UFo
UFh
UFeo
UFm
UFmh

N

FIGURE 3: Vegetative Cover Type Map; KEC, Lake Road, Killingly, CT; as seen on 4-26-16 aerial photo (Google Earth)

FIGURE 3: Avian Breeding Survey Points; KEC, Lake Road, Killingly, CT; as seen on 5-6-16 aerial photo (Google Earth)

PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 8-15-16 ***SCALE***: NTS

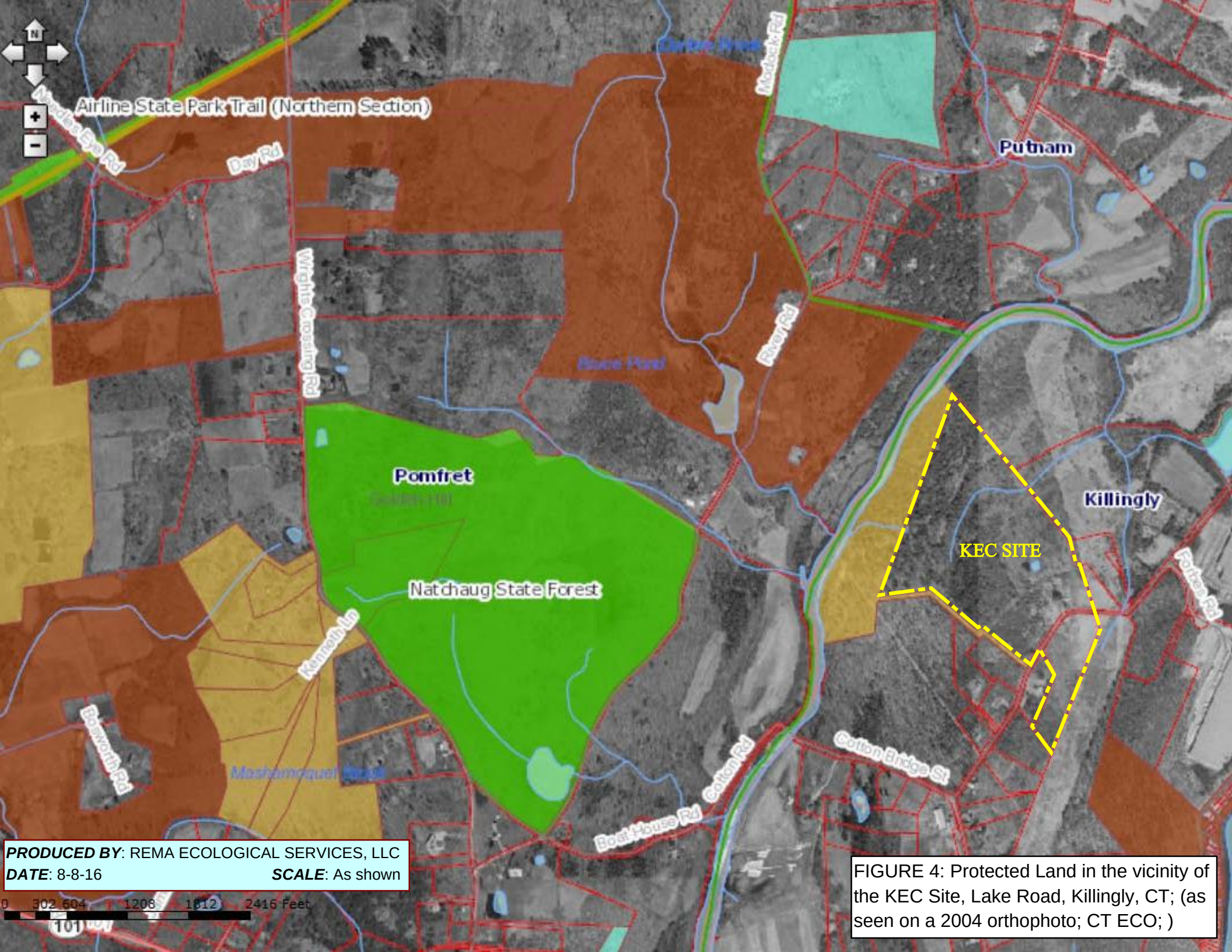


FIGURE 4: Protected Land in the vicinity of the KEC Site, Lake Road, Killingly, CT; (as seen on a 2004 orthophoto; CT ECO;)

