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ENVIRONMENTAL CONSULTING

Summer 2024 Bat Mist-Net Survey for the Lost City Solar Generating Facility, Muhlenberg County, Kentucky

IPaC Consultation Code: 2024-0039738

Submitted To:

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PROJECT BACKGROUND

Copperhead Environmental Consulting, Inc. (Copperhead) was contracted by Lost City Renewables, LLC (Lost City) to conduct a bat mist-net survey and culvert inspection for the Lost City Solar Generating Facility Project (Project) in Muhlenberg County, Kentucky (Figure 1). The goal of this survey was to document the presence or probable absence of the federally endangered Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), the proposed federally endangered tricolored bat[1] (*Perimyotis subflavus*), and the little brown bat[2] (*Myotis lucifugus)* (collectively referred to as target species) within the Project area of investigation (AOI) during the summer maternity season. Additionally, any target species captured would be radio-tagged to determine their roost locations to inform Project design. Based on mapping provided by Lost City, the AOI contains approximately 690 acres of suitable forested bat habitat.

A Study Plan was submitted to the US Fish and Wildlife Service (USFWS) Kentucky Field Office and the Kentucky Department of Fish and Wildlife Resources (KDF&WR) on 5 July 2024. Study Plan approval was received from both agencies on 8 July. On 10 July, Copperhead submitted a Study Plan amendment which included the inspection of a historic railroad culvert for bat occupancy. Approval of the Study Plan amendment was received on 11 July (Appendix A). Surveys were conducted under USFWS Federal Fish and Wildlife Permit #ES94849B-2 and #ES56515D-1, and KDF&WR Scientific Wildlife Collecting Permit SC2411004, SC2411005, SC2411008, SC2411010, SC2411016, and SC2411018.

[1] On 14 September 2022, USFWS announced a proposal to list the tricolored bat as endangered under the Endangered Species Act (USFWS 2022).

[2] The USFWS is currently conducting a discretionary status review of the little brown bat to determine if listing under the Endangered Species Act is warranted (USFWS 2024a).

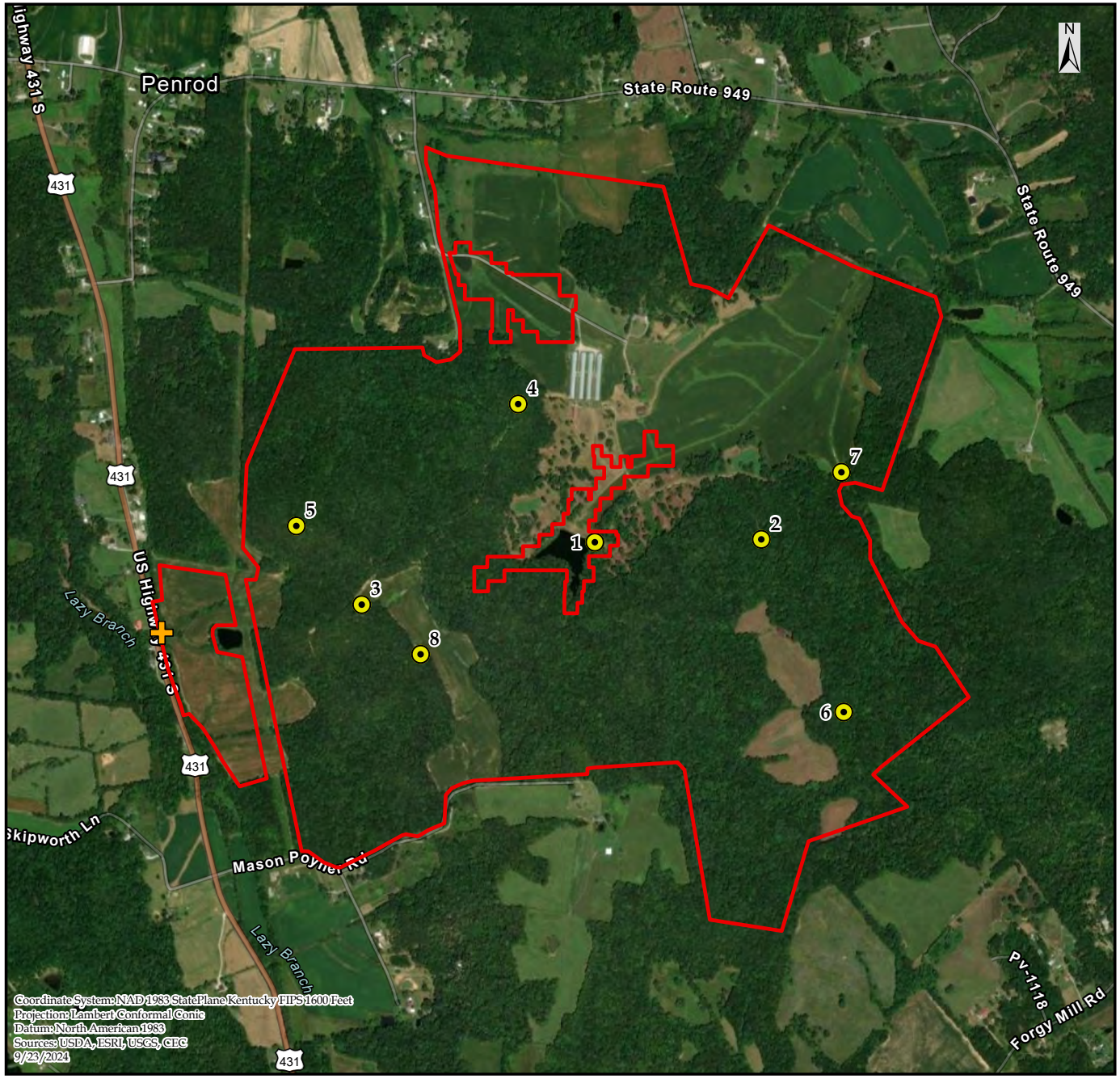

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FIGURE 1:
Site Overview of the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Legend

- Historic Railroad Culvert
- Mist-Net Site Location
- AOI

0 500 1,000
US Feet

Scale: 1 in = 1,500 ft

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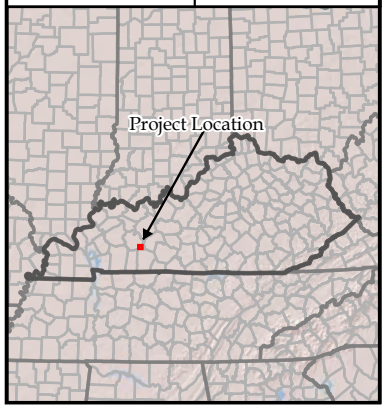

METHODOLOGY

Level of Effort/Site Selection

Mist-net surveys were implemented in accordance with the USFWS 2024 Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (USFWS 2024b; Guidance). Based on the Guidance for the required number of net nights (nn) for non-linear projects, the requisite mist-net survey level of effort (LOE) for Indiana bats is 6 nn per 123 acres of forested habitat, and the requisite LOE for northern long-eared bats in non-coastal areas is 10 nn per 123 acres of forested habitat. The Guidance states that the northern long-eared bat survey LOE is also adequate to determine the presence or probable absence of tricolored bats during the 2024 survey season. To complete a presence or probable absence survey for all four target species, the higher northern long-eared bat survey LOE (10 nn per 123 acres of forest) was used during the mist-net survey. Based on the estimated amount of suitable forested bat habitat within the Project area (690 acres), 60 nn of survey (8 nn of survey conducted at six survey sites and 4 nn of survey conducted at one survey site) were completed to ensure regulatory compliance for the Project. Proposed potential mist-net site locations were included in the Study Plan approved by USFWS; however, final mist-net sites were selected in the field.

Mist-Net Surveys

Prior to the survey, Copperhead biologists conducted field reconnaissance of the Project AOI to select mist-net locations best suitable for target species bat capture. Mist-nets were set up to maximize coverage of flight paths used by bats along suitable travel corridors, foraging areas, or drinking areas. Placement of mist-nets was based on the extent of canopy cover, presence of an open flyway, and forest conditions near the site. Mist-net locations and orientations were determined in the field to maximize target species captures by biologists permitted to survey for federally listed bats. Individual net locations were recorded using handheld GPS enabled tablets and mapped with ArcGIS Pro (v. 3.x ESRI, Redlands, CA).

One two-person survey team (consisting of a federally and state permitted biologist and one technician) surveyed a maximum of four net sets each night. Each site was surveyed for a minimum of two calendar nights and individual net locations within a site were surveyed for no more than two full calendar nights of survey. Low visibility, high-quality, nylon nets, 4 to 18 meters (~13 - 59 feet) in length and 5.2 to 7.8 meters (~17 – 26 feet) high were used for each net set. Nets were deployed at sunset each night, left open for at least five hours, and checked every 10 minutes. Disturbance near the nets was kept to a minimum between checks. Weather data, including temperature, wind speed, and cloud cover, were recorded for each site on an hourly basis to ensure compliance with the Guidance. Mist-net surveys cannot be conducted during inclement weather (i.e., temperatures <50°F, precipitation/heavy fog that exceeds 30 minutes, or sustained wind speeds greater than 9 mph that exceeds 30 minutes). Therefore, if inclement weather was encountered during the survey, mist-net survey efforts were suspended for that night and repeated on a subsequent night when weather conditions were suitable.

Bats were live-caught, processed within 30 minutes from the time of capture, and released unharmed near the point of capture. Data recorded for each individual bat included time of capture, capture net ID, capture height, species, sex, age class, reproductive condition, mass, and forearm length.

Diurnal Radio-Telemetry

Target species captured during the mist-net survey were fitted with unique frequency radio-transmitters to determine locations of day roosts. Biologists searched for each radio-tagged bat for a minimum of four hours per day (or until each bat was located) for a period of seven days. The transmitters were Holohil Systems Ltd. (Carp, Ontario, Canada) LB-2X (frequency 172.xxx) with a standard minimum lifespan of 12 days. The transmitters were tested before attachment and attached between the scapula of each bat using non-toxic surgical adhesive. Model TRX-1000S (Wildlife Materials Inc., Carbondale, Illinois, USA) tracking receivers and 172 FB 3- or 5-element Yagi directional antennas were used to locate day roosts used by radio-tagged bats.

Each located roost was photographed, and the location recorded using a handheld GPS enabled tablet. Data recorded for each individual roost tree included roost ID, tree species, location description, date first used by radio-tagged bat, diameter at breast height (DBH), tree height, roost height, micro-habitat used, decay state (as described by Thomas et al. [1979]), percent bark cover, percent bark cover usable by bats, tree ranking, percent canopy clover, habitat classification and plot characteristics (number of live trees, snags, total trees determined using a 10-factor prism). When a radio-tagged bat was found roosting on private property outside the Project AOI, and land access was not granted, the estimated location of the roost was determined using radio-telemetry triangulation techniques.

Emergence Count Survey

If an Indiana bat, northern long-eared bat, or little brown bat had been tracked to a roost, and land access was granted, two evening emergence count surveys would have been conducted. Per the Guidance, no emergence count surveys were conducted at tricolored bat roosts due to the difficulty of observing them emerge from their roosts.

White-Nose Syndrome and Safety Protocols

To minimize the transmission of White-nose Syndrome (WNS) between captured bats, all survey activities adhered to the March 2024 *National White-Nose Syndrome Decontamination Protocol* (WSDMWG 2024). All hard, non-porous netting equipment was sanitized with Isopropyl alcohol wipes (70%) prior to arrival and after each survey night; all other equipment was submersed in hot water (131°F) for a minimum of five minutes. Individual bats were kept in unused paper bags while awaiting processing. Disposable latex gloves were worn over sanitized handling gloves and changed or sanitized following the handling of each bat. Additionally, biologists wore site dedicated clothing while handling bats. All non-disposable equipment (e.g., PESOLA® scales, rulers, calipers, etc.) coming into contact with bats were sanitized immediately following the

handling of each bat. Bats were evaluated for potential WNS infection through wing scoring following the *Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome* (Reichard 2008). All Copperhead employees coming in direct contact with bats had up-to-date rabies vaccinations.

COVID-19 Protocol

To minimize the potential for transmission of COVID-19, Copperhead conducted surveys in accordance with *Guidance for Fish and Wildlife Service Employees Engaging in Activities with Bats* (USFWS 2020), and our federal and state permit guidelines. In addition to the personal protective equipment identified in the March 2024 *National White-Nose Syndrome Decontamination Protocol*, biologists wore non-vented N95 masks while handling bats. Photographs of bats were taken for confirmation of species when required, but all unnecessary handling was reduced. Employees who had tested positive for COVID-19, or were suspected to have COVID-19, were not allowed to work on the Project until the most current CDC criteria for when infected persons can safely be around others were met. While in the field, personnel monitored themselves and each other for signs of COVID-19 infection. If any person had shown signs of infection, that person would have been isolated and returned home as soon as possible.

Culvert Inspection

Qualified bat biologists conducted a comprehensive visual inspection of a historic railroad culvert located within the Project AOI to document evidence of roosting bat species in accordance with the Guidance (*Appendix K: Assessing and Surveying Bridges and Culverts for Bat Use*). All accessible surfaces and cracks were inspected from above and below to search for evidence of day-roosting bats (e.g., guano, urine or body staining, auditory squeaking or chirping, ammonia odor). Biologists completed a *Bridge/Culvert Bat Assessment Form* datasheet, and representative photographs of each bridge were collected.

RESULTS

Mist-Net Surveys

Mist-net surveys were conducted at eight sites from 29 July – 9 August 2024 (Table 1, Figure 1, Appendix B). Inclement weather during the nights of 30 July and 1 August, and survey heat-related illness on 6 August resulted in these surveys nights being cancelled before completing five hours of effort. These surveys were repeated on subsequent nights under suitable weather conditions.

Table 1. Mist-Net Site Locations Surveyed During the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Mist-Net Site Number	Survey Dates (2024)	Net Nights Completed	Latitude	Longitude	Site Location Description
1	1*, 3, 4 Aug	8	37.10093	-86.98185	Pond and ATV trail south of Free Ln.
2	29, 31 Jul	8	37.10032	-86.98376	Forested corridor south of farmland.
3	1*, 3, 4 Aug	8	37.09926	-86.99175	Ridgetop road, east of US-431
4	29, 30*, 31 Jul	8	37.10395	-86.98771	Ridgetop road, South of KY-949
5	29, 31 Jul	8	37.10171	-86.99285	Dirt road on forested ridge southwest of Free Ln. and east of US-431S
6	5, 6*, 9 Aug	4	37.10131	-86.97237	Forested, intermittent stream west of Ware Ridge Rd. and north of Forgy Mill Rd.
7	5, 6 Aug	8	37.10357	-86.97243	Forest farm trail and stream south of KY-949
8	1*, 3, 4 Aug	8	37.09048	-86.97685	Interior corridor and small creek at agricultural field edge north of Mayson-Poyner Rd. and East of US-431

*Survey cancelled due to inclement weather/illness

A total of 99 bats of five species were captured during the survey (Table 2). Eastern red bats (*Lasiurus borealis*) comprised 63% of total captures (n=62), evening bats (*Nycticeius humeralis*) comprised 19% of total captures (n=19), big brown bats (*Eptesicus fuscus*) comprised 14% of total captures (n=14), tricolored bats comprised 3% of total captures (n=3), and gray bats (*Myotis grisescens*) comprised 1% of total captures (n=1). All three tricolored bats were captured at Site 1, (one on 1 August and two on 4 August). The single federally endangered gray bat was captured at Site 3 on 1 August (Table 3). Detailed mist-net site, capture and weather data are provided in Appendix C, mist-net site photographs are provided in Appendix D, and tricolored bat and gray bat photographs are provided in Appendix E.

