

Appendix 3-C: Habitat Surveys

July 31, 2009

Ms. Lynn Gresock
Associate Vice President
ARCADIS U.S., Inc.
Two Executive Drive, Suite 303
Chelmsford, MA, 01824

Re: Phase 1 Bog Turtle Survey and Timber Rattlesnake Habitat Assessment,
Cricket Valley Energy Project Site, Town of Dover, Dutchess County, NY
TES File No. 3487

Dear Ms. Gresock:

As requested by ARCADIS, Terrestrial Environmental Specialists, Inc. (TES) assessed lands surrounding the Cricket Valley Energy project site for the presence of potentially suitable habitat for the federally-threatened, New York State-endangered bog turtle (*Glyptemys muhlenbergii*) and the New York State-threatened timber rattlesnake (*Crotalus horridus*). The area under examination is an approximately 118.4-acre portion of a 131.6-acre site under option by Cricket Valley Energy and is located west of State Route 22 and east of the Swamp River in the Town of Dover, Dutchess County, New York (Figure 1). An active Metro-North railway transects this study area.

In response to information requests from ARCADIS, the U.S. Fish and Wildlife Service (USFWS) and the New York Natural Heritage Program (NYNHP) indicated the presence of bog turtles in the vicinity of the project area. In its response letter, the NYNHP identified a number of records for rare or listed plants and animals, and significant natural communities that occur in the vicinity of the project site (see Appendix A for Correspondence). These records include a documented occurrence of bog turtle “on or in very close proximity” to the study area and two records for timber rattlesnakes within 1.5 miles of the study area. Additionally, several occurrences of fen communities have been documented in the vicinity of the site. Fen communities are considered the primary habitat type for bog turtles in New York State.

More specific information on the recorded bog turtle occurrence, provided by the New York State Department of Environmental Conservation (NYSDEC), indicates that one bog turtle was found dead on the Metro-North railroad tracks, in between the eastern and western portions of the study area. This record is from June 2008 and is associated with three nearby (0.4 miles to 0.7 miles) fen communities.

More specific information on the timber rattlesnake den sites indicates that two den sites are known from a location approximately 1.5 miles northwest of the study area. A second record for timber rattlesnake is located approximately 1.0 mile to the west of study area (L. Masi, pers. comm.).

The Phase 1 bog turtle survey and timber rattlesnake habitat assessment were conducted on June 23, 24, and 25, 2009. This report provides a description of these efforts, the results of the surveys, as well as a brief overview of the habitat requirements for bog turtles and timber rattlesnakes. Figures 1 and 2 are included after the text of this report. Figure 1 shows the study area boundaries and Figure 2 shows the wetland boundaries and the habitat types identified on the site. Results of the correspondence with the USFWS and the NYNHP, habitat evaluation forms, and representative photographs of areas included in the assessments are provided as Appendices A, B, and C, respectively.

Phase 1 Bog Turtle Survey

The bog turtle is a small and elusive semi-aquatic turtle that grows to no more than 4.5 inches in length and spends much of its life underground or hidden in vegetation. In New York, the bog turtle range occurs in two separate regions: the Hudson Valley Region and the Lake Plain Region along the southern and eastern shores of Lake Ontario. The majority of bog turtle populations occur in the Hudson Valley, which is part of the Hudson/Housatonic Recovery Unit.

Bog turtles have specific habitat requirements that include spring-fed, open-canopy wetlands with shallow, slow-moving water, deep mucky soils, and tussock-forming herbaceous vegetation (e.g. *Carex stricta*) or moss (*Sphagnum* spp.) covered hummocks. A diversity of microhabitats within these wetlands provides areas that the turtles require for basking, foraging, nesting, and hibernation.

Dutchess County is within the Hudson/Housatonic Recovery Unit for bog turtles. Many of the bog turtle populations in this recovery unit occur in calcareous fens, which are fed by groundwater percolating through glacial deposits. Other habitats occupied by bog turtles in the Hudson Valley are wet meadows, sedge meadows, and red maple swamps (Gibbs *et al.* 2007, NYNHP 2009a, NYSDEC Bog Turtle Fact Sheet, USFWS 2001).