ATTACHMENT B: Annotated Photographs

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

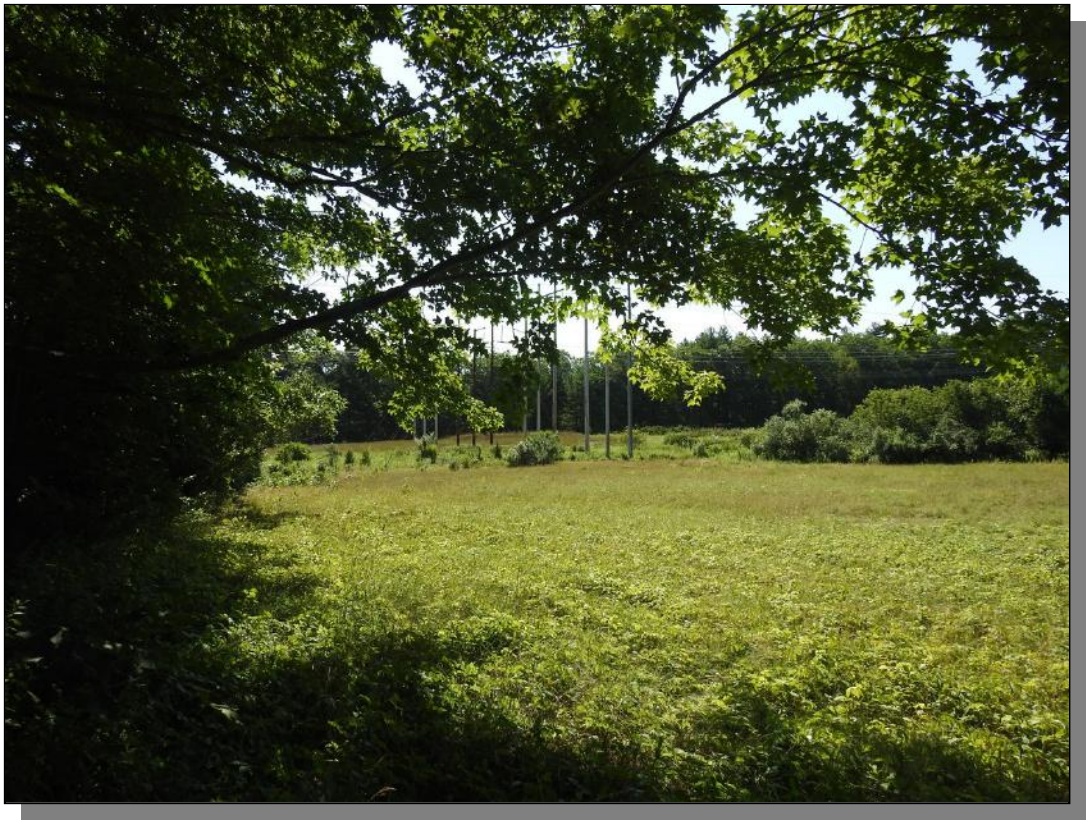


Photo A-1: Upland cover type, UGm (moist grassland), east of powerline and south of Lake Rd. with a mix of grasses and forbs. Field is mowed at least annually. Southeasterly view.

Photo A-2: Northwesterly view of upland cover type UGm (moist grassland), north of Lake Road and east of the home of the existing residence; regularly mowed.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-3: Upland cover type UGd (dry grassland), a clearing south of the pond and at the base of the eastern ridge. Upland oak forest (UFo) cover type in background.

Photo A-4: Close-up of drought-tolerant vegetation, plantain-leaved pussy toes and star moss in Upland cover type, UGd (dry grassland). Good habitat for ground beetles.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-5: Upland cover type UGs (successional grassland), a clearing south of Lake Road, dominated by goldenrod, among clonal black locust and within thicket cover type.