Table 2. Summary of Bat Captures During the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

	Adult					Juvenile				
	Male		Female			Male		Female		
Species	TD	NR	L	PL	NR	TD	NR	NR	UNK*	Total
Lasiurus borealis	1	2	-	3	1	9	13	16	17	62
Nycticeius humeralis	8	1			1	2	2	3	2	19
Eptesicus fuscus	-	2	-	1	4	-	2	4	1	14
Perimyotis subflavus	-	-	-	-	-	-	1	2	-	3
Myotis grisescens	-	1	-	-	-	-	-	-	-	1
Total	9	6	-	4	6	11	18	25	20	99

Eptesicus fuscus = big brown bat, *Lasiurus borealis* = eastern red bat, *Perimyotis subflavus* = tricolored bat, *Myotis grisescens* = gray bat, *Nycticeius humeralis* = evening bat
NR = non-reproductive, TD = testes descended, PL = post-lactating, L = lactating, UNK = Unknown
* Bat escaped or released prior to processing

Table 3. Summary of Listed Bat and Target Species Bat Captures During the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Bat Species	Capture Site Number	Capture Date (2024)	Age	Sex	Reproductive Status	Transmitter Freq. (172.xxx)	Band ID (KYF&W)
*Perimyotis subflavus**	1	1 Aug	Juvenile	Male	Non-reproductive	-	-
Perimyotis subflavus	1	4 Aug	Juvenile	Female	Non-reproductive	125	C21800
Perimyotis subflavus	1	4 Aug	Juvenile	Female	Non-reproductive	607	C21799
Myotis grisescens	3	1 Aug	Adult	Male	Non-reproductive	-	B26351

* Bat was too small to band or to apply a radio-transmitter

Diurnal Radio-Telemetry

In total, three tricolored bats were captured during the survey at Site 1. The first tricolored bat, captured on 1 August, was processed but found to be too small (4.0 grams) to band or apply a radio-transmitter. However, two additional tricolored bats (Bat 125 and Bat 607), captured at Site 1 on 4 August 2024, were banded, fitted with radio-transmitters and tracked for seven days (5 – 11 August). In total, four roost trees were documented (Table 4, Figure 2). Of the four located roost trees, three were tulip poplar (*Liriodendron tulipifera*) and one was a sugar maple (*Acer saccharum*). All roost trees were live and located within interior forests. A summary of radio-

tracking results for each bat is provided below and in Table 5. Detailed roost tree data are provided in Appendix F and roost tree photographs are provided in Appendix G.

Table 4. Roost Locations Used by Radio-Tagged Tricolored Bats During the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Bat ID	Roost ID	Date First Used (2024)	Tree Species	Latitude	Longitude	Tree Decay State	DBH (cm)	Tree Height (m)	Percent Bark Cover
125	170	5 August	*Acer saccharum*	37.09515	-86.97905	Live	16.2	18	100
125	582	6 August	*Liriodendron tulipifera*	37.09531	-86.97900	Live	35.7	25	100
607	171	5 August	*Liriodendron tulipifera*	37.11084	-86.97647	Live	9.8	12	100
607	304	6 August	*Liriodendron tulipifera*	37.11088	-86.97641	Live	31.4	22	100

Table 5. Daily Roost Use by Radio-Tagged Tricolored Bats During the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Bat ID	5 August	6 August	7 August	8 August	9 August	10 August	11 August
125	RT 170	RT 582	RT 582	RT 582	RT 582	RT 582	RT 582
607	RT 171	RT 304	Triangulated in the immediate area of RT 171 and RT 304	Triangulated in the immediate area of RT 171 and RT 304	Triangulated in the immediate area of RT 171 and RT 304	Triangulated in the immediate area of RT 171 and RT 304	Triangulated in the immediate area of RT 171 and RT 304

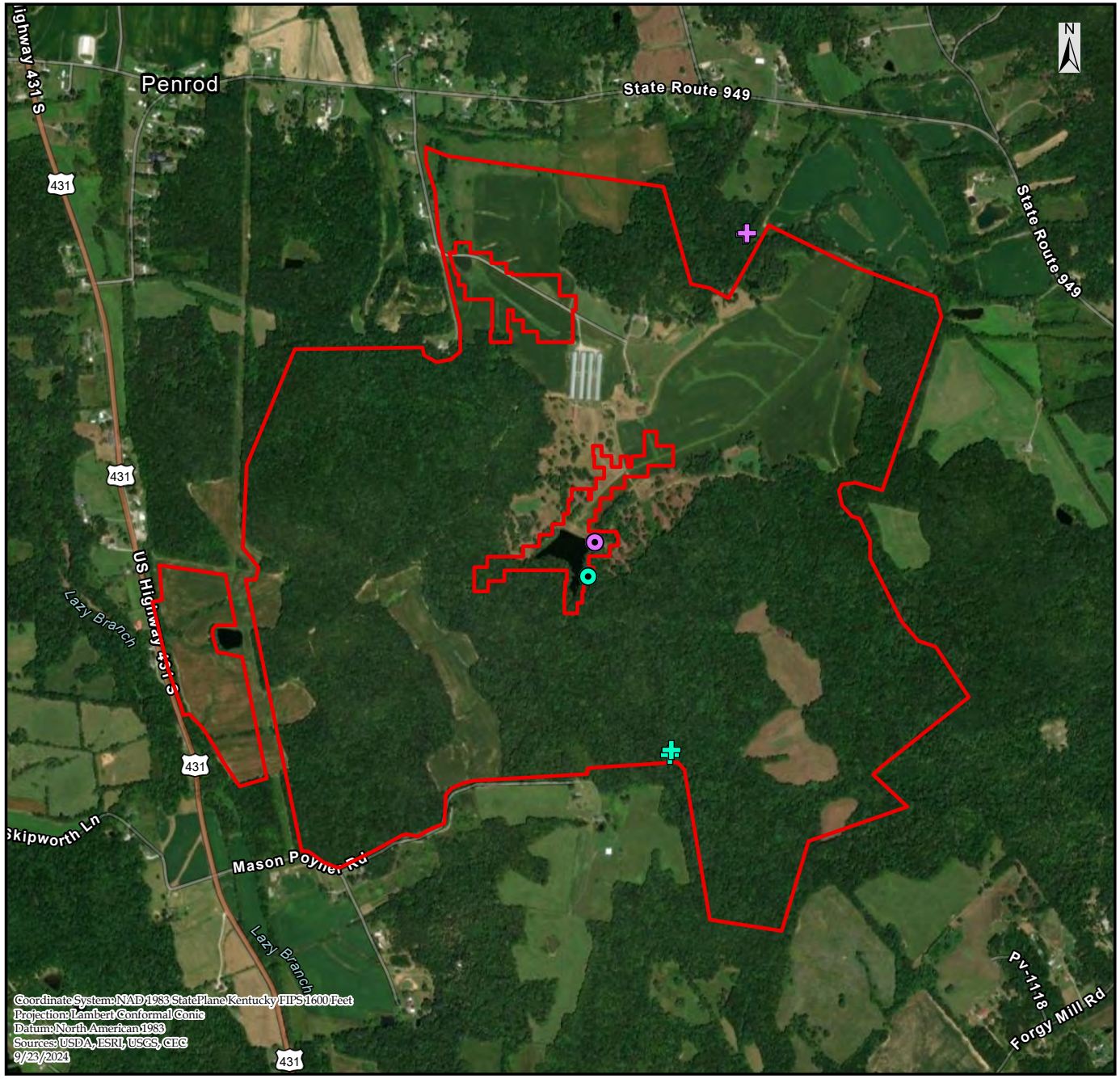

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FIGURE 2:
Tricolored Bat Radio-Telemetry Overview for the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Legend

- Bat 125 Capture Location
- Bat 607 Capture Location
- Bat 125 Roost Location
- Bat 607 Roost Location
- AOI

0 500 1,000
US Feet

Scale: 1 in = 1,500 ft

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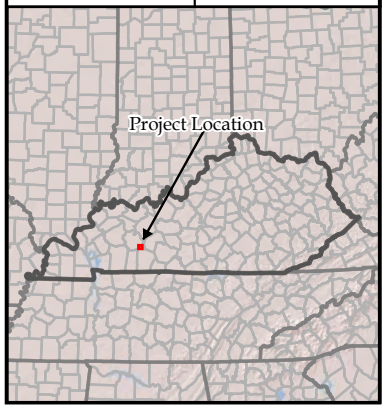

Bat 125

Bat 125 was a juvenile non-reproductive female tricolored bat caught and radio-tagged at Site 1 on 4 August 2024. On 5 August, Bat 125 was found roosting approximately 655 meters southeast of the capture location in a live sugar maple (RT 170). On 6 August, Bat 125 was found to have moved approximately 17 meters north to roost in a live tulip polar (RT 582). Bat 125 remained in RT 582 for the remainder of the radio-tracking effort (6-11 August). In total, radio-telemetry efforts documented two roosts used by Bat 125 (Table 4 and 5 and Figure 2 and 3).

Bat 607

Bat 607 was a juvenile non-reproductive female tricolored bat caught and radio-tagged at Site 1 on 4 August 2024. On 5 August, Bat 607 was found roosting approximately 1,144 meters northeast of the capture location in a live tulip poplar (RT 171) approximately 54 meters outside of the Project AOI. On 6 August, Bat 607 was found to have moved approximately 7 meters northeast to roost in a second live tulip polar (RT 304). While tracking Bat 607 on 7 August, biologists encountered freshly marked property boundary markers on the edge of the Project AOI. Since landowner permission for the area outside the Project AOI was not granted, tracking crews used radio-telemetry triangulation techniques from within the Project AOI to determine the approximate roost location for Bat 607. Bat 607 was triangulated to be roosting in the immediate area of RT 171 and RT 304. Since these roosts were only 7 meters apart, it is unknown which exact roost Bat 607 was using. Bat 607 continued to roost in the immediate area of RT 171 and RT 304 for the remainder of the radio-tracking effort (7-11 August). In total, radio-telemetry efforts documented two roosts used by Bat 607 (Table 4 and 5 and Figure 2 and 4).

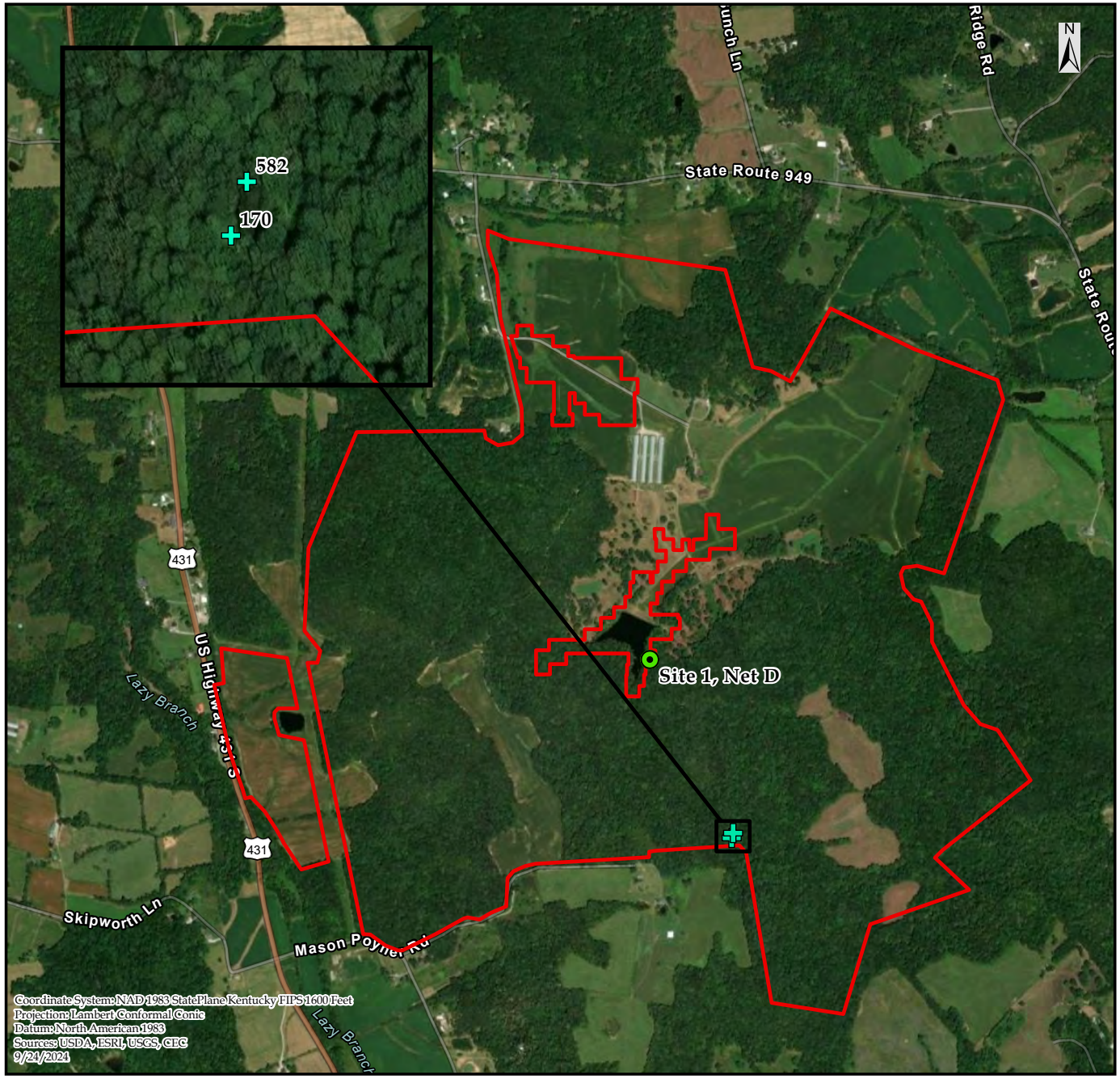

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FIGURE 3:
Bat 125 Roost Locations
for the Lost City Solar
Generating Facility Project,
Muhlenberg County, Kentucky.