The Cricket Valley project site lies within the Harlem Valley Calcareous Wetlands Significant Biodiversity Area (Penhollow *et al.* 2006) and the north flow of the Great Swamp. Twenty-six occurrences for bog turtles have been documented in this area.

Methods

A Phase 1 bog turtle survey is an evaluation of the wetlands on a site for their potential as suitable bog turtle habitat. The survey is completed by assessing the presence and suitability of three key habitat criteria: hydrology, soils, and vegetation. Suitable hydrology is identified by the presence of springs or seeps, year-round saturated soils, and shallow surface water, particularly slow-moving rivulets; although, the wetland can be interspersed with both wet and dry pockets. Suitable soils are generically described as mucky. The term “mucky” does not refer to a technical soil type, rather mucky soils are described as soft and penetrable (to a depth of at least 3 to 5 inches). Pockets of deeper mucky soils, usually associated with a woody root mass or hummock, serve as overwintering locations. Suitable vegetation includes shrub and herbaceous species, primarily sedges, grasses, and rushes. Fen species, such as yellow sedge (*Carex flava*), grass-of-parnassus (*Parnassia glauca*), and shrubby cinquefoil (*Potentilla fruticosa*), are other good

indicators of suitable vegetation. Other plant species commonly found in bog turtle habitat include, but are not limited to sphagnum moss, sensitive fern (*Onoclea sensibilis*), tussock sedge, jewelweed (*Impatiens* spp.), skunk cabbage (*Symplocarpus foetidus*), poison sumac (*Toxicodendron vernix*), alder (*Alnus* spp.), and red maple (*Acer rubrum*). Suitable hydrology and soils are considered to be the primary determinants of suitable bog turtle habitat (USFWS 2006).

The study area for the Phase 1 survey was approximately 118.4 acres. The boundaries were based on parcel boundaries and natural features (e.g., the Swamp River). The extent of the study area includes the project site and surrounding wetlands, encompassing an area much larger than the area that would be impacted by the proposed project.

During the Phase 1 survey, observations of hydrology, soils, and vegetation were made in each of the five wetlands within the study area boundaries. Cover types within the wetlands were characterized by the species and structure of the dominant plant species in that portion of the wetland (Figure 2). Habitat evaluation forms for Phase 1 bog turtle surveys were developed by the USFWS in conjunction with the Pennsylvania Fish and Boat Commission (PFBC). One habitat evaluation form was completed for each wetland, and representative photographs were taken (See Appendices B and C, respectively).

Results

Five wetlands occur within the study area boundaries, totaling approximately 56.2 acres (Figure 2). Wetlands 1 through 3 occur on the east side of the Metro-North railway and are entirely within the study area boundary. These wetlands are comprised primarily of emergent vegetation, dominated by the invasive common reed (*Phragmites australis*). Wetlands 4 and 5 occur on the west side of the railway. These wetlands are primarily forested and are associated with the floodplains of the Swamp River. Wetlands 4 and 5 extend beyond the boundaries of the study area; the portions of these wetlands outside of the study area boundaries were not included in Phase 1 survey efforts.