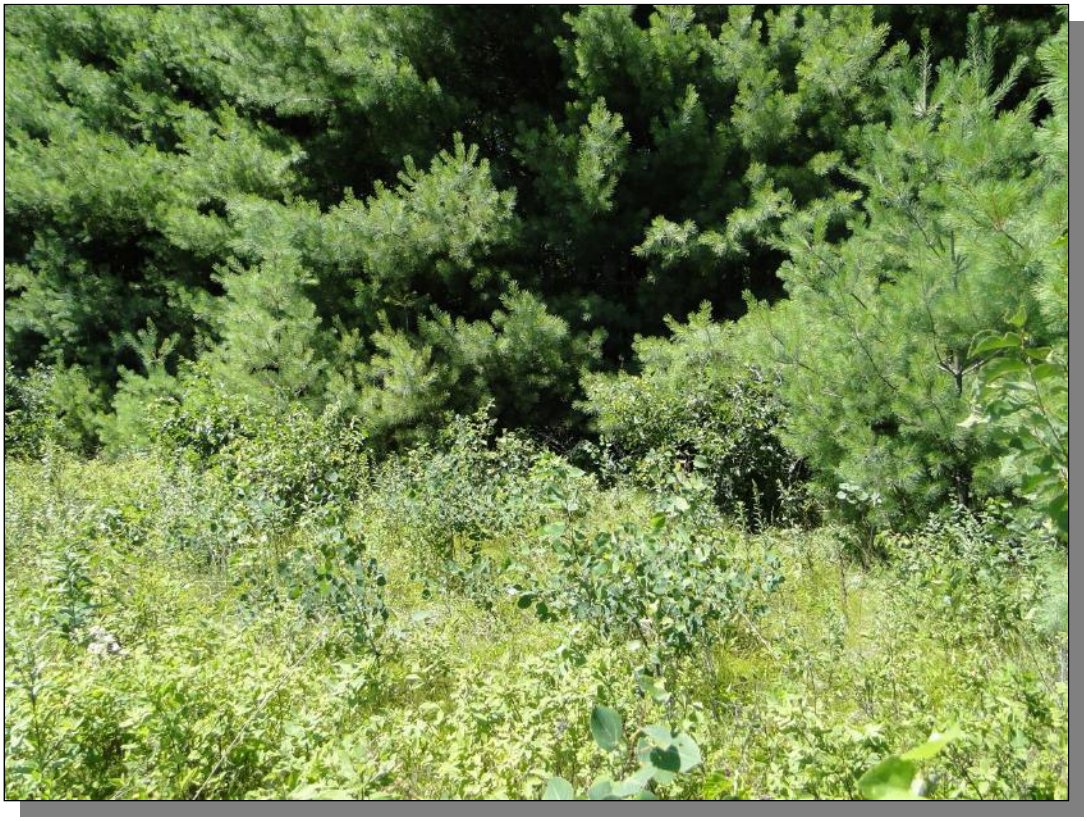


Photo A-6: Upland Cover type UGm (moist grassland), with woody 2016 seedlings. Occasional mowing has kept them in check, but field could become "successional". Upland thicket cover type (USe) is in background: white pine (evergreen) saplings.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-7: Upland cover type, USd (deciduous shrub/sapling thicket), south of Lake Rd. in a former field. Vines are also important. Note invasives: Morrow's honeysuckle (red berries), As. bittersweet, Japanese knotweed (left), & Jap. barberry (lower right.)

Photo A-8: Upland cover type USd (deciduous shrub sapling thicket), borders the southern field (UGm). Invasive glossy buckthorn and autumn olive in foreground, left.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-11: Upland Cover type USj (Japanese knotweed thicket), left rear, on 5-20-16 with moist meadow in foreground (UGm). Yellow blooming flower is Golden alexanders.