Legend

- Bat 125 Roost Location
- Capture Location
- AOI

0 500 1,000
US Feet

Scale: 1 in = 1,500 ft

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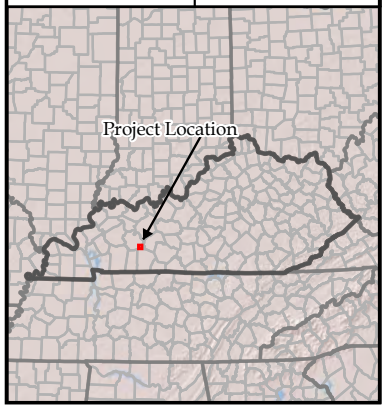

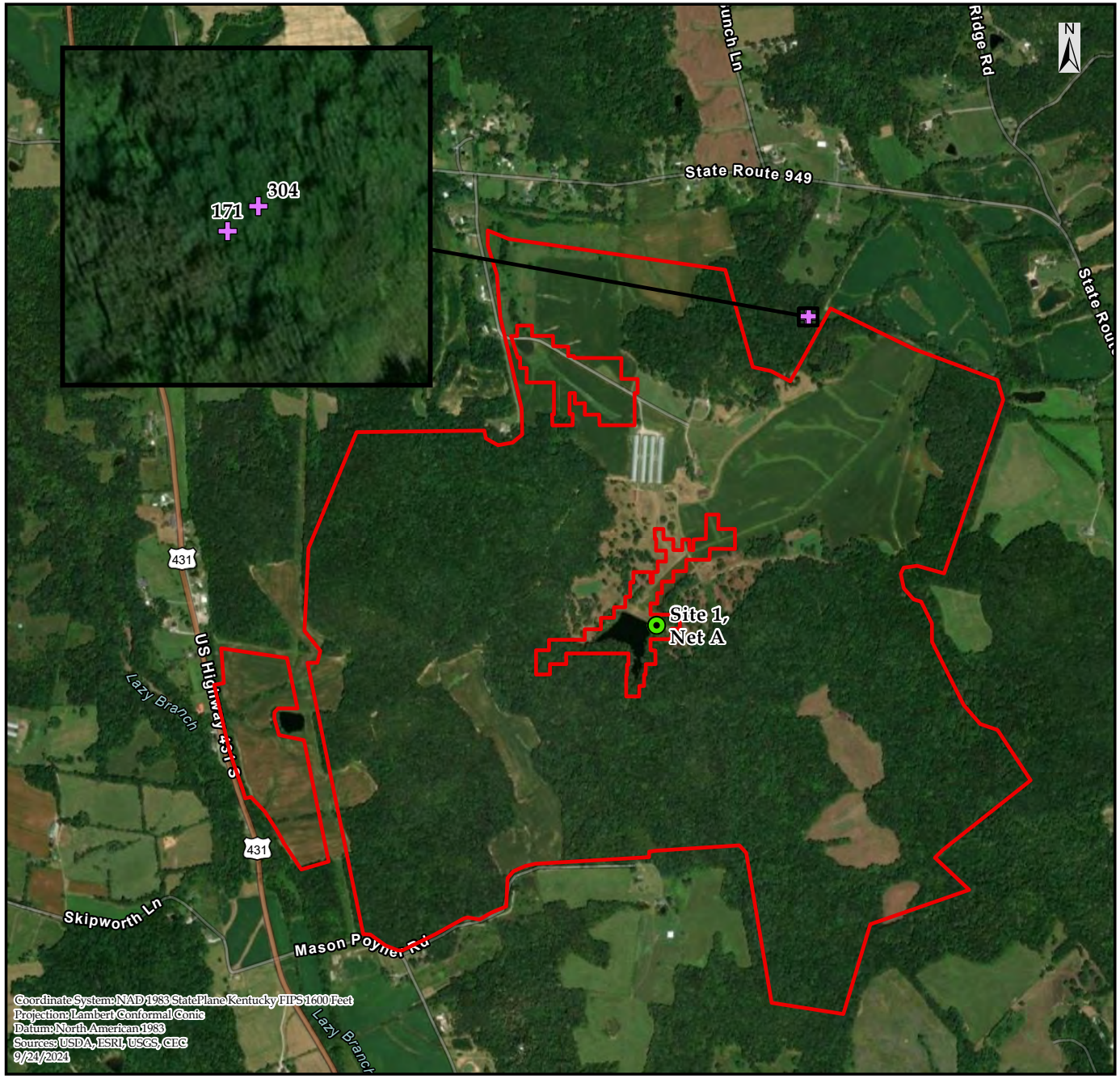

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FIGURE 4:
Bat 607 Roost Locations
for the Lost City Solar
Generating Facility Project,
Muhlenberg County, Kentucky.

Legend

- Bat 607 Roost Location
- Capture Location
- AOI

0 500 1,000
US Feet

Scale: 1 in = 1,500 ft

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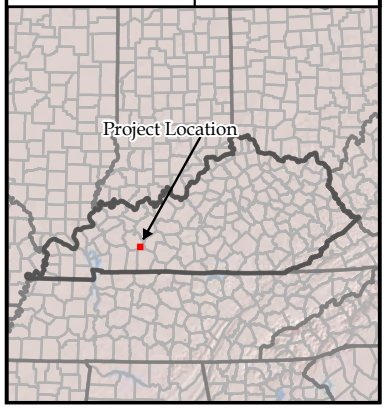

Habitat

The Project AOI is located directly southeast of Penrod, Kentucky. The Project AOI consists of a variety of habitats including residential and commercial farming property, agricultural fields, fallow fields, and forested areas. A summary of habitat at each of the mist-net survey sites is provided in Table 6.

Table 6. Habitat Classifications for the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Site ID	Roost Habitat[1]	Water Resources[2]	Forest Structure[3]	Land Cover[4]	Dominant Vegetation
1	moderate	optimal	poor	moderate	*Acer saccharinum, Fagus grandifolia, Juniperus virginiana, Liriodendron tulipifera, Liquidambar styraciflua*
2	optimal	poor	moderate	moderate	*Acer saccharum, Fagus grandifolia, Liquidambar styraciflua, Liriodendron tulipifera, Quercus stellata, Carya laciniosa*
3	optimal	poor	optimal	optimal	*Fraxinus pennsylvanica, Juniperus virginiana, Nyssa sylvatica, Quercus montana, Ulmus alata*
4	optimal	poor	optimal	optimal	*Fraxinus americana, Juniperus virginiana, Quercus montana, Quercus stellata, Quercus rubra, Ulmus alata*
5	moderate	poor	moderate	optimal	*Quercus rubra, Quercus montana, Quercus marilandica, Fraxinus americana, Juniperus virginiana*
6	moderate	moderate	moderate	optimal	*Fagus grandifolia, Acer saccharum, Liriodendron tulipifera, Platanus occidentalis, Liquidambar styraciflua*
7	poor	optimal	moderate	optimal	*Acer rubrum, Acer saccharum, Fraxinus americana, Platanus occidentalis, Liriodendron tulipifera, Liquidambar styraciflua, Pinus virginiana*
8	moderate	moderate	moderate	optimal	*Quercus montana, Quercus alba, Juniperus virginiana, Acer rubrum, Ulmus rubra, Carya tomentosa*

[1]Roost Habitat - Poor: No or few snags >= ~5″ DBH with sloughing bark or other usable roost features (cracks, crevices, etc.); Moderate: Snags with sloughing bark or other roost features present ~5-15-inch DBH within 1000 feet of forested areas; Optimal: Snags with sloughing bark or other roost features present >~15-inch DBH within 1000 feet of forested areas. [2]Water Resources - Poor: bat drinking resources not present at the site; Moderate: Ephemeral or intermittent streams or ponded areas present but too cluttered to allow many bats to drink easily or simultaneously. No corridors, openings or canopy gaps allow bats easy access to the resource; Optimal: Streams or ponds (including road ruts) present that appear to offer drinking resource throughout the majority of the summer. Flyways to resources are available. [3]Forest Structure - Poor: Habitat even aged and young. Trees smaller than 5-inch DBH. Understory growth cluttered and restricts flying/foraging. Hardwoods are absent or stand is monoculture; Moderate: some diversity in age of trees in the stand. Trees 5 to 15 inches present. Understory clutter dominant but not ubiquitous. Trees greater than 15″ DBH may be present but rare; Optimal: Mature forest. Diverse age classes of trees present. Trees > 15-inch DBH frequent. Varying tree height and treefalls allow for frequent small openings and gaps that facilitate bat foraging. [4]Land Cover- Poor: Area surrounding site predominantly un-forested. Few mature trees present not connected to other areas of trees; Moderate: Trees present in the form of small woodlots and wooded fence rows. Little connection to adjacent forested areas; Optimal: Area is largely forested. Wooded stands are connected to other wooded stands via wooded stream, fence row, or other wooded corridor.

Culvert Inspection

Copperhead biologists assessed a historic railroad culvert located at 37.09862, -86.99820 for evidence of roosting bats on 3 August 2024 (Figure 1). The culvert was found to be approximately 1.5 meters heigh, 18.3 meters long and was constructed of hand cut stone. No bats were observed roosting within the culvert during the inspection. However, a small amount of desiccated guano was observed within the cracks of the culvert wall, and fresh guano was observed on the walls of the culvert. Completed *Bridge/Culvert Bat Assessment Forms* are provided in Appendix H and representative photographs are provided in Appendix I.

CONCLUSIONS

During the mist-net survey, three tricolored bats were captured at Site 1 in the center of the Project AOI, and a single gray bat was captured at Site 3 in the western portion of the Project AOI. Radio-telemetry efforts documented a total of four tricolored bat roost trees, two of which are located immediately outside the northern boundary of the Project AOI (Figure 2 and 4). No Indiana bats, northern long-eared bats, or little brown bat bats were captured during the mist-net survey. This suggests these species are not likely present within the Project AOI during the maternity season or are present in numbers too low to be detected by approved USFWS protocols. According to the Guidance, probable absence results for federally listed bat species are valid for up to five years (USFWS 2024b).

During the culvert bat inspection, no bats were observed roosting within the culvert, however, biologists did observe evidence of previous bat use (fresh and desiccated guano). This indicates that the culvert has been used by bats in the past.

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APPENDIX A

US Fish and Wildlife Service Correspondence

U.S. Fish and Wildlife Service

Study Plan Form for Bat Surveys and Monitoring (v. 2.1)[1]

PROJECT & SURVEY INFORMATION

Project Name: Lost City Solar (Generating Facility)

Proposed Survey Start Date: 29 July 2024

Project Proponent's Name (e.g., client/company/institution): Lost City Renewables, LLC

Project Location: State(s): Kentucky

County(s): Muhlenberg

Latitude: 37.10215

Longitude: -86.98178

REQUIRED: Attach or provide links to Google Earth® KMZ files (preferred) and/or shapefiles (mapping must show project boundaries, impacted forest habitat (if known) and all proposed survey sites)
Files are attached: Yes ☑ No ☐
File Links:

Project Summary. In the space provided below, please provide a description of the proposed action, including any activities that will permanently or temporarily alter the current environment and existing habitat features.

Lost City Renewables, LLC plans to develop a 250-Megawatt solar generating facility near the town of Penrod, Kentucky in Muhlenberg County. Development is planned to occur in non-forested and forested areas throughout the Project Area. The actual amount of tree clearing is not yet known, and will depend on the final Project design and layout.

CONTACT INFORMATION

Project Manager/Primary Point of Contact (POC): Zachary Baer

Phone: 724-549-6739

Field Survey Crew Leader (if different from POC): Zachary Baer

Cell Phone: 724-549-6739

Institution/Company Name: Copperhead Environmental Consulting, Inc.

Mailing Address: 471 Main Street, P.O. Box 73, Paint Lick, KY 40461

POC Email Address: zbaer@copperheadconsulting.com

USFWS Sec. 10(a)(1)(A) Permit No.(s) (if applicable): ES94849B-2; ES25612A-2; ES56515D-1

State Permit No.(s) (if applicable): see additional survey information section below

[1] Unless otherwise directed by the Service, surveyors may complete this fillable form, in lieu of a traditional narrative format, and submit it (and supporting files) to the Ecological Services Field Office in the state(s) where the work is to be completed (https://www.fws.gov/our-facilities). Use of this form is not a requirement at this time. Our goal is to improve pre-survey coordination and to expedite the Field Office review and approval process. Please submit your study plan at least 15 working days in advance of your proposed survey start date. Suggestions for improving this document may be sent to R4_Bat_Survey_Guidance@fws.gov.

Have project proponents been informed that abiding by protective time-of-year restrictions (where available) may be sufficient to avoid take of federally listed bats and (in some cases) may negate the need for a bat survey? Yes☑ No☐

Have project proponents been informed that the Service does not require presence/probable absence surveys for federally listed species and that presence can be assumed in a project area containing suitable habitat? Yes☑ No☐

Will this survey be conducted on private or public lands? *(Check both if applicable)*: Private☑ Public☐

Has permission of all necessary landowners/managing agencies been obtained? Yes☑ No☐

If no, explain: _____

Does this project have a federal nexus[2]? Yes☑ No☐ Unsure☐

If yes, explain: Project may require US Army Corps of Engineers 404 permit

IPaC[3] Consultation Code (if applicable): 2024-0039738

Purpose of Survey: Official P/A Survey ☑ Research ☐ Monitoring ☐
Educational Outreach/Training Other: _____

Survey Target Species: Indiana bat (IBAT) ☑ Northern long-eared bat (NLEB) ☑
Tricolored bat (TCB) ☑ Other: Little brown bat

Has a Phase-1 Habitat Assessment* of the project area been conducted? Yes☑ No☐
If yes, how was the habitat assessment conducted? Field☐ Desktop☑ Combo☐
*(*if available, attach a written report)*

Is suitable habitat[4] present (or assumed present) for all "target" species? Yes☑ No☐

If no, explain: _____

Does this project fall within the outer-tier[5] of any "target" species known home range? Yes☐ No☐ Unsure☑

If yes, which species: _____

Project Configuration

Is this project **linear** (>1 km in total length)? Yes☐ No☑ Combo☐ Unsure☐

If yes, how many 1-km sections containing suitable IBAT/NLEB habitat will be impacted? _____

Is this project **non-linear**? Yes☑ No☐ Combo☐ Unsure☐

If yes, how many acres of suitable IBAT/NLEB habitat is in the overall project area? 690

If yes, how many acres of suitable IBAT/NLEB habitat will be directly impacted/cleared? unknown

PROPOSED METHODS & SURVEY LEVEL OF EFFORT[6]

ACOUSTICS

Total number of detector sites proposed to be surveyed: 0 Number of detector nights/site: N/A

[2] A project or action that is carried out, authorized, funded, and/or permitted by a federal agency.
[3] https://ipac.ecosphere.fws.gov/
[4] See Appendix A of the Guidelines regarding suitable habitat definitions.
[5] See Appendix G of the Guidelines if you are unclear what the out-tier of a known range includes.
[6] Survey level of effort (acoustic or netting) must be spread over at least two calendar nights/survey site.

Total number of detector nights for entire survey: _____

Total proposed number of calendar nights to complete the entire survey: _____

Detector(s) (Brand, Model): _____ Microphone(s): directional☐ omnidirectional☐

Recording Format: Full Spectrum☐ Zero-Crossing☐

FWS-Approved[7] Acoustic Bat ID Software: KPro vers.____ KPro Classifier, NA vers. ____ BCID vers.____
Other Candidate Programs (e.g., Sonobat) vers.: _____

Species to be included for automatic software ID classification analysis:

EPFU☐ CORA☐ COTO☐ LABO☐ LACI☐ LANO☐ LASE☐ TABR☐ MYCI☐ MYEV☐ MYGR☐ MYLU☑
MYLE☐ MYSE☐ MYSO☑ MYTH☐ MYVO☐ NYHU☐ PESU☑ Others:_____

Will qualitative analysis (i.e., manual vetting) be used? Yes☐ No☐ Unsure☐

Name(s) of qualified biologist(s) conducting qualitative/manual identifications (attach resume or link with qualifications):

_____

MIST-NETTING

Total number of net sites to be surveyed: 8 Total number of net nights/site: See additional survey infor

Total number of net nights for entire survey (No. of sites X No. of net nights/site): 60

Total proposed number of calendar nights to complete the entire survey: 4

A) Maximum number of net set-ups that will be operated/checked (10-min interval) on a given calendar night at a given survey site: 4
B) Minimum Number of personnel present to operate/check X (see A) net set-ups on a given site: 2
C) Proposed Staffing Rate (A divided by B): 2

Staffing Rate

Number of Section 10-permitted biologists per net site (or state-permitted in USFWS R5): 1

Do you propose to band bats? Yes☑ No☐

If yes, please answer the following:

What species will be banded? COTO☐ MYGR☐ MYLU☑ MYSE☐ MYSO☑ PESU☑
Others:_____ All captured bats:
If banding *Myotis* sp. or PESU, specify band size: 2.4-PESU 2.9-Myotis
Describe your proposed bands (color and letter-numbers) and banding scheme: Silver KDFWR
Will banding pliers be used? Yes☑ No☐

Will any biological samples be collected from captured bats (e.g., guano, hair, swab, wing punch)? Yes☐ No☑

If yes, explain: _____

Name of institution or facility to conduct DNA analysis: _____

RADIO-TRACKING

Will any bats be radio-tagged and tracked? Yes☑ No☐

[7] https://www.fws.gov/media/automated-acoustic-bat-id-software-programs

If yes, please answer following:

Which species will be radio-tagged? Indiana, northern long-eared, tricolored, and little brown bats

Name of USFWS Section 10 permitted biologist(s) who will apply transmitter(s): see additional survey information below

Make/model and approximate weight of transmitter(s) to be used: Holohil, LB-2X, 0.27g

Manufacturer date and estimated life-span of transmitters to be used: 1 January 2023 or newer, 12 days

Frequency range (MHz) of transmitters (e.g., 150.xxx or 172.xxx): 172.xxx

If radio-tracking multiple targeted bats/species, what criteria will be used in selecting which bats will be tracked?
Up to two bats of each target species will be radio-tagged. Preference will be given to adult reproductive females and juvenile bats of each target species.