- Wetland 1

Wetland 1 is approximately 1.7 acres and is an emergent and forested wetland. Small areas of scrub-shrub and open water cover types also occur in this wetland. Man-made berms and industrial debris are evidence of past disturbance to the hydrology of this wetland (Photos 1 through 4). No springs or seeps were observed. Surface water was present, and ranged from 1 to 18 inches in depth in the forested and scrub-shrub areas. These areas appeared to be flooded, as was evidenced by submerged skunk cabbage, marsh fern (*Thelypteris palustris*), poison ivy (*Toxicodendron radicans*), and Virginia creeper (*Parthenocissus quinquefolia*). Soils in this wetland were saturated; however, they were not mucky. The dominant plant species in this wetland is common reed. Tree and shrub species in the wetland are green ash (*Fraxinus pennsylvanica*), eastern red cedar (*Juniperus virginiana*), silky dogwood (*Cornus amomum*), and honeysuckle (*Lonicera* sp.). Herbaceous plants in this wetland include skunk cabbage, marsh fern, sensitive fern, and horsetail (*Equisetum* sp.). One shrubby cinquefoil plant was identified in the small scrub-shrub area. No other fen indicator plants were identified in this wetland. Overall, the conditions present in this wetland were not representative of suitable bog turtle habitat.

- Wetland 2

Wetland 2 is approximately 8.7 acres and is predominantly an emergent wetland, although the eastern and southern portions of the wetland are forested. This wetland also contains small areas of scrub-shrub cover (Photos 5, 6, and 7). Hydrology in this wetland has been impacted by the railroad bed and man-made berms. Industrial debris and waste products were especially evident in the southwestern portion of this wetland (Photo 10). One possible spring (or groundwater upwelling) was observed in the east side of the wetland (near wetland flag W2-13). Soils in this area were saturated and, in many areas, inundated. Common reed is the dominant species in the central and southern portions of the emergent wetland (Photo 8), and cat-tail (*Typha* sp.) is the dominant species in the northern portion (Photo 9). On the east side of this wetland between the common reed stand and the forested portion of the wetland (near wetland flag W2-15), is a small patch of vegetation containing shrubby cinquefoil. This area is approximately 0.06 acres and is dominated by a dense stand of common reed and partially within the fringes of the wooded portion of the wetland. This area was shaded by the reeds and the overstory of the adjacent wooded area (Photos 11 and 12). No tussock-forming vegetation or hummocks were observed here. Water levels in this area were 0 to 2 inches. Soils were saturated, but not mucky. An area of scrub-shrub vegetation occurs in the northeastern portion of this wetland. This area was inundated, with water levels reaching approximately 30 inches (Photo 7). The substrate in this area was firm. Plant species in cover type were silky dogwood, honeysuckle, multiflora rose (*Rosa multiflora*), sensitive fern, marsh fern, and a variety of sedges and rushes.

Overall, this wetland was not considered to represent suitable bog turtle habitat. In the cat-tail marsh and scrub-shrub portions, water levels were much higher than that preferred by bog turtles. Soils in this wetland were saturated, but not mucky. Although some fen indicator species were found in this wetland (e.g., shrubby cinquefoil, yellow sedge), the vegetative characteristics of this wetland were not considered suitable. The patch containing shrubby cinquefoil was dominated by common reed and bordered by closed canopy forested wetland. The sedge component occurred in an area of deep water. No tussocks or hummocks were observed in this wetland.

- Wetland 3

Wetland 3 is approximately 0.6 acres and is affiliated with a former drainage canal. This narrow wetland is bounded to the west by the railroad bed and to the east by a wooded area (Photos 13 and 14). Dominant species were eastern red cedar, common reed, skunk cabbage, and horsetail. No springs or seeps were observed. This wetland contained no evidence of hydrology, soil, or vegetation features that would be indicative of bog turtle habitat.

- Wetlands 4 and 5

Together, Wetlands 4 and 5 encompass approximately 45.2 acres and are part of New York State-regulated wetland DP-22. Wetland DP-22 is a 5,513-acre Class 1 wetland that includes both the north flow and the south flow of the Great Swamp. These wetlands are being described together because they are both affiliated with the Swamp River; their structures and compositions are very similar; and they are separated only by an access path to a pump house. These wetlands are bordered to the east by the railroad and to the west by the Swamp River. This complex continues

outside of the study area boundaries; portions outside of the study area were not included in the Phase 1 survey.