Photo A-12: Upland Cover type USj (Japanese knotweed thicket) in former field, south of Lake Rd. Knotweed is behind stone wall. Former hedgerow has large sugar maples.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-13: Upland cover type, USe (evergreen sapling thicket) on 5-20-16, north of Lake Road. Closely spaced white pines have dieback of lower branches & sparse herbs.

Photo A-14: This large old white pine was likely a major seed source for the dense, nearby stand of the upland evergreen sapling cover type (USe) in the background.

Photo A-15: Highbush blueberry and glossy buckthorn (invasive) are both heavy fruit producers, important food sources for birds. Each dominates different parts of the shrub- lands south of Lake Road, in both uplands and wetlands, extending into the utility ROW.

Photo A-16: On-site the deciduous shrub thicket cover type (USd) is limited to the left edge of photo, but extensive adjacent shrubland habitat along the ROW increases diversity and populations sizes of the wildlife and invertebrate fauna within the site.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo 17: Cover type is immature upland forest, UFi. This is the moist lower hillside of the southwestern hill, south of Lake Road, near an old private cemetery. Herb stratum is dense.

Photo A18: Typical herb stratum in immature deciduous cover types (UFi and USd) south of Lake Road, with Virginia creeper, poison ivy, and sedges. In deciduous thickets north of Lake Rd. herb stratum consists mostly of Asiatic bittersweet seedlings.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo 19: Cemetery within the immature forested cover type (a former field on hillside shown in Photo 17.) Note the enclave of larger trees which escaped past mowing.

Photo A20: Hedgerows along stone walls consist of species in the upland moist deciduous forest cover type (UFm), such as white ash (left) and sugar maple. Trees are often very large, having escaped past mowing of adjacent fields.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo 21: Moist upland forest cover type (UFm), at the base of the north end of the eastern ridge, adjacent to Wetland Unit A2, northwesterly view. Hay-scented fern forms the ground cover; deciduous trees (red maple and black birch) are dominant.