Will all radio-tagged bats be tracked (min. of 4-hrs. search effort/day) to their diurnal roosts for the minimum recommended period of 7 days? Yes☑ No☐

If no, explain: _____

Will night-time foraging data/telemetry be collected? Yes☐ No☑

Glue used for attaching transmitters: Type: Silicone-based Surgical Adhesive Name: Perma type

Manufacturer: Perma-Type Company, In Other: _____

EMERGENCE SURVEYS

After diurnal roost sites of radio-tagged bats are identified, will emergence surveys be conducted at each identified roost (assuming landowner permission is obtained)? Yes☑ No☐

If yes, how many emergence surveys/roost? maximum of two per roost

Have you identified a small number (e.g., ≤10) of potentially suitable roost trees* that you propose to conduct emergence surveys for? Yes☐ No☑

*(*If yes, provide photographs of each tree documenting that all of the tree can be observed by the surveyor along with coordinates (lat/long and/or KML/shapefile) of all trees to be surveyed.)*

POTENTIAL HIBERNACULA SURVEYS

Are you aware of any known hibernacula used by the target species within the project area itself or nearby?

Yes☐ No☑ Unknown☐

If yes or unknown, list sites or explain: _____

Has your desktop analysis identified any natural or man-made features that could be used as a hibernaculum by any of the target bat species? Yes☐ No☑ Unknown☐

If yes, underground features (e.g., caves, mines, tunnels, bunkers, cisterns) present: Yes☐ No☐

If yes, above-ground features* (e.g., crawl spaces) present: Yes☐ No☐

If unknown, explain: _____

Are you requesting approval of a field survey for potential hibernacula at this time? Yes*☐ No☑

*(*If yes, attach a separate narrative explaining how the project area(s) will be surveyed for potential hibernacula.)*

Are you submitting the results of a Phase 1 Habitat Assessment of potentially suitable hibernacula identified from field surveys? Yes*☐ No☑

*(*If yes, provide a Phase 1 Habitat Assessment Data Sheet for each potential hibernaculum/portal(s)[8] identified to be surveyed.)*

BRIDGE & CULVERT ASSESSMENTS

Will any bridges or culverts be surveyed for bat presence? Yes☐ No☑

If yes, please answer the following:

[8] If multiple cave entrances/portals, please list all locations.

Structure type(s) (check all that apply): Bridge☐ Culvert☐ Other☐
If "other", explain: _____

Survey methodology for structure(s) (check all that apply):
Visual inspection☐ Guano collection☐ Emergence survey☐ Acoustics*☐
Mist-net*☐ Harp-trap*☐ Other _____
*(*Due to site-specific conditions of structures, coordination with the local USFWS Field Office and appropriate state agency(ies) is necessary before proceeding with these survey methodologies)*

Will guano be collected and analyzed to confirm species ID? Yes☐ No☐
If "yes", name of institution/entity performing analysis: _____

ADDITIONAL SURVEY INFORMATION[9]

Will the proposed bat survey deviate from the current version of the USFWS Survey Guidelines?[10] Yes☐ No☑

If yes, provide justification for any departures or modifications to the guidelines (if applicable) below:

Proposed mist-net locations are provided on the attached Project mapping files. However, actual locations will be determined in the field based on site specific conditions. Proposed survey start date, field survey crew and field survey crew leader will be dependent on staff availability and scheduling. If captured, emergence surveys will not be conducted at tricolored bat roost per the 2024 USFWS Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines.

Kentucky State Permit Numbers: SC2411004; SC2411010; SC2411005; SC2411006; SC2411011; SC2411018; SC2411012; SC2411013; SC2411007; SC2411008; SC2411014; SC2411015; SC2411176; SC2411016; SC2411017;

Name of USFWS Section 10 permitted biologist(s) who may apply transmitter(s): Zachary Baer, Crystal Birdsall, Ian Burns, Taylor Culbertson, Kelsie Eshler, Malachia Evans, Mark Gumbert, Chris Leftwich, Les Meade, Piper Roby, Steve Samoray, Michael Schirmacher, William Seiter, and/or Price Sewell

Copperhead proposes to survey eight individual mist-net sites to complete the necessary 60 net nights of survey. Eight net nights (four net nights per calender night) of survey will be completed at seven sites and four net nights (two net nights per calender night) of survey will be completed at one mist-net site. Each mist-net site will be surveyed for a minimum of two calendar nights.

I hereby acknowledge that the information being provided to the Service is accurate and complete as of today's date.

Signature: Zachary Baer Digitally signed by Zachary Baer Date: 2024.07.05 16:36:35 -04'00' Date: 07-05-2024

[9] Attach additional pages to this form, if needed.

[10] Proposed surveys deviating from the current Range-wide IBAT & NLEB Survey Guidelines will only be accepted with a thoroughly described justification. Coordinate with your local USFWS Field Office (https://www.fws.gov/our-facilities) for acceptable modifications.

********FOR U.S. FISH AND WILDLIFE SERVICE USE ONLY**********

United States Department of the Interior

Fish and Wildlife Service

Kentucky ES Field Office

330 W. Broadway, Room 265, Frankfort, KY 40601

Office Phone: (502) 695-0468

SITE-SPECIFIC AUTHORIZATION - BAT WORK

Our Field Office has reviewed your study plan and found it to contain sufficient information for our approval. When signed, this statement serves as your site-specific authorization to conduct the proposed activities at the specified locations included in the attached Study Plan Form and supporting files and must be carried with your federal permit when conducting work for this project. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit as well as your state permit(s) (if needed). The section 10(a)(1)(A) permit authorizing the activities must remain with the surveyor at all times. This authorization is not valid if you have not obtained permission from the owner of the lands where activities will occur.

For federal permit reporting purposes, please use the appropriate USFWS bat survey data spreadsheet, available on the IBAT and NLEB Summer Survey Guidance website[1]. To mitigate the risk of humans transmitting viruses (e.g., SARS-CoV-2) to bats or viral transmission from bats to humans, the U.S. Fish and Wildlife Service requests anyone directly handling or working in close proximity to bats follow current guidelines prepared by the CDC[2] and IUCN Bat Specialist Group[3] in addition to the following the standard WNS decontamination protocols[4].

If the work expands beyond the scope of your original study plan or if there are adverse effects to bats that were not anticipated, cease all survey and/or research activities, and contact this office prior to continuing. Additionally, if a federally listed bat is captured, this USFWS Field Office must be notified within 48 hours with information regarding species, sex, age, and whether or not the bat has a transmitter attached.

Field Office POC: Mike Armstrong

email: Mike_Armstrong@fws.gov phone: (502) 229-4632

☐ **Authorized as Proposed**

☑ **Authorized with Conditions** (see below)

You are authorized to proceed provided that the following adjustment(s) and/or conditions are met.

(1) Band any MYGR captured with appropriate sized KDFWR bands using banding pliers. (2) Ensure net set placements reflect variation of habitats present on site and preferred by MYSO, MYSE, and PESU. (3) Ensure transmitters are thoroughly tested for proper functioning prior to the study (see Appendix D of Survey Guidance). (4) attach transmitters to the first 2 individuals of all 3 species

☐ **Not Authorized.**

Comments:

Signature & Date: MICHAEL ARMSTRONG

Digitally signed by MICHAEL ARMSTRONG
Date: 2024.07.08 11:22:46 -04'00'

NOTE: Please check the appropriate box above before signing/locking the document.

[1] https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines
[2] https://www.cdc.gov/healthypets/covid-19/wildlife.html
[3] https://www.iucnbsg.org/uploads/6/5/0/9/6509077/amp_recommendations_for_researchers_final.pdf
[4] https://www.whitenosesyndrome.org/mmedia-education/national-wns-decontamination-protocol-u-s

Zack Baer

From: Armstrong, Mike <mike_armstrong@fws.gov>
Sent: Thursday, July 11, 2024 8:52 AM
To: Zack Baer; FWWildlifeDiversity@ky.gov; KentuckyES, FW4; Burford, Laura S (FW)
Cc: Marty Marchaterre; Chris Leftwich
Subject: Re: [EXTERNAL] Lost City Solar Generating Facility (IPaC: 2024-0039738)
Attachments: Amended_1543_Lost City Solar Non-linear Bat Survey_Study Plan_07102024_KFO signed.pdf

Thanks for letting me know Zack. Approved amended study plan attached. All previous conditions still apply.

Mike

Mike Armstrong
Southeast Region Bat Recovery Biologist
U.S. Fish & Wildlife Service
Kentucky Field Office
330 W. Broadway, Room 265
Frankfort, KY 40601
Cell: 502-229-4632
Office/Teams: 502-653-0498

**Check us out at https://www.fws.gov/office/kentucky-ecological-services

---

From: Zack Baer <zbaer@copperheadconsulting.com>
Sent: Wednesday, July 10, 2024 5:42 PM
To: Armstrong, Mike <mike_armstrong@fws.gov>; FWWildlifeDiversity@ky.gov <FWWildlifeDiversity@ky.gov>; KentuckyES, FW4 <kentuckyes@fws.gov>; Burford, Laura S (FW) <Laura.Burford@ky.gov>
Cc: Marty Marchaterre <mmarchaterre@copperheadconsulting.com>; Chris Leftwich <cleftwich@copperheadconsulting.com>
Subject: RE: [EXTERNAL] Lost City Solar Generating Facility (IPaC: 2024-0039738)

Hi Mike,

We have learned that there is an abandoned railroad bridge in the Project area that may be suitable for bats. Because of this I have amended the Study Plan for Lost City to include bridge/culvert inspections. If other potentially suitable bridge/culverts are encountered during the survey these will be inspected for bats as well.

I just wanted to get this amended now so that we can inspect them while we are in the field.

Thanks,

Zachary Baer
Sr. Scientist

Copperhead Environmental Consulting, Inc.
471 Main St.
P.O. Box 73
Paint Lick, Kentucky 40461
724.549.6739 - Mobile
859.925.9012 - Office
859.925.9816 - Fax
www.copperheadconsulting.com

From: Armstrong, Mike <mike_armstrong@fws.gov>
Sent: Monday, July 8, 2024 11:25 AM
To: Zack Baer <zbaer@copperheadconsulting.com>; FWWildlifeDiversity@ky.gov; KentuckyES, FW4 <kentuckyes@fws.gov>; Burford, Laura S (FW) <Laura.Burford@ky.gov>
Cc: Marty Marchaterre <mMarchaterre@copperheadconsulting.com>; Chris Leftwich <cleftwich@copperheadconsulting.com>
Subject: Re: [EXTERNAL] Lost City Solar Generating Facility (IPaC: 2024-0039738)

Morning Zack.

I have reviewed the submitted study plan for the subject project and approve it with conditions. Please review those conditions and let me know if you want to discuss any of them.

Good luck with your survey,

Mike

Mike Armstrong
Southeast Region Bat Recovery Biologist
U.S. Fish & Wildlife Service
Kentucky Field Office
330 W. Broadway, Room 265
Frankfort, KY 40601
Cell: 502-229-4632
Office/Teams: 502-653-0498

**Check us out at https://www.fws.gov/office/kentucky-ecological-services

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From: Zack Baer <zbaer@copperheadconsulting.com>
Sent: Friday, July 5, 2024 4:41 PM

To: Armstrong, Mike <mike_armstrong@fws.gov>; FWWildlifeDiversity@ky.gov <FWWildlifeDiversity@ky.gov>; KentuckyES, FW4 <kentuckyes@fws.gov>; Burford, Laura S (FW) <Laura.Burford@ky.gov>
Cc: Marty Marchaterre <mmarchaterre@copperheadconsulting.com>; Chris Leftwich <cleftwich@copperheadconsulting.com>
Subject: [EXTERNAL] Lost City Solar Generating Facility (IPaC: 2024-0039738)

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Mr. Armstrong, and Ms. Burford,

Please find attached Copperhead Environmental Consulting, Inc.'s (Copperhead) Study Plan to conduct a bat mist-net, and radio-telemetry survey for the proposed Lost City Solar Generating Facility Project in Muhlenberg County, Kentucky (IPaC: 2024-0039738). Can you please review the completed USFWS Study Plan form and attached Project mapping and provide Study Plan approval and site specific authorization, if appropriate.

I have also attached the KDFWR Project Proposal Form.

Please let me know if you have any questions or require any additional information.

Thank you,

Zachary Baer
Sr. Scientist

Copperhead Environmental Consulting, Inc.
471 Main St.
P.O. Box 73
Paint Lick, Kentucky 40461
724.549.6739 - Mobile
859.925.9012 - Office
859.925.9816 - Fax
www.copperheadconsulting.com

U.S. Fish and Wildlife Service

Study Plan Form for Bat Surveys and Monitoring (v. 2.1)[1]

PROJECT & SURVEY INFORMATION

Project Name: Lost City Solar (Generating Facility)

Proposed Survey Start Date: 29 July 2024

Project Proponent's Name (e.g., client/company/institution): Lost City Renewables, LLC

Project Location: State(s): Kentucky

County(s): Muhlenberg

Latitude: 37.10215

Longitude: -86.98178

REQUIRED: Attach or provide links to Google Earth® KMZ files (preferred) and/or shapefiles (mapping must show project boundaries, impacted forest habitat (if known) and all proposed survey sites)
Files are attached: Yes ☑ No ☐
File Links: _____

Project Summary. In the space provided below, please provide a description of the proposed action, including any activities that will permanently or temporarily alter the current environment and existing habitat features.

Lost City Renewables, LLC plans to develop a 250-Megawatt solar generating facility near the town of Penrod, Kentucky in Muhlenberg County. Development is planned to occur in non-forested and forested areas throughout the Project Area. The actual amount of tree clearing is not yet known, and will depend on the final Project design and layout.

CONTACT INFORMATION

Project Manager/Primary Point of Contact (POC): Zachary Baer

Phone: 724-549-6739

Field Survey Crew Leader (if different from POC): Zachary Baer

Cell Phone: 724-549-6739

Institution/Company Name: Copperhead Environmental Consulting, Inc.

Mailing Address: 471 Main Street, P.O. Box 73, Paint Lick, KY 40461

POC Email Address: zbaer@copperheadconsulting.com

USFWS Sec. 10(a)(1)(A) Permit No.(s) (if applicable): ES94849B-2; ES25612A-2; ES56515D-1

State Permit No.(s) (if applicable): see additional survey information section below

[1] Unless otherwise directed by the Service, surveyors may complete this fillable form, in lieu of a traditional narrative format, and submit it (and supporting files) to the Ecological Services Field Office in the state(s) where the work is to be completed (https://www.fws.gov/our-facilities). Use of this form is not a requirement at this time. Our goal is to improve pre-survey coordination and to expedite the Field Office review and approval process. Please submit your study plan at least 15 working days in advance of your proposed survey start date. Suggestions for improving this document may be sent to R4_Bat_Survey_Guidance@fws.gov.