Wetlands 4 and 5 are comprised primarily of deciduous forest wetland with fringes of emergent wetland along the banks of the Swamp River (Photos 15 through 20). High quality floodplain forest and red maple-hardwood swamp communities were indicated in this area by NYNHP. Floodplain forest in this wetland contained multiflora rose, honeysuckle, silky dogwood, alder, American elm (*Ulmus americana*), red maple, hickory (*Carya* sp.), green ash, and in the herbaceous layer, sensitive fern, goldenrods (*Solidago* sp.) and asters (*Aster* sp.), royal fern (*Osmunda regalis*), jack-in-the-pulpit (*Arisaema triphyllum*), poison ivy, and Virginia creeper. A few small canopy gaps occurred within this wetland where emergent vegetation occurred; however these areas did not contain suitable vegetation, soils, or hydrology to represent suitable bog turtle habitat. Emergent portions of this wetland were either dominated by common reed or contained *Carex lacustris*, soft rush (*Juncus effusus*), bur-reed (*Sparganium* sp.), skunk cabbage, cat-tail, sensitive fern, and royal fern. Soils in the floodplain forest were saturated but not mucky, with puddles on the surface of 1 to 4 inches deep. The areas of emergent wetland along the edge of the river did not have mucky soils, and the water level, for the most part, was relatively deep (approximately 30 inches). Neither the forested portion of these wetlands, nor the emergent portions along the Swamp River exhibited properties of suitable bog turtle habitat.

Discussion

Despite the fact that a record exists for bog turtle on the project site, no suitable habitat was found. The NYNHP record was of one individual found on the Metro-North railroad tracks between the eastern and western portions of the study area and is associated with three nearby fen complexes. Because the distance between the railroad tracks and these fens is within the dispersal capability of the species, it is possible that this bog turtle found on the site was moving from one of the nearby locations and became trapped between the rails.

Based on observations of hydrology, soils, and vegetation made during this Phase 1 survey, no areas were characterized as suitable bog turtle habitat. Wetlands 1, 2, and 3 east of the railroad tracks contained primarily emergent vegetation dominated by common reed. These wetlands are surrounded by a border of forested wetlands and uplands, and contained a few small areas of scrub-shrub vegetation. Although a small area within Wetland 2 contained shrubby cinquefoil, a fen indicator plant that is frequently found in bog turtle habitats, this area was not considered to be suitable bog turtle habitat. The area was approximately 0.06 acres and was dominated by a dense stand of common reed. No tussocks or hummocks were present in this area, and the canopy was closed by the reeds and bordering woods. Wetlands 4 and 5 were almost entirely comprised of floodplain forest. Fringes of emergent wetland along the banks of the Swamp River contained either common reed, or a mixed stand of *Carex lacustris*, soft rush, bur-reed, skunk cabbage, cat-tail, sensitive fern, and royal fern.

Water levels were variable throughout the site and ranged from 0 to at least 30 inches. In certain areas there was evidence of flooding, as indicated by water levels above the high water mark and by plant species normally growing out of water that were submerged. One possible spring was observed in Wetland 2, but none of the other characteristics of suitable bog turtle habitat were found

in this area. Soils around the site were either saturated or inundated, but no deep mucky soils were observed on the site. Because of the generally high water levels (particularly in scrub-shrub and emergent portions of the wetlands), lack of mucky soils, significant amount of forest cover, and absence of tussock-forming vegetation or hummocks in the understory, wetlands on the site were not considered to contain suitable habitat for bog turtles. Therefore, it is our recommendation that a Phase 2 bog turtle survey would not be necessary.

Timber Rattlesnake Habitat Assessment

The timber rattlesnake is a large-bodied pit viper that uses the heat sensing pits on its face to detect prey, primarily small rodents. The timber rattlesnake is a “sit-and-wait” ambush predator (Brown 1993). In New York State, the timber rattlesnake occurs in northeastern New York, in the southern tier, and in the Hudson Valley. Eleven den sites are known to occur in the Harlem Valley (Penhollow *et al.* 2006).