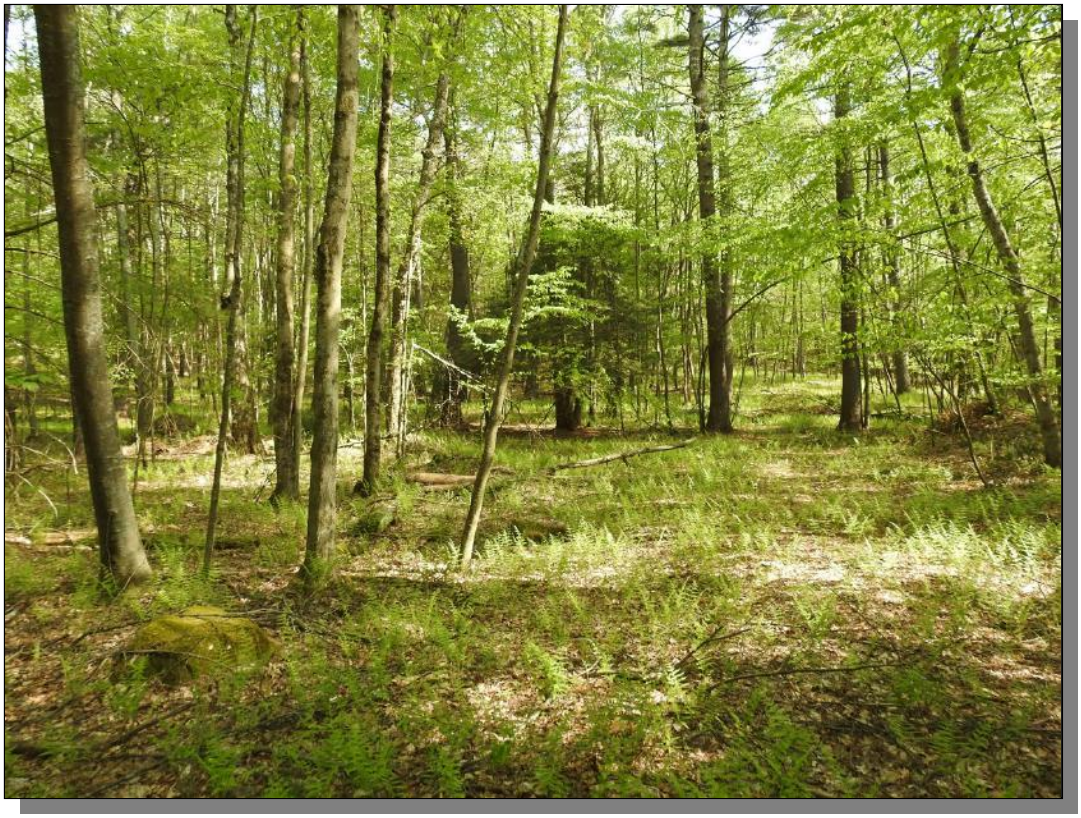

Photo A22: UFm cover type (moist deciduous forest) on level ground by Wetland Unit B. Hay-scented fern is dominant, but not fully expanded; photo taken on 5-20-16.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo 23: Upland oak forest (UFo) cover type on east-facing slope in southwestern corner of site, south of Lake Road (Switchyard Site); it has few rock outcrops and is moderately mature.

Photo A 24: Upland oak forest (UFo) cover type occupies portions of the rocky crest of the western ridge. Note wide range of size classes. Herb stratum present at lower right.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo 25: Upland Oak forest (UFo) is the cover type adjacent to a glade with Penn sedge and wood ferns on the spine at the southern end of the western ridge.

Photo A26: Close-up of marginal wood fern, taken at northern end of the western ridge. The habitat of this species is rocky terrain, regardless of bedrock composition.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo A-27: Upland cover type is mixed evergreen-hardwood forest (UFeo) on rocky crest of western ridge. Black birch is common, hemlock present, and mosses well-developed.

Photo A-28: Upland cover type is mixed evergreen-hardwood forest (UFeo). Penn sedge & star sedge grow in this glade on western ridge. Shagbark hickory is at center left.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo A-29: Upland cover type is mixed evergreen-hardwood forest (UFeo) on level summit of southwestern hill. Evergreen component is mature white pine, rather than hemlock.

*Photo A-30: M*ature mixed white pine-oak forest (UFeo) is the upland cover type on summit of the central hill, southeast of Wetland Unit A3. Note flat-top wall at right.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo A-31: This upland cover type is hemlock forest (UFh), with few other woody species and a sparse herb stratum. Site is a plateau at north end of the western ridge.

Photo A-32: Hemlock is also dominant on level land in the northern corner of the site. This cover type is UFh (m), as the moisture regime is mesic, not a dry ridge top.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
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Photo A-33: This upland cover type is also hemlock forest (UFh), growing on the western ridge crest. Woody debris dropped by dead trees in overcrowded stands is habitat. Understory vegetation is lacking due to dense shade.

Photo A-34: Starflower or *Trientalis borealis* is a common wildflower in multiple forested cover types, especially where evergreens are nearby, but light levels are not

Photo B-1: Man-Made Pond (Wetland Unit A1); February 2, 1916; facing northerly

Photo B-2: Man-made pond; March 11, 2016; Note outlet stream from springhouse; facing northwesterly