Have project proponents been informed that abiding by protective time-of-year restrictions (where available) may be sufficient to avoid take of federally listed bats and (in some cases) may negate the need for a bat survey? Yes☑ No☐

Have project proponents been informed that the Service does not require presence/probable absence surveys for federally listed species and that presence can be assumed in a project area containing suitable habitat? Yes☑ No☐

Will this survey be conducted on private or public lands? *(Check both if applicable)*: Private☑ Public☐

Has permission of all necessary landowners/managing agencies been obtained? Yes☑ No☐

If no, explain: _____

Does this project have a federal nexus[2]? Yes☑ No☐ Unsure☐

If yes, explain: Project may require US Army Corps of Engineers 404 permit

IPaC[3] Consultation Code (if applicable): 2024-0039738

Purpose of Survey: Official P/A Survey ☑ Research ☐ Monitoring ☐
Educational Outreach/Training Other: _____

Survey Target Species: Indiana bat (IBAT) ☑ Northern long-eared bat (NLEB) ☑
Tricolored bat (TCB) ☑ Other: Little brown bat

Has a Phase-1 Habitat Assessment* of the project area been conducted? Yes☑ No☐
If yes, how was the habitat assessment conducted? Field☐ Desktop☑ Combo☐
*(*if available, attach a written report)*

Is suitable habitat[4] present (or assumed present) for all "target" species? Yes☑ No☐

If no, explain: _____

Does this project fall within the outer-tier[5] of any "target" species known home range? Yes☐ No☐ Unsure☑

If yes, which species: _____

Project Configuration

Is this project **linear** (>1 km in total length)? Yes☐ No☑ Combo☐ Unsure☐

If yes, how many 1-km sections containing suitable IBAT/NLEB habitat will be impacted? _____

Is this project **non-linear**? Yes☑ No☐ Combo☐ Unsure☐

If yes, how many acres of suitable IBAT/NLEB habitat is in the overall project area? 690

If yes, how many acres of suitable IBAT/NLEB habitat will be directly impacted/cleared? unknown

PROPOSED METHODS & SURVEY LEVEL OF EFFORT[6]

ACOUSTICS

Total number of detector sites proposed to be surveyed: 0 Number of detector nights/site: N/A

[2] A project or action that is carried out, authorized, funded, and/or permitted by a federal agency.
[3] https://ipac.ecosphere.fws.gov/
[4] See Appendix A of the Guidelines regarding suitable habitat definitions.
[5] See Appendix G of the Guidelines if you are unclear what the out-tier of a known range includes.
[6] Survey level of effort (acoustic or netting) must be spread over at least two calendar nights/survey site.

Total number of detector nights for entire survey: _____

Total proposed number of calendar nights to complete the entire survey: _____

Detector(s) (Brand, Model): _____ Microphone(s): directional☐ omnidirectional☐

Recording Format: Full Spectrum☐ Zero-Crossing☐

FWS-Approved[7] Acoustic Bat ID Software: KPro vers.____ KPro Classifier, NA vers. ____ BCID vers.____
Other Candidate Programs (e.g., Sonobat) vers.: _____

Species to be included for automatic software ID classification analysis:

EPFU☐ CORA☐ COTO☐ LABO☐ LACI☐ LANO☐ LASE☐ TABR☐ MYCI☐ MYEV☐ MYGR☐ MYLU☑
MYLE☐ MYSE☐ MYSO☑ MYTH☐ MYVO☐ NYHU☐ PESU☑ Others:_____

Will qualitative analysis (i.e., manual vetting) be used? Yes☐ No☐ Unsure☐

Name(s) of qualified biologist(s) conducting qualitative/manual identifications (attach resume or link with qualifications):

_____

MIST-NETTING

Total number of net sites to be surveyed: 8 Total number of net nights/site: See additional survey infor

Total number of net nights for entire survey (No. of sites X No. of net nights/site): 60

Total proposed number of calendar nights to complete the entire survey: 4

A) Maximum number of net set-ups that will be operated/checked (10-min interval) on a given calendar night at a given survey site: 4
B) Minimum Number of personnel present to operate/check X (see A) net set-ups on a given site: 2
C) Proposed Staffing Rate (A divided by B): 2

Staffing Rate

Number of Section 10-permitted biologists per net site (or state-permitted in USFWS R5): 1

Do you propose to band bats? Yes☑ No☐

If yes, please answer the following:

What species will be banded? COTO☐ MYGR☐ MYLU☑ MYSE☐ MYSO☑ PESU☑
Others:_____ All captured bats:
If banding *Myotis* sp. or PESU, specify band size: 2.4-PESU 2.9-Myotis
Describe your proposed bands (color and letter-numbers) and banding scheme: Silver KDFWR
Will banding pliers be used? Yes☑ No☐

Will any biological samples be collected from captured bats (e.g., guano, hair, swab, wing punch)? Yes☐ No☑

If yes, explain: _____

Name of institution or facility to conduct DNA analysis: _____

RADIO-TRACKING

Will any bats be radio-tagged and tracked? Yes☑ No☐

[7] https://www.fws.gov/media/automated-acoustic-bat-id-software-programs

If yes, please answer following:

Which species will be radio-tagged? Indiana, northern long-eared, tricolored, and little brown bats

Name of USFWS Section 10 permitted biologist(s) who will apply transmitter(s): see additional survey information below

Make/model and approximate weight of transmitter(s) to be used: Holohil, LB-2X, 0.27g

Manufacturer date and estimated life-span of transmitters to be used: 1 January 2023 or newer, 12 days

Frequency range (MHz) of transmitters (e.g., 150.xxx or 172.xxx): 172.xxx

If radio-tracking multiple targeted bats/species, what criteria will be used in selecting which bats will be tracked?
Up to two bats of each target species will be radio-tagged. Preference will be given to adult reproductive females and juvenile bats of each target species.

Will all radio-tagged bats be tracked (min. of 4-hrs. search effort/day) to their diurnal roosts for the minimum recommended period of 7 days? Yes☑ No☐

If no, explain: _____

Will night-time foraging data/telemetry be collected? Yes☐ No☑

Glue used for attaching transmitters: Type: Silicone-based Surgical Adhesive Name: Perma type

Manufacturer: Perma-Type Company, In Other: _____

EMERGENCE SURVEYS

After diurnal roost sites of radio-tagged bats are identified, will emergence surveys be conducted at each identified roost (assuming landowner permission is obtained)? Yes☑ No☐

If yes, how many emergence surveys/roost? maximum of two per roost

Have you identified a small number (e.g., ≤10) of potentially suitable roost trees* that you propose to conduct emergence surveys for? Yes☐ No☑

*(*If yes, provide photographs of each tree documenting that all of the tree can be observed by the surveyor along with coordinates (lat/long and/or KML/shapefile) of all trees to be surveyed.)*

POTENTIAL HIBERNACULA SURVEYS

Are you aware of any known hibernacula used by the target species within the project area itself or nearby?

Yes☐ No☑ Unknown☐

If yes or unknown, list sites or explain: _____

Has your desktop analysis identified any natural or man-made features that could be used as a hibernaculum by any of the target bat species? Yes☐ No☑ Unknown☐

If yes, underground features (e.g., caves, mines, tunnels, bunkers, cisterns) present: Yes☐ No☐

If yes, above-ground features* (e.g., crawl spaces) present: Yes☐ No☐

If unknown, explain: _____

Are you requesting approval of a field survey for potential hibernacula at this time? Yes*☐ No☑

*(*If yes, attach a separate narrative explaining how the project area(s) will be surveyed for potential hibernacula.)*

Are you submitting the results of a Phase 1 Habitat Assessment of potentially suitable hibernacula identified from field surveys? Yes*☐ No☑

*(*If yes, provide a Phase 1 Habitat Assessment Data Sheet for each potential hibernaculum/portal(s)[8] identified to be surveyed.)*

BRIDGE & CULVERT ASSESSMENTS

Will any bridges or culverts be surveyed for bat presence? Yes☑ No☐

If yes, please answer the following:

[8] If multiple cave entrances/portals, please list all locations.

Structure type(s) (check all that apply): Bridge☑ Culvert☑ Other☐
If "other", explain: _____

Survey methodology for structure(s) (check all that apply):
Visual inspection☑ Guano collection☐ Emergence survey☐ Acoustics*☐
Mist-net*☐ Harp-trap*☐ Other _____
*(*Due to site-specific conditions of structures, coordination with the local USFWS Field Office and appropriate state agency(ies) is necessary before proceeding with these survey methodologies)*

Will guano be collected and analyzed to confirm species ID? Yes☐ No☑
If "yes", name of institution/entity performing analysis: _____

ADDITIONAL SURVEY INFORMATION[9]

Will the proposed bat survey deviate from the current version of the USFWS Survey Guidelines?[10] Yes☐ No☑

If yes, provide justification for any departures or modifications to the guidelines (if applicable) below:

Proposed mist-net locations are provided on the attached Project mapping files. However, actual locations will be determined in the field based on site specific conditions. Proposed survey start date, field survey crew and field survey crew leader will be dependent on staff availability and scheduling. If captured, emergence surveys will not be conducted at tricolored bat roost per the 2024 USFWS Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines.

Kentucky State Permit Numbers: SC2411004; SC2411010; SC2411005; SC2411006; SC2411011; SC2411018; SC2411012; SC2411013; SC2411007; SC2411008; SC2411014; SC2411015; SC2411176; SC2411016; SC2411017;

Name of USFWS Section 10 permitted biologist(s) who may apply transmitter(s): Zachary Baer, Crystal Birdsall, Ian Burns, Taylor Culbertson, Kelsie Eshler, Malachia Evans, Mark Gumbert, Chris Leftwich, Les Meade, Piper Roby, Steve Samoray, Michael Schirmacher, William Seiter, and/or Price Sewell

Copperhead proposes to survey eight individual mist-net sites to complete the necessary 60 net nights of survey. Eight net nights (four net nights per calender night) of survey will be completed at seven sites and four net nights (two net nights per calender night) of survey will be completed at one mist-net site. Each mist-net site will be surveyed for a minimum of two calendar nights.

I hereby acknowledge that the information being provided to the Service is accurate and complete as of today's date.

Signature: Zachary Baer Digitally signed by Zachary Baer Date: 2024.07.10 17:34:28 -04'00' Date: 07-10-2024

[9] Attach additional pages to this form, if needed.

[10] Proposed surveys deviating from the current Range-wide IBAT & NLEB Survey Guidelines will only be accepted with a thoroughly described justification. Coordinate with your local USFWS Field Office (https://www.fws.gov/our-facilities) for acceptable modifications.

********FOR U.S. FISH AND WILDLIFE SERVICE USE ONLY**********

United States Department of the Interior

Fish and Wildlife Service

Kentucky ES Field Office

330 W Broadway, Room 265, Frankfort, KY 40601

Office Phone: (502) 695-0468

SITE-SPECIFIC AUTHORIZATION - BAT WORK

Our Field Office has reviewed your study plan and found it to contain sufficient information for our approval. When signed, this statement serves as your site-specific authorization to conduct the proposed activities at the specified locations included in the attached Study Plan Form and supporting files and must be carried with your federal permit when conducting work for this project. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit as well as your state permit(s) (if needed). The section 10(a)(1)(A) permit authorizing the activities must remain with the surveyor at all times. This authorization is not valid if you have not obtained permission from the owner of the lands where activities will occur.

For federal permit reporting purposes, please use the appropriate USFWS bat survey data spreadsheet, available on the IBAT and NLEB Summer Survey Guidance website[1]. To mitigate the risk of humans transmitting viruses (e.g., SARS-CoV-2) to bats or viral transmission from bats to humans, the U.S. Fish and Wildlife Service requests anyone directly handling or working in close proximity to bats follow current guidelines prepared by the CDC[2] and IUCN Bat Specialist Group[3] in addition to the following the standard WNS decontamination protocols[4].

If the work expands beyond the scope of your original study plan or if there are adverse effects to bats that were not anticipated, cease all survey and/or research activities, and contact this office prior to continuing. Additionally, if a federally listed bat is captured, this USFWS Field Office must be notified within 48 hours with information regarding species, sex, age, and whether or not the bat has a transmitter attached.

Field Office POC: Mike Armstrong

email: Mike_Armstrong@fws.gov phone: (502) 229-4632

☐ **Authorized as Proposed**

☑ **Authorized with Conditions** (see below)

You are authorized to proceed provided that the following adjustment(s) and/or conditions are met.

Conditions from previous study plan authorization still apply

☐ **Not Authorized.**

Comments:

Signature & Date: MICHAEL ARMSTRONG Digitally signed by MICHAEL ARMSTRONG Date: 2024.07.11 08:50:16 -04'00'

NOTE: Please check the appropriate box above before signing/locking the document.

[1] https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines
[2] https://www.cdc.gov/healthypets/covid-19/wildlife.html
[3] https://www.iucnbsg.org/uploads/6/5/0/9/6509077/amp_recommendations_for_researchers_final.pdf
[4] https://www.whitenosesyndrome.org/mmedia-education/national-wns-decontamination-protocol-u-s

Zack Baer

From: Burford, Laura S (FW) <Laura.Burford@ky.gov>
Sent: Monday, July 8, 2024 1:40 PM
To: Zack Baer
Cc: Rogers, Michaela L (FW); Armstrong, Mike
Subject: RE: Lost City Solar Generating Facility (IPaC: 2024-0039738)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Zack,

Thank you for providing a study plan for your bat netting and radio-telemetry surveys at the proposed Lost City Solar Generating Project in Muhlenberg County. This notification satisfies the requirements of your Kentucky scientific collection permit.

Good luck with the surveys!

Laura

Laura Burford
State Wildlife Action Plan Coordinator
Kentucky Department of Fish and Widlife Resources
#1 Sportsman's Lane, Frankfort, KY 40601
502-892-4536 | Laura.Burford@ky.gov

From: Zack Baer <zbaer@copperheadconsulting.com>
Sent: Friday, July 5, 2024 4:41 PM
To: Mike Armstrong (Mike_Armstrong@fws.gov) <Mike_Armstrong@fws.gov>; FW Wildlife Diversity <FWwildlifediversity@ky.gov>; KentuckyES, FW4 <kentuckyes@fws.gov>; Burford, Laura S (FW) <Laura.Burford@ky.gov>
Cc: Marty Marchaterre <mMarchaterre@copperheadconsulting.com>; Chris Leftwich <cleftwich@copperheadconsulting.com>
Subject: Lost City Solar Generating Facility (IPaC: 2024-0039738)

Mr. Armstrong, and Ms. Burford,

Please find attached Copperhead Environmental Consulting, Inc.'s (Copperhead) Study Plan to conduct a bat mist-net, and radio-telemetry survey for the proposed Lost City Solar Generating Facility Project in Muhlenberg County, Kentucky (IPaC: 2024-0039738). Can you please review the completed USFWS Study Plan form and attached Project mapping and provide Study Plan approval and site specific authorization, if appropriate.

I have also attached the KDFWR Project Proposal Form.

Please let me know if you have any questions or require any additional information.