In the northeast, timber rattlesnakes spend about half of the year (October – April) in underground hibernacula (dens). Den sites typically occur in open steep, south-facing slopes with rock outcrops, ledges, or talus surrounded by deciduous or mixed forest, where fissures or crevices in the ground allow access to these winter retreats. Upon emergence, rattlesnakes require basking areas, usually at or near the den site. These open rocky areas also serve as gestating sites for gravid (pregnant) females. During the active season, timber rattlesnakes will travel approximately 1.0 to 2.5 miles from their den sites in search of prey. Their primary foraging habitat is upland deciduous and mixed forests with a closed canopy; however, timber rattlesnakes can also be found in open fields, riparian areas, and forested wetlands during the active season (Brown 1993, Gibbs *et al.* 2007, NatureServe 2009, NYNHP 2009b).

Methods

An effort to evaluate the study area for potential timber rattlesnake habitat was also conducted on June 25, 2009. The extent of the study area was the same as that used for the Phase 1 bog turtle survey. Characteristics of upland habitats within the study area were noted, with specific attention to rock outcrops and forested areas. The floodplain forests on the west side of the Metro-North railroad tracks were investigated during the Phase 1 bog turtle survey on June 24, 2009. Because there is potential for timber rattlesnakes to use floodplain forests, these areas were also taken into consideration. Representative photographs of areas investigated during the timber rattlesnake habitat assessment are included in Appendix C.

The study area was investigated for the presence of rock outcrops, ledges, and talus that would represent potentially suitable den sites, as well as basking, shedding, and gestating areas. Forested habitats on the site were evaluated for their potential to provide appropriate foraging and transient habitat. Males and non-gravid females typically forage in well-drained deciduous or mixed forests with high canopy cover, little surface vegetation, and heavy fallen leaf cover. Transient habitat consists of more open forests with clearings and rocky terrain and is generally within approximately 700 feet of the den site. Transient habitat provides basking areas and shelter between den sites and summer foraging areas (Brown 1993, NYNHP 2009b).

Results

Uplands within the study area include the developed/industrial area, open fields, and mixed deciduous-coniferous forest. One rock feature occurs on the east side of the site, south of the access road behind an abandoned building (Figure 2). This rock outcrop was investigated for its potential as a den site. The top of this rock outcrop is wooded, and a small stand of common reed is growing at its base (Photos 21 and 22). No talus or boulders are associated with this feature. Solar exposure is limited by the abandoned building that is situated to the west. This rock outcrop was not considered to be a suitable den site for timber rattlesnakes.

Several open, sparsely vegetated, sandy areas and an area of open field occur in proximity to the abandoned buildings in the study area (Photos 23, 24, and 25). The upland forest in the study area can be characterized as a mixed forest community containing tree species such as quaking aspen (*Populus tremuloides*), white ash (*Fraxinus americana*), white pine (*Pinus strobus*), eastern red cedar, with a relatively open understory (Photos 26, 27, and 28). The floodplain forest on the west side of the railroad tracks had a relatively closed canopy consisting of tree species such as American elm, red maple, and hickory and had relatively dense shrub and herbaceous layers.

Because timber rattlesnakes are highly mobile during the summer foraging season and use a variety of habitat types, it is possible that timber rattlesnakes could occur within the study area during this time of year. The areas of upland forest may provide suitable foraging habitat, and while timber rattlesnakes would be less likely to forage in the floodplain forest, snakes may traverse these areas during the active season. No timber rattlesnakes were observed during field surveys by TES.

Discussion

No potentially suitable dens were located in the study area. Therefore, this area would not provide critical overwintering habitat for timber rattlesnakes. Timber rattlesnakes typically forage in well-drained, deciduous and mixed upland forests surrounding the den site. Most of the forested areas in the western portion of the study are wetlands, and there are limited areas of upland forest on the eastern portion of the study area; thereby reducing the potential of the study area as suitable foraging habitat. However, because the site is within the dispersal distance from known den locations in the area, it is possible that timber rattlesnakes could be found on the site during April through October.