Photo B-3: Man-made pond (Wetland Unit A1); April 13, 2016; facing southerly

Photo B-4: Man-made pond; May 20, 2016; facing northwesterly

Photo B-5: Man-made pond; June 10, 2016; facing easterly

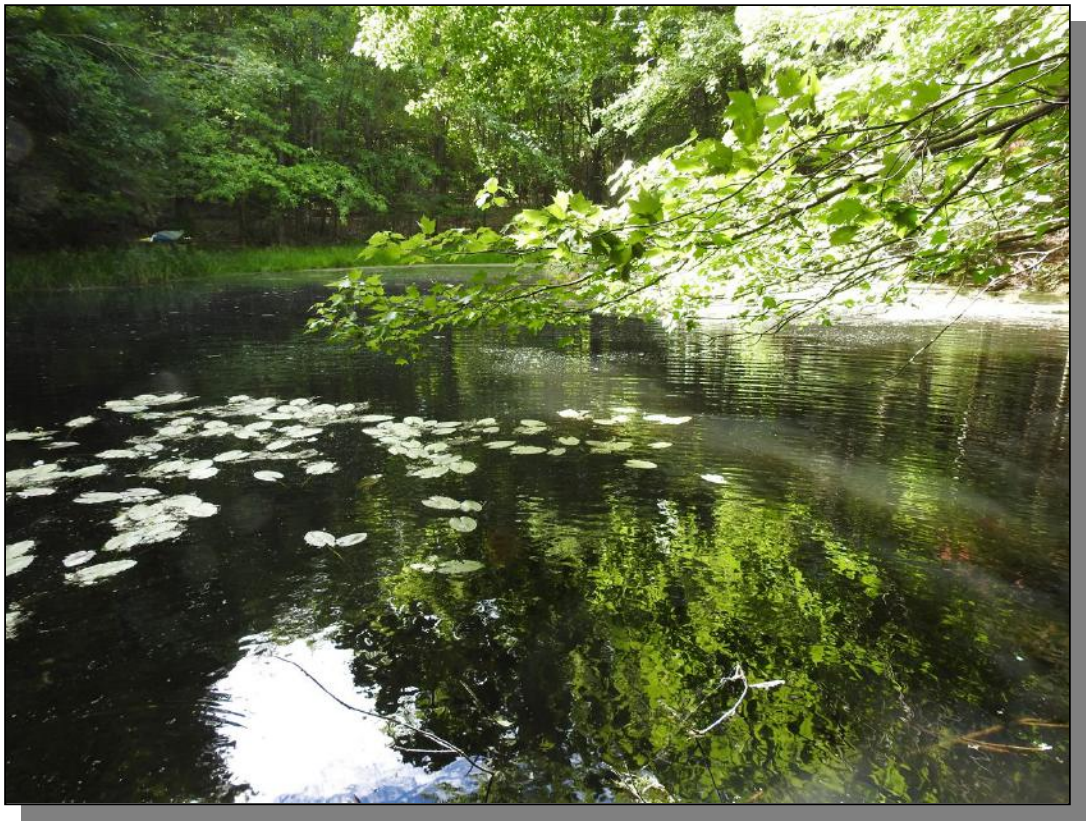

Photo B-6: Man-made pond; July 21, 2016; facing southeasterly

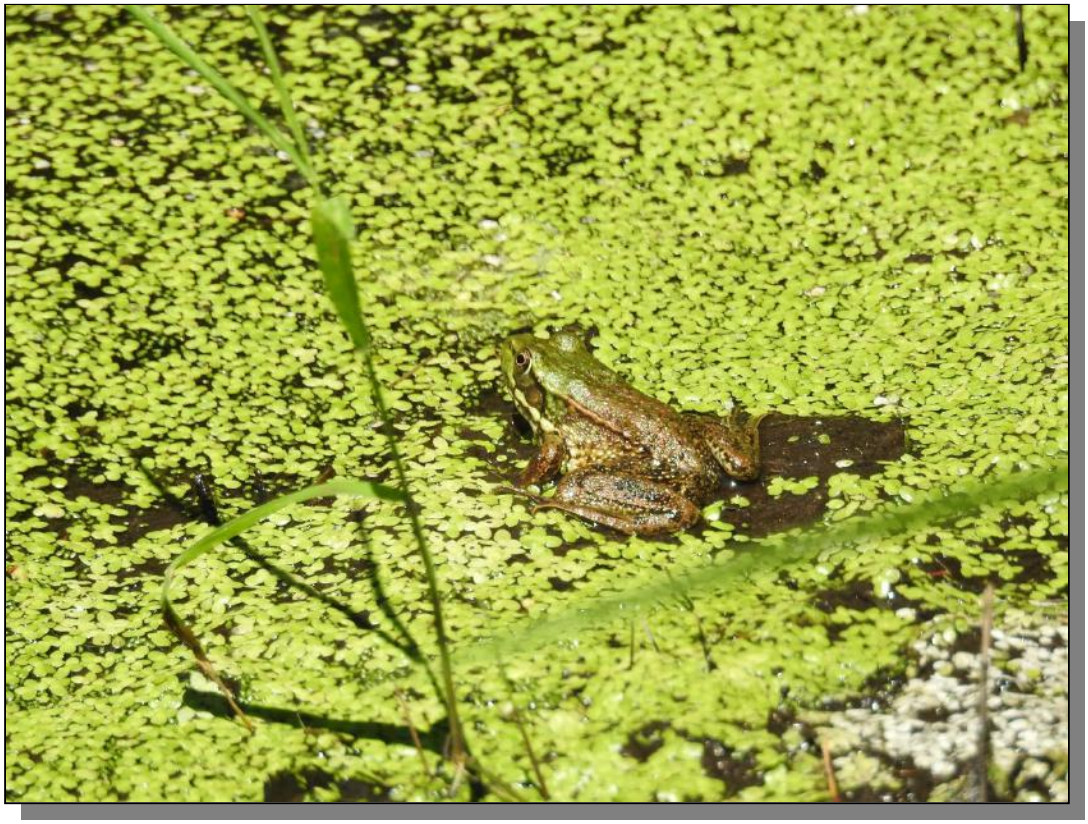

Photo B-7: Green frog *(Lithobates clamitans) in pond (Wetland Unit A1); July 2016*

Photo B-8: Juvenile bullfrog on minnow trap set at man-made pond; June 12, 2016

Photo B-9: Ice-breaking used for survey the man-made pond on February 19, 2016; facing northerly

Photo B-10: Many smallmouth bass (*Miropterus dolomieu)* were netted during survey on February 19, 2016.

Photo B-11: Juvenile small mouth bass in jar, February 19, 2016.

Photo B-12: Predaceous diving beetle (Dytiscid) from pond, on February 19, 2016.

Photo B-13: Water scorpion at pond (Nepidae family in the order Hemiptera, genus *Ranarta*), February 19, 2016.

Photo B-14: Off-site vernal pool on March 25, 2016. Amphibian egg masses were counted here, though no trapping was done.

Photo B-15: Minnow Trap #1, March 25, 2016. 12 juvenile smallmouth bass and 1 backswimmer (notonectid)

Photo B-16: March 25, 2016. Trap #2; nine juvenile smallmouth bass.

Photo B-17: Trap #3; March 25, 2016.

Photo B-18: Trap #5; March 25, 2016

Photo B-19: Trap #5; March 25, 2016

Photo B-20: Trap #6; March 25, 2016.

Photo B-21: Spotted salamander egg mass, left of oak leaf; in man-made pond (Wetland Unit A1); April 13, 2016

Photo B-22: Spotted salamander egg mass within colony of filmentous green algae; in pond (Wetland Unit A1); April 13, 2016

Photo B-23: Wetland Unit B (west side of site); embedded vernal pool habitat, on April 13, 2016.

Photo B-24: Wood frog egg masses (greenish hue, under blue flagging); in Wetland Unit B amphibian pool; April 13, 2016

Photo B-25: Large cluster of spotted salamander egg masses, a mix of opaque and clear, Wetland Unit B (west side of site) on April 13, 2016; note excellent water clarity.

Photo B-26: Search for amphibian egg masses in Wetland Unit B, during a rainstorm; May 5, 2016

Photo B-27: Large spotted salamander egg mass from Wetland Unit B, infused with green algae; May 4, 2016.

Photo B-28: Pond (Wetland Unit A1) during amphibian survey on May 4, 2016; facing northerly

Photo B-29: Predated spotted salamander egg mass from man-made pond, without embryos; May 4, 2016.

Photo B-30: Pond (Wetland Unit A1) during amphibian survey on May 4, 2016.

Photo B-31: Offsite vernal pool still has water on July 21, 2016 during a moderate to severe drought spell.