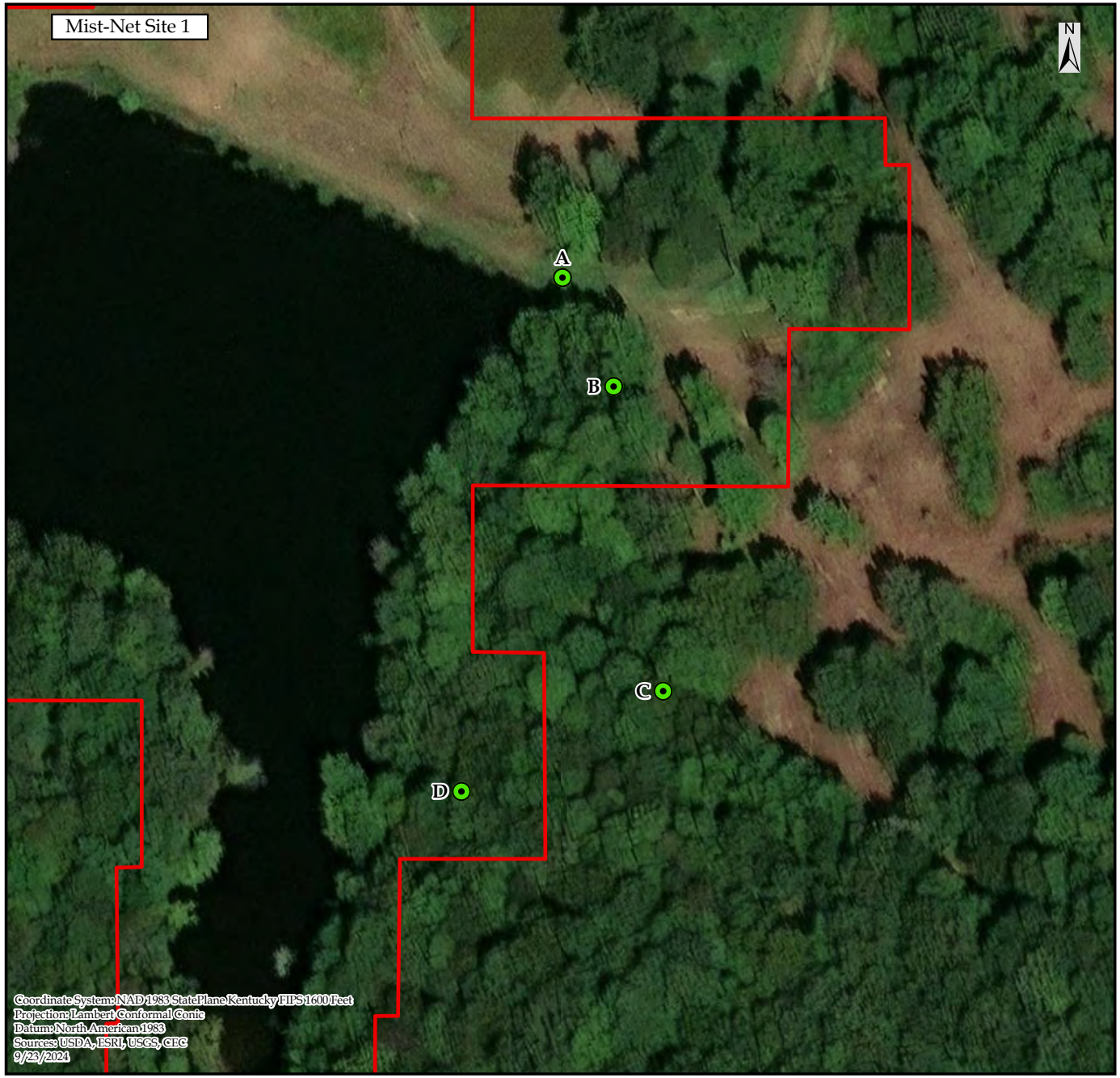
Thank you,

Zachary Baer
Sr. Scientist

Copperhead Environmental Consulting, Inc.
471 Main St.
P.O. Box 73
Paint Lick, Kentucky 40461
724.549.6739 - Mobile
859.925.9012 - Office
859.925.9816 - Fax
www.copperheadconsulting.com

APPENDIX B

Mist-Net Site Maps



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ENVIRONMENTAL CONSULTING

Prepared for:

Lost City

APPENDIX B. FIGURE 1:
Site 1 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

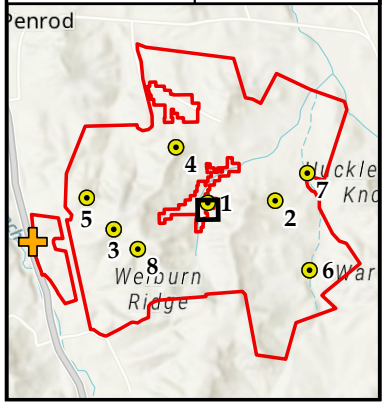
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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APPENDIX B. FIGURE 2:
Site 2 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

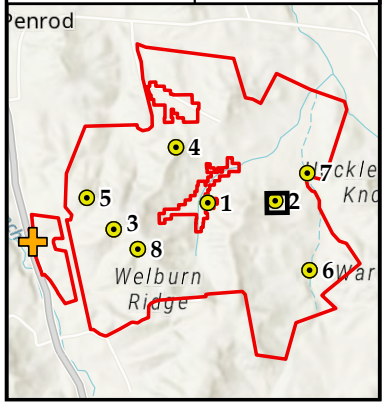
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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APPENDIX B. FIGURE 3:
Site 3 Mist-Net Locations for the Lost City Solar Generating Facility Project,
Muhlenberg County, Kentucky.

Legend

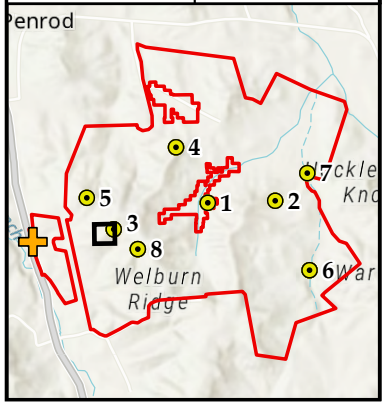
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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APPENDIX B. FIGURE 4:
Site 4 Mist-Net Locations for the Lost City Solar Generating Facility Project,
Muhlenberg County, Kentucky.

Legend

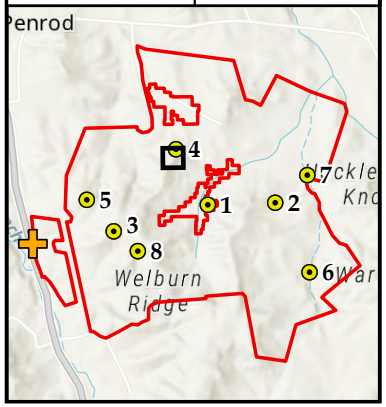
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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APPENDIX B. FIGURE 5:
Site 5 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

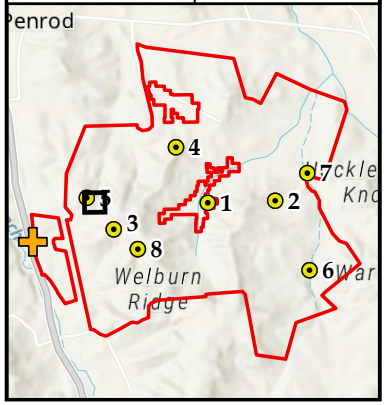
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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APPENDIX B. FIGURE 6:
Site 6 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

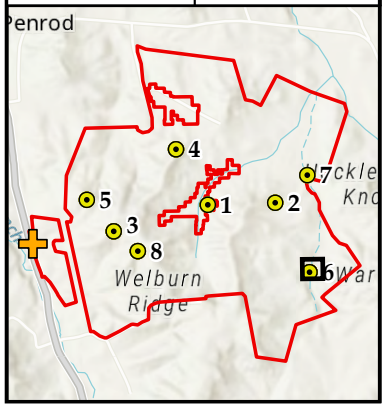
- Historic Railroad Culvert
- Mist-Net Location
- AOI

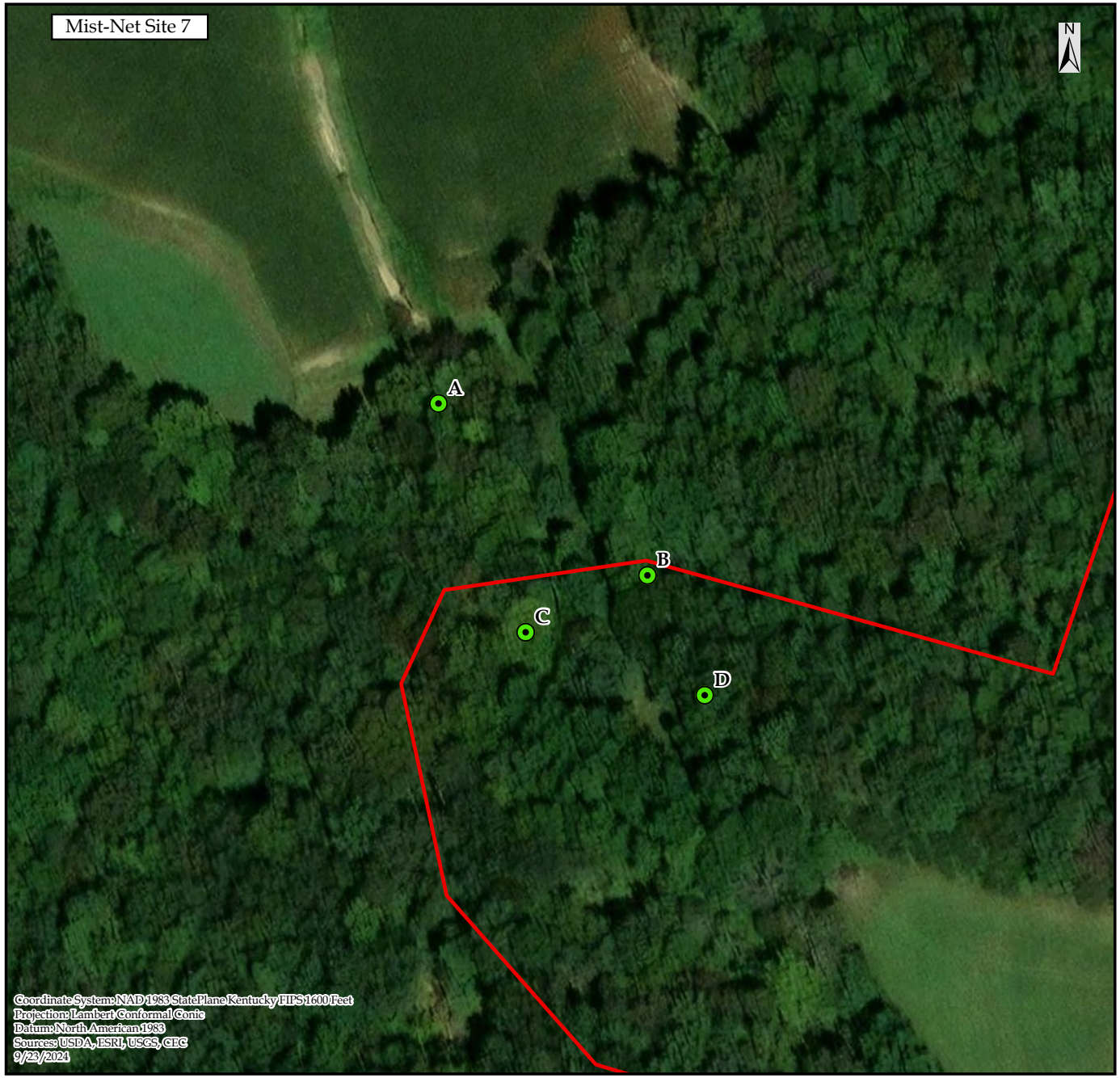
0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01





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Prepared for:

Lost City

APPENDIX B. FIGURE 7:
Site 7 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

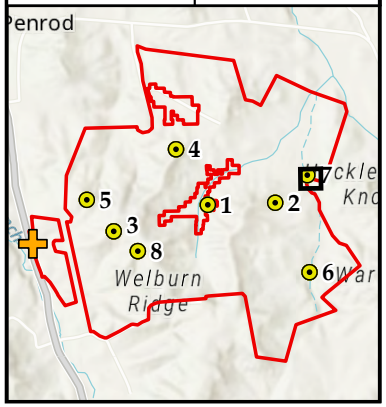
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



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Prepared for:

Lost City

APPENDIX B. FIGURE 8:
Site 8 Mist-Net Locations for
the Lost City Solar Generating
Facility Project,
Muhlenberg County, Kentucky.

Legend

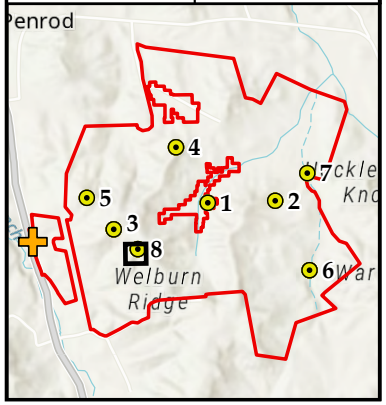
- Historic Railroad Culvert
- Mist-Net Location
- AOI

0 50 100
US Feet

Scale: 1 in = 100 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	TC	Date:	9/23/2024
Checked by:	ZB	Revision:	01



APPENDIX C

Mist-Net Survey Data

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Appendix B, Table 1. Mist-Net Site Data for the Lost City Solar Generating Facility; Muhlenberg County, Kentucky.

Site No.	Latitude	Longitude	County	State	Site Location Description	Site Habitat Type	Dominant Vegetation	Roost Habitat[1]	Water Resources[2]	Forest Structure[3]	Land Cover[4]
1	37.10093	-86.98185	Muhlenberg	KY	Pond and ATV trail south of Free Ln	Forest Bottomland	*Acer saccharinum, Fagus grandifolia, Juniperus virginiana, Liriodendron tulipifera, Liquidambar styraciflua*	Moderate	Optimal	Poor	Moderate
2	37.10032	-86.98376	Muhlenberg	KY	Forested corridor south of farmland.	Forest Bottomland	*Acer saccharum, Fagus grandifolia, Liquidambar styraciflua, Liriodendron tulipifera, Quercus stellata, Carya laciniosa*	Optimal	Poor	Moderate	Moderate
3	37.09926	-86.99175	Muhlenberg	KY	Ridgetop road, east of us-431	Forest Upland	*Fraxinus pennsylvanica, Juniperus virginiana, Nyssa sylvatica, Quercus montana, Ulmus alata*	Optimal	Poor	Optimal	Optimal
4	37.10395	-86.98771	Muhlenberg	KY	Ridgetop road, South of KY-949	Forest Upland	*Fraxinus americana, Juniperus virginiana, Quercus montana, Quercus stellata, Quercus rubra, Ulmus alata*	Optimal	Poor	Optimal	Optimal

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Site No.	Latitude	Longitude	County	State	Site Location Description	Site Habitat Type	Dominant Vegetation	Roost Habitat[1]	Water Resources[2]	Forest Structure[3]	Land Cover[4]
5	37.10171	-86.99285	Muhlenberg	KY	Dirt road on forested ridge SW of Free Ln and East of US Hwy 431S	Forest Upland	*Quercus rubra, Quercus montana, Quercus marilandica, Fraxinus americana, Juniperus virginiana*	Moderate	Poor	Moderate	Optimal
6	37.10131	-86.97237	Muhlenberg	KY	Forested, intermittent stream west of Ware Ridge and north of Forgy Mill Rd.	Riparian Creek	*Fagus grandifolia, Acer saccharum, Platanus occidentalis, Liriodendron tulipifera, Liquidambar styraciflua*	Moderate	Moderate	Moderate	Optimal
7	37.10357	-86.97243	Muhlenberg	KY	Forest farm trail and stream south of KY-949	Forest Bottomland	*Acer rubrum, Acer saccharum, Fraxinus americana, Platanus occidentalis, Liriodendron tulipifera, Liquidambar styraciflua, Pinus virginiana*	Poor	Optimal	Moderate	Optimal
8	37.09048	-86.97685	Muhlenberg	KY	Interior corridor and small creek at agricultural field edge north of Mayson-Poyner Rd and East of U.S. Hwy 431	Forest Upland	*Quercus montana, Quercus alba, Juniperus virginiana, Acer rubrum, Ulmus rubra, Carya tomentosa*	Moderate	Moderate	Moderate	Optimal

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[1]Roost Habitat - Poor: No or few snags >= ~5" DBH with sloughing bark or other usable roost features (cracks, crevices, etc.); Moderate: Snags with sloughing bark or other roost features present ~5-15-inch DBH within 1000 feet of forested areas; Optimal: Snags with sloughing bark or other roost features present >~15-inch DBH within 1000 feet of forested areas.
[2]Water Resources - Poor: bat drinking resources not present at the site; Moderate: Ephemeral or intermittent streams or ponded areas present but too cluttered to allow many bats to drink easily or simultaneously. No corridors, openings or canopy gaps allow bats easy access to the resource; Optimal: Streams or ponds (including road ruts) present that appear to offer drinking resource throughout the majority of the summer. Flyways to resources are available.
[3]Forest Structure - Poor: Habitat even aged and young. Trees smaller than 5-inch DBH. Understory growth cluttered and restricts flying/foraging. Hardwoods are absent or stand is monoculture; Moderate: some diversity in age of trees in the stand. Trees 5 to 15 inches present. Understory clutter dominant but not ubiquitous. Trees greater than 15" DBH may be present but rare; Optimal: Mature forest. Diverse age classes of trees present. Trees > 15-inch DBH frequent. Varying tree height and treefalls allow for frequent small openings and gaps that facilitate bat foraging.
[4]Land Cover- Poor: Area surrounding site predominantly un-forested. Few mature trees present not connected to other areas of trees; Moderate: Trees present in the form of small woodlots and wooded fence rows. Little connection to adjacent forested areas; Optimal: Area is largely forested. Wooded stands are connected to other wooded stands via wooded stream, fence row, or other wooded corridor.

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Appendix B, Table 2. Nightly Mist-Net Survey Data for the Lost City Solar Generating Facility; Muhlenberg County, Kentucky.

Site No.	Survey Date (2024)	Total Nightly Net Sets	Time Nets Up	Time Nets Down	Bat Captures (Per Night)	Moon Percent	Moonrise	Moonset	Sunrise	Sunset	Nightly Survey Status	Permitted Biologist
1	01-Aug	4	19:54	23:45	8	new-20	02:40	18:27	05:53	19:54	Rain Out	Crystal Birdsall
	03-Aug	4	19:52	00:52	4	new-20	04:46	19:52	05:55	19:52	Complete	William Seiter
	04-Aug	4	19:51	00:51	5	new-20	05:51	20:23	05:56	19:51	Complete	William Seiter
2	29-Jul	4	19:57	00:57	13	21-40	00:20	15:18	05:51	19:57	Complete	Crystal Birdsall
	31-Jul	4	19:55	00:55	5	new-20	01:46	17:31	05:52	19:55	Complete	Crystal Birdsall
3	01-Aug	4	19:54	23:26	6	new-20	02:40	18:27	05:53	19:54	Rain Out	Ian Burns
	03-Aug	4	19:52	00:52	5	new-20	04:46	19:52	05:55	19:52	Complete	Ian Burns
	04-Aug	4	19:51	00:51	5	new-20	05:51	20:23	05:56	19:51	Complete	Ian Burns
4	29-Jul	4	19:57	00:57	4	21-40	00:20	15:18	05:51	19:57	Complete	Ian Burns
	30-Jul	4	19:57	20:56	0	21-40	00:59	16:27	05:51	19:56	Rain Out	Ian Burns
	31-Jul	4	19:55	00:55	5	new-20	01:46	17:31	05:52	19:55	Complete	Ian Burns
5	29-Jul	4	19:57	00:57	4	21-40	00:20	15:18	05:51	19:57	Complete	Malachia Evans
	31-Jul	4	19:55	00:55	10	new-20	01:46	17:31	05:52	19:55	Complete	Malachia Evans
6	05-Aug	2	19:50	00:50	0	new-20	06:54	20:49	05:56	19:50	Complete	Malachia Evans
	06-Aug	2	19:49	21:30	0	new-20	07:54	21:13	05:57	19:49	Other	Zachary Baer
	09-Aug	2	19:46	00:46	0	21-40	10:47	22:16	06:00	19:46	Complete	Zachary Baer
7	05-Aug	4	19:50	00:50	10	new-20	06:54	20:49	05:56	19:50	Complete	Leslie Meade
	06-Aug	4	19:49	00:49	4	new-20	07:54	21:13	05:57	19:49	Complete	Leslie Meade

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Site No.	Survey Date (2024)	Total Nightly Net Sets	Time Nets Up	Time Nets Down	Bat Captures (Per Night)	Moon Percent	Moonrise	Moonset	Sunrise	Sunset	Nightly Survey Status	Permitted Biologist
	01-Aug	4	19:54	22:54	5	new-20	02:40	18:27	05:53	19:54	Rain Out	Malachia Evans
8	03-Aug	4	19:52	00:52	4	new-20	04:46	19:52	05:55	19:52	Complete	Malachia Evans
	04-Aug	4	19:51	00:51	2	new-20	05:51	20:23	05:56	19:51	Complete	Malachia Evans

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Appendix B, Table 3. Site Specific Mist-Net Data for the Lost City Solar Generating Facility; Muhlenberg County, Kentucky.

Site No.	Survey Date (2024)	Net ID	Mist-Net Set Habitat	Net Height (m)	Net Length (m)	Latitude	Longitude	Comments
1	01-Aug	A	Pond	7.8	12.0	37.10153	-86.98198	
1	01-Aug	B	Corridor	5.2	9.0	37.10131	-86.98185	
1	01-Aug	C	Corridor	5.2	9.0	37.10070	-86.98171	
1	01-Aug	D	Corridor	5.2	18.0	37.10049	-86.98221	
1	03-Aug	A	Pond	7.8	12.0	37.10153	-86.98198	
1	03-Aug	B	Corridor	5.2	9.0	37.10131	-86.98185	
1	03-Aug	C	Corridor	5.2	18.0	37.10070	-86.98171	
1	03-Aug	D	Corridor	5.2	4.0	37.10049	-86.98221	
1	04-Aug	A	Pond	7.8	12.0	37.10153	-86.98198	
1	04-Aug	B	Corridor	5.2	9.0	37.10131	-86.98185	
1	04-Aug	C	Corridor	5.2	18.0	37.10070	-86.98171	
1	04-Aug	D	Corridor	5.2	4.0	37.10049	-86.98221	
2	29-Jul	A	Corridor	7.8	12.0	37.10168	-86.97573	
2	29-Jul	B	Forest Gap	5.2	9.0	37.10088	-86.97609	
2	29-Jul	C	Road Rut	5.2	6.0	37.10106	-86.97582	
2	29-Jul	D	Corridor	5.2	9.0	37.10222	-86.97520	
2	31-Jul	A	Corridor	7.8	12.0	37.10168	-86.97573	
2	31-Jul	B	Forest Gap	5.2	9.0	37.10088	-86.97609	
2	31-Jul	C	Road Rut	5.2	6.0	37.10106	-86.97582	
2	31-Jul	D	Corridor	5.2	9.0	37.10222	-86.97520	

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Site No.	Survey Date (2024)	Net ID	Mist-Net Set Habitat	Net Height (m)	Net Length (m)	Latitude	Longitude	Comments
3	01-Aug	A	Forest Edge	5.2	12.0	37.09956	-86.99070	
3	01-Aug	B	Corridor	5.2	9.0	37.09930	-86.99144	
3	01-Aug	C	Forest Gap	5.2	9.0	37.09922	-86.99207	
3	01-Aug	D	Corridor	7.8	6.0	37.09888	-86.99229	
3	03-Aug	A	Forest Edge	5.2	12.0	37.09956	-86.99070	
3	03-Aug	B	Corridor	5.2	9.0	37.09930	-86.99144	
3	03-Aug	C	Forest Gap	5.2	9.0	37.09922	-86.99207	
3	03-Aug	D	Corridor	7.8	6.0	37.09888	-86.99229	
3	04-Aug	A	Forest Edge	5.2	12.0	37.09956	-86.99070	
3	04-Aug	B	Corridor	5.2	9.0	37.09930	-86.99144	
3	04-Aug	C	Forest Gap	5.2	9.0	37.09922	-86.99207	
3	04-Aug	D	Corridor	7.8	6.0	37.09888	-86.99229	
4	29-Jul	A	Corridor	5.2	6.0	37.10565	-86.98493	
4	29-Jul	B	Forest Gap	5.2	6.0	37.10527	-86.98489	Hard to get good photo in forest gap
4	29-Jul	C	Corridor	5.2	6.0	37.10489	-86.98536	
4	29-Jul	D	Corridor	7.8	12.0	37.10475	-86.98537	
4	30-Jul	A	Corridor	5.2	6.0	37.10565	-86.98493	
4	30-Jul	B	Forest Gap	5.2	6.0	37.10527	-86.98489	Hard to get good photo in forest gap
4	30-Jul	C	Corridor	5.2	6.0	37.10489	-86.98536	
4	30-Jul	D	Corridor	7.8	12.0	37.10475	-86.98537	
4	31-Jul	A	Corridor	5.2	6.0	37.10565	-86.98493	
4	31-Jul	B	Forest Gap	5.2	6.0	37.10527	-86.98489	Hard to get good photo in forest gap

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Site No.	Survey Date (2024)	Net ID	Mist-Net Set Habitat	Net Height (m)	Net Length (m)	Latitude	Longitude	Comments
4	31-Jul	C	Corridor	5.2	6.0	37.10489	-86.98536	
4	31-Jul	D	Corridor	7.8	12.0	37.10475	-86.98537	
5	29-Jul	A	Corridor	5.2	6.0	37.10169	-86.99287	Small corridor leading into clearing
5	29-Jul	B	Corridor	5.2	9.0	37.10171	-86.99284	Road corridor, top of hill
5	29-Jul	C	Corridor	5.2	9.0	37.10171	-86.99285	Road corridor
5	29-Jul	D	Forest Gap	7.8	12.0	37.10173	-86.99284	
5	31-Jul	A	Corridor	5.2	6.0	37.10169	-86.99287	Small corridor leading into clearing
5	31-Jul	B	Corridor	5.2	9.0	37.10171	-86.99284	Road corridor, top of hill
5	31-Jul	C	Corridor	5.2	9.0	37.10171	-86.99285	Road corridor
5	31-Jul	E	Corridor	7.8	6.0	37.10131	-86.99314	Corridor, near ag field entrance
6	05-Aug	A	Creek	5.2	12.0	37.09652	-86.97254	Across creek and old overgrown logging road
6	05-Aug	B	Creek	5.2	9.0	37.09708	-86.97193	Across confluence of two creek branches at nice pool
6	06-Aug	A	Creek	5.2	12.0	37.09652	-86.97254	
6	06-Aug	B	Creek	5.2	9.0	37.09708	-86.97193	
6	09-Aug	A	Creek	5.2	12.0	37.09652	-86.97254	
6	09-Aug	B	Creek	5.2	9.0	37.09708	-86.97193	
7	05-Aug	A	Creek	5.2	6.0	37.10358	-86.97248	
7	05-Aug	B	Corridor	5.2	9.0	37.10354	-86.97241	
7	05-Aug	C	Creek	5.2	12.0	37.10356	-86.97243	
7	05-Aug	D	Corridor	5.2	9.0	37.10357	-86.97243	
7	06-Aug	A	Creek	5.2	6.0	37.10358	-86.97248	
7	06-Aug	B	Corridor	5.2	9.0	37.10354	-86.97241	

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Site No.	Survey Date (2024)	Net ID	Mist-Net Set Habitat	Net Height (m)	Net Length (m)	Latitude	Longitude	Comments
7	06-Aug	C	Creek	5.2	12.0	37.10356	-86.97243	
7	06-Aug	D	Corridor	5.2	9.0	37.10357	-86.97243	
8	01-Aug	A	Corridor	5.2	6.0	37.09808	-86.98847	Corridor at field edge
8	01-Aug	B	Forest Gap	5.2	12.0	37.09806	-86.98871	Mossy knoll parallel to corridor
8	01-Aug	C	Creek	5.2	4.0	37.09724	-86.98857	
8	01-Aug	D	Corridor	7.8	12.0	37.09757	-86.98909	
8	03-Aug	A	Corridor	5.2	6.0	37.09808	-86.98847	Corridor at field edge
8	03-Aug	B	Forest Gap	5.2	12.0	37.09806	-86.98871	Mossy knoll parallel to corridor
8	03-Aug	C	Creek	5.2	4.0	37.09724	-86.98857	
8	03-Aug	D	Corridor	7.8	12.0	37.09757	-86.98909	
8	04-Aug	A	Corridor	5.2	6.0	37.09808	-86.98847	Corridor at field edge
8	04-Aug	B	Forest Gap	5.2	12.0	37.09806	-86.98871	Mossy knoll parallel to corridor
8	04-Aug	C	Creek	5.2	4.0	37.09724	-86.98857	
8	04-Aug	D	Corridor	7.8	12.0	37.09757	-86.98909	

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Appendix B, Table 4. Bat Capture Data for the Lost City Solar Generating Facility; Muhlenberg County, Kentucky.

Site No.	Date (2024)	Nightly Capture No.	Species	Time Caught	Capture Net	Net Height (m)	Age	Sex	Repro Status	Mass (g)	RFA (mm)	Wing Damage Index	Comments
1	01-Aug	1	LABO	20:00	C	4	J	F	N	11	42	0	
1	01-Aug	2	LABO	20:05	C	3.5	J	M	N	11	41	0	
1	01-Aug	3	PESU	20:25	A	5.5	J	M	N	4	31	0	Bat too small to band or transmitter
1	01-Aug	4	LABO	20:42	A	4	J	M	TD	9	39	0	
1	01-Aug	5	LABO	20:57	A	4	J	F	N	12.5	42	0	
1	01-Aug	6	LABO	21:35	A	2.5	J	F	N	12.5	43	0	
1	01-Aug	7	EPFU	22:00	B	3	J	M	N	18.75	47	0	
1	01-Aug	8	LABO	22:15	D	3	U	U	U	-	-	U	Escape
1	03-Aug	1	NYHU	20:49	A	3	A	M	N	10.4	36	0	
1	03-Aug	2	NYHU	21:08	A	7	A	M	TD	10.2	35	0	
1	03-Aug	3	NYHU	21:13	A	1	U	F	U	-	-	U	Escape
1	03-Aug	4	LABO	21:50	B	4	J	F	N	10	40	0	
1	04-Aug	1	LABO	21:21	A	4	J	M	TD	-	-	0	Escape
1	04-Aug	2	LABO	23:10	A	6	J	M	U	10.3	39	0	
1	04-Aug	3	PESU	23:38	D	1	J	F	N	5.9	34	0	Banded KYF&WR C21800, Transmitter 172.125
1	04-Aug	4	LABO	23:43	A	7	J	F	N	11.5	41	0	
1	04-Aug	5	PESU	00:15	A	4.5	J	F	N	5.9	35	0	Banded KYF&WR C21799, Transmitter 172.607
2	29-Jul	1	NYHU	20:30	A	5	J	F	N	9.75	37	0	
2	29-Jul	2	LABO	20:30	A	2.5	J	M	N	10	39	0	

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Site No.	Date (2024)	Nightly Capture No.	Species	Time Caught	Capture Net	Net Height (m)	Age	Sex	Repro Status	Mass (g)	RFA (mm)	Wing Damage Index	Comments
2	29-Jul	3	EPFU	21:00	C	4.75	J	F	N	20	50	0	
2	29-Jul	4	NYHU	23:00	A	5.5	A	M	TD	10.25	35	0	
2	29-Jul	5	LABO	23:20	C	3.5	J	M	N	10.75	40	0	
2	29-Jul	6	NYHU	23:20	A	4	U	U	U	-	-	U	Escape
2	29-Jul	7	LABO	23:20	A	7	A	M	TD	12.25	-	0	Escape
2	29-Jul	8	LABO	23:50	C	5	U	U	U	-	-	U	Escape
2	29-Jul	9	EPFU	23:50	A	6.5	A	F	PL	20.25	48	0	
2	29-Jul	10	LABO	00:15	C	5	A	F	N	16	41	0	
2	29-Jul	11	LABO	00:40	C	2	U	U	U	-	-	U	Escape
2	29-Jul	12	LABO	00:40	C	1	J	M	N	10	40	0	
2	29-Jul	13	EPFU	00:40	C	4.5	A	F	N	21.25	50	0	
2	31-Jul	1	LABO	21:45	C	3.5	U	U	U	-	-	U	Escape
2	31-Jul	2	LABO	23:15	D	4.5	J	M	N	12	39	0	
2	31-Jul	3	LABO	23:32	C	4	U	U	U	-	-	U	Escape
2	31-Jul	4	LABO	00:18	C	4	J	M	TD	10.5	39	0_P	
2	31-Jul	5	NYHU	00:18	A	5	J	F	N	9.25	34	0	
3	01-Aug	1	EPFU	20:34	B	1	A	F	N	19.75	47	0	
3	01-Aug	2	EPFU	21:10	A	2.5	U	U	U	-	-	U	Escaped from bag
3	01-Aug	3	EPFU	21:25	D	0	A	F	N	21.5	48	0_P	
3	01-Aug	4	EPFU	21:25	B	3	A	M	N	19.5	46	0	
3	01-Aug	5	LABO	21:25	D	3.5	U	U	U	-	-	U	Escape

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Site No.	Date (2024)	Nightly Capture No.	Species	Time Caught	Capture Net	Net Height (m)	Age	Sex	Repro Status	Mass (g)	RFA (mm)	Wing Damage Index	Comments
3	01-Aug	6	MYGR	22:10	D	2	A	M	N	10.75	43	0	Banded KYF&WR B26351, Bumps on forearms
3	03-Aug	1	LABO	20:11	B	4	U	U	U	-	-	U	Escape
3	03-Aug	2	LABO	22:15	B	2.5	J	M	N	9.5	38	0	
3	03-Aug	3	LABO	23:26	D	2	J	F	N	9.5	4	0	
3	03-Aug	4	NYHU	00:30	B	3	A	M	TD	10.5	33	0	
3	03-Aug	5	LABO	00:45	A	4	J	F	N	10	38	0	
3	04-Aug	1	LABO	23:30	B	1	J	M	TD	9	38	0	
3	04-Aug	2	LABO	00:10	D	2	J	M	N	9.5	38	0	
3	04-Aug	3	LABO	00:51	D	3	J	F	N	8.5	41	0	
3	04-Aug	4	EPFU	00:51	D	3.5	J	F	N	19.5	50	0	
3	04-Aug	5	NYHU	00:51	D	4	J	M	TD	8.5	36	0	
4	29-Jul	1	LABO	20:30	D	4	J	F	N	9.75	39	0	
4	29-Jul	2	LABO	23:40	C	2.5	U	U	U	-	-	U	Escape
4	29-Jul	3	LABO	00:05	B	0.5	J	F	N	11.25	41	0	
4	29-Jul	4	LABO	00:30	D	3.5	A	F	PL	14.25	40	0	
4	31-Jul	1	LABO	23:10	A	1	A	M	N	10.5	38	0	
4	31-Jul	2	LABO	23:30	C	2.5	A	M	N	9.25	38	0	
4	31-Jul	3	LABO	23:30	C	2.5	J	F	N	10.5	40	0	
4	31-Jul	4	LABO	00:00	C	5.2	U	U	U	-	-	U	Escape
4	31-Jul	5	LABO	00:00	C	0.5	U	U	U	-	-	U	Escape
5	29-Jul	1	LABO	21:56	B	2.5	J	F	N	12.5	43	0	

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Site No.	Date (2024)	Nightly Capture No.	Species	Time Caught	Capture Net	Net Height (m)	Age	Sex	Repro Status	Mass (g)	RFA (mm)	Wing Damage Index	Comments
5	29-Jul	2	NYHU	22:45	C	1.5	A	M	TD	8.75	37	0	
5	29-Jul	3	LABO	23:38	B	4	U	U	U	-	-	U	Escaped while lowering net
5	29-Jul	4	NYHU	23:56	A	4	J	F	N	10.25	39	0	
5	31-Jul	1	LABO	20:10	C	1	J	F	N	9.5	41	0	
5	31-Jul	2	LABO	20:10	C	1.25	J	F	N	11.25	43	0	
5	31-Jul	3	LABO	20:25	B	2	U	U	U	-	-	U	Escaped from net
5	31-Jul	4	EPFU	20:32	E	2.75	A	F	N	19.25	49.5	0	Worn teeth, older bat
5	31-Jul	5	LABO	21:20	E	1	J	M	N	9.25	38	0	
5	31-Jul	6	LABO	21:50	B	3	J	M	N	11.5	42.25	0	
5	31-Jul	7	EPFU	21:55	B	4.5	J	M	N	19	49	0	
5	31-Jul	8	LABO	00:01	B	2.5	U	U	U	-	-	U	Escaped from net
5	31-Jul	9	LABO	00:48	B	4.5	J	M	TD	8.5	40.5	0	
5	31-Jul	10	LABO	00:48	B	4	U	U	U	-	-	U	Escaped from net
7	05-Aug	1	NYHU	20:25	B	1.5	A	M	TD	10.25	34	0	
7	05-Aug	2	EPFU	20:40	B	3	A	M	N	19.25	47	0	
7	05-Aug	3	NYHU	20:40	B	3.5	A	F	N	10.75	34	0	
7	05-Aug	4	LABO	20:40	C	4.5	J	M	N	8.5	39	0	
7	05-Aug	5	NYHU	21:10	D	2.5	A	M	TD	11.25	37	0	
7	05-Aug	6	LABO	21:10	D	3	A	F	PL	18.5	41	0	
7	05-Aug	7	NYHU	21:10	D	2.5	A	M	TD	10.5	34	0	
7	05-Aug	8	NYHU	21:10	D	3	J	M	N	11	35	0	
7	05-Aug	9	NYHU	21:10	B	3	J	M	N	9.25	36	0	

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Site No.	Date (2024)	Nightly Capture No.	Species	Time Caught	Capture Net	Net Height (m)	Age	Sex	Repro Status	Mass (g)	RFA (mm)	Wing Damage Index	Comments
7	05-Aug	10	LABO	21:30	D	1.5	J	M	N	9.75	40	0	
7	06-Aug	1	NYHU	21:20	A	4	A	M	TD	10.75	36	0	
7	06-Aug	2	LABO	21:20	B	1.5	J	M	N	9.75	39	0	
7	06-Aug	3	LABO	22:10	D	3	J	M	N	9.75	40	0	
7	06-Aug	4	LABO	23:20	A	1	J	F	N	10.5	41	0	
8	01-Aug	1	LABO	20:10	B	1.5	J	M	TD	9.75	39	0	
8	01-Aug	2	LABO	20:10	D	2.5	J	F	N	10.5	41.5	0	
8	01-Aug	3	LABO	20:10	D	3	U	U	U	-	-	U	Escaped from net
8	01-Aug	4	LABO	20:18	D	2.5	J	M	TD	8.75	39.5	0	
8	01-Aug	5	LABO	22:45	D	6.5	A	F	PL	13.5	41.5	0	
8	03-Aug	1	NYHU	21:45	D	2.75	J	M	TD	10	39.5	0_P	
8	03-Aug	2	EPFU	22:55	A	1	J	F	N	22	50	0	Bat mites
8	03-Aug	3	EPFU	23:10	D	5	J	F	N	22	50	0	Bat #2 recaptured in a different net
8	03-Aug	4	LABO	23:10	D	6.5	J	M	TD	10.5	38.5	0	
8	04-Aug	1	LABO	22:08	B	4.5	U	U	U	-	-	U	Escape
8	04-Aug	2	LABO	22:28	B	3.5	J	M	TD	6.75	36	0	

LABO=Lasiurus borealis (eastern red bat); EPFU=Eptesicus fuscus (big brown bat); NYHU=Nycticeius humeralis (evening bat); MYGR=Myotis grisescens (gray bat); PESU=Perimyotis subflavus (tricolored bat)
A=adult; J=juvenile; M=male; F=female; N=non-reproductive; PL=post-lactating; L=lactating

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Appendix B, Table 5. Nightly Weather Conditions Data for the Lost City Solar Generating Facility; Muhlenberg County, Kentucky.

Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
2	29-Jul	20:00	84	0	0	
2	29-Jul	21:00	77	0	0	
2	29-Jul	22:00	75	0	0	
2	29-Jul	23:00	75	0	0	
2	29-Jul	00:00	75	0	0	
2	29-Jul	01:00	75	3	2	
4	29-Jul	19:57	76	0	0	
4	29-Jul	20:57	76	0	0	
4	29-Jul	21:57	76	0	0	
4	29-Jul	22:57	75	0	1	
4	29-Jul	23:57	75	0	3	
4	29-Jul	00:57	76	0	2	
5	29-Jul	19:57	78	0	1	
5	29-Jul	20:57	77	0	0	
5	29-Jul	21:57	76	0	1	94% RH
5	29-Jul	22:57	76	0	1	
5	29-Jul	23:57	76	0	2	96% RH
5	29-Jul	00:57	76	0	2	
4	30-Jul	19:56	-	6	4	Rainout, didn't record temperature

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Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
2	31-Jul	20:00	85	0	0	
2	31-Jul	21:00	79	0	0	
2	31-Jul	22:00	78	0	0	
2	31-Jul	23:00	77	0	0	
2	31-Jul	00:00	77	0	0	
2	31-Jul	01:00	76	0	0	
4	31-Jul	19:55	86	0	0	
4	31-Jul	20:55	82	0	0	
4	31-Jul	21:55	79	0	0	
4	31-Jul	22:55	78	0	1	
4	31-Jul	23:55	77	0	1	
4	31-Jul	00:55	76	0	1	
5	31-Jul	19:55	83	0	0	
5	31-Jul	20:55	83	0	0	
5	31-Jul	21:55	79	0	0	
5	31-Jul	22:55	78	0	0	
5	31-Jul	23:55	78	0	0	
5	31-Jul	00:55	76	0	0	
1	01-Aug	19:54	80	3	0	
1	01-Aug	20:54	75	3	0	
1	01-Aug	21:54	74	3	1	
1	01-Aug	22:54	73	6	3	Rainout at 2345

COPPERHEAD
ENVIRONMENTAL CONSULTING

Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
3	01-Aug	19:54	73	1	0	
3	01-Aug	20:54	74	3	1	
3	01-Aug	21:51	74	3	1	
3	01-Aug	22:54	74	5	4	Rain started at 2256, rainout called at 2326 Nets closed for 30 minutes
8	01-Aug	19:54	76	3	1	
8	01-Aug	20:54	75	3	1	96% RH
8	01-Aug	21:54	74	3	1	
8	01-Aug	22:54	74	5	2	Lightning strikes very close. Rain starting. Closed nets.
8	01-Aug	23:24	73	6	3	Heavy rain and lightning still going, rainout called
1	03-Aug	19:52	78	0	0	
1	03-Aug	20:52	74	0	1	
1	03-Aug	21:52	73	0	0	
1	03-Aug	22:52	73	0	0	
1	03-Aug	23:52	72	0	0	
1	03-Aug	00:52	71	0	0	
3	03-Aug	19:52	73	0	0	
3	03-Aug	20:52	75	0	0	
3	03-Aug	21:52	74	0	0	
3	03-Aug	22:52	74	0	0	
3	03-Aug	23:52	73	0	0	
3	03-Aug	00:52	73	0	0	

COPPERHEAD
ENVIRONMENTAL CONSULTING

Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
8	03-Aug	19:52	81	1	0	
8	03-Aug	20:52	77	0	0	
8	03-Aug	21:52	76	0	0	
8	03-Aug	22:52	75	0	0	
8	03-Aug	23:52	74	0	0	
8	03-Aug	00:52	74	0	0	
1	04-Aug	19:51	79	0	0	
1	04-Aug	20:51	75	0	0	
1	04-Aug	21:51	74	0	1	
1	04-Aug	22:51	73	0	0	
1	04-Aug	23:51	73	0	0	
1	04-Aug	00:51	72	0	0	
3	04-Aug	19:51	82	0	0	
3	04-Aug	20:51	78	0	0	
3	04-Aug	21:51	77	0	0	
3	04-Aug	22:51	75	0	0	
3	04-Aug	23:51	73	0	0	
3	04-Aug	00:51	73	0	0	
8	04-Aug	19:51	81	0	0	62% RH
8	04-Aug	20:51	79	0	0	73% RH
8	04-Aug	21:51	77	0	0	
8	04-Aug	22:51	76	0	0	83% RH

COPPERHEAD
ENVIRONMENTAL CONSULTING

Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
8	04-Aug	23:51	75	0	0	85% RH
8	04-Aug	00:51	75	0	0	
6	05-Aug	19:50	78	0	0	
6	05-Aug	20:50	75	0	0	
6	05-Aug	21:50	74	0	0	
6	05-Aug	22:50	74	0	0	
6	05-Aug	23:50	73	0	0	
6	05-Aug	00:50	72	0	0	
7	05-Aug	19:50	78	0	0	
7	05-Aug	20:50	76	0	0	
7	05-Aug	21:50	74	0	0	
7	05-Aug	22:50	73	0	0	
7	05-Aug	23:50	73	0	0	
7	05-Aug	00:50	72	0	0	
6	06-Aug	19:49	79	0	0	
6	06-Aug	20:49	75	0	0	Survey cancelled at 2130 due to illness
7	06-Aug	19:49	79	0	0	
7	06-Aug	20:49	76	0	0	
7	06-Aug	21:49	75	0	0	
7	06-Aug	22:49	74	0	0	
7	06-Aug	23:49	74	0	0	

COPPERHEAD
ENVIRONMENTAL CONSULTING

Site No.	Survey Date (2024)	Time	Temperature (°F)	Sky Conditions	Estimated Wind Speed	Comments
7	06-Aug	00:49	74	0	0	
6	09-Aug	19:46	72	0	0	
6	09-Aug	20:46	68	0	0	
6	09-Aug	21:46	68	0	0	
6	09-Aug	22:46	66	0	0	
6	09-Aug	23:46	64	0	0	
6	09-Aug	00:46	64	0	0	

Weather Conditions Key	
Sky Conditions Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or Overcast
4	Fog or Smoke
5	Drizzle or light rain
6	Heavy Rain - thunderstorm
Estimated Wind Speet (Beaufort Wind Scale)	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

APPENDIX D

Mist-Net Site Photograph Log

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 1

Site 1
Net A

Site 1
Net B

Site 1
Net C

Site 1
Net D, 1 August, View 1

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 2

Site 1
Net D, 1 August, View 2

Site 1
Net D, 3-4 August

Site 2
Net A

Site 2
Net B

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 3

Site 2
Net C

Site 2
Net D

Site 3
Net A

Site 3
Net B

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 4

Site 3
Net C

Site 3
Net D

Site 4
Net A

Site 4
Net B

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 5

Site 4
Net C

Site 4
Net D

Site 5
Net A

Site 5
Net B

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 6

Site 5
Net C

Site 5
Net D

Site 5
Net E

Site 6
Net A

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 7

Site 6
Net B

Site 7
Net A

Site 7
Net B

Site 7
Net C

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 8

Site 7
Net D

Site 8
Net A

Site 8
Net B

Site 8
Net C

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Mist-Net Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 9

Site 8
Net D

APPENDIX E

Listed Bat and Target Species Bat Photograph Log

COPPERHEAD
ENVIRONMENTAL