Summary

TES was contracted by ARCADIS to conduct a Phase 1 bog turtle survey and a timber rattlesnake habitat assessment on lands surrounding the Cricket Valley project site, located between State Route 22 and the Swamp River in the Town of Dover, Dutchess County, New York. The NYNHP indicated that there is a documented occurrence of bog turtles “on or in very close proximity” of the property, and there are two timber rattlesnake records within 1.5 miles of the property. Additional information from the NYSDEC indicates that the bog turtle record from the site is of one individual found dead on the Metro-North railroad tracks between the eastern and western portions of the study area. This occurrence has been linked with several fens in the vicinity

of the site. Two timber rattlesnake den locations occur approximately 1.5 miles to the northwest of the site, and another den site occurs approximately one mile to the west of the site.

The surveys for these species were conducted on June 23, 24, and 25, 2009. It was determined that potentially suitable habitat for bog turtles does not exist on the site. Wetlands on the site did not meet the three habitat criteria (hydrology, soils, vegetation) that constitute suitable bog turtle habitat. One small area (approximately 0.06 acres) within Wetland 2 did contain some indicators of bog turtle habitat (e.g., a spring or groundwater upwelling, and fen-indicator plants); however, soils were not mucky in this area; it did not contain tussock-forming vegetation or hummocks characteristic of bog turtle habitat; and the area was dominated by a dense stand of common reed and was bordered by wooded wetlands. In my professional opinion, wetlands within the study area do not contain suitable habitat for bog turtles. Therefore, a Phase 2 bog turtle survey would not be necessary.

One small rock outcrop was observed on the site. This feature was not considered to be a suitable timber rattlesnake den site because it occurs at a relatively low elevation, is not associated with any talus, and has limited solar exposure. However, because the known den sites indicated by NYNHP are within the distance traveled by timber rattlesnakes, and because they are known to use a variety of habitat types throughout the summer foraging season, the possible occurrence of timber rattlesnakes within the study area during May through October cannot be ruled out. However, abundant more suitable foraging habitat occurs in the region more proximate to the locations of the documented den sites northwest and west of the site.

If you have any questions regarding the Phase 1 bog turtle survey or the timber rattlesnake habitat assessment, please feel free to contact me at 315-695-7228 or slshute@tesenvironmental.com.

Sincerely,
Terrestrial Environmental Specialists, Inc.

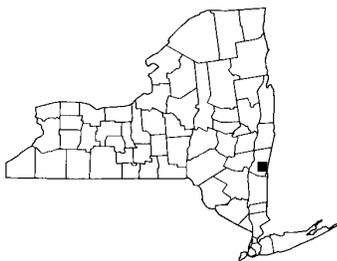


Sarah L. Shute
Assistant Environmental Scientist

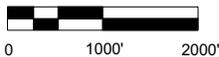
SLS/dmm
Attachments

References

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QUADRANGLE LOCATION



SCALE 1" = 2000'

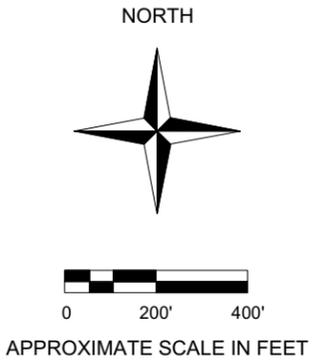
NORTH



Figure 1. Site Location
 NYS DOT Topographic Map
 Dover Plains Quadrangle
 1989



LEGEND
 DIST/DEV - Disturbed/Developed Land
 MFU - Mixed Forest Upland
 DFW - Deciduous Forest Wetland
 SSW - Scrub-Shrub Wetland
 EW - Emergent Wetland
 OW - Open Water



Aerial Photograph obtained from NYS GIS Clearinghouse 2004

Figure Prepared by Terrestrial Environmental Specialists, Inc.

Figure 2.
Aerial Photograph of Site with Cover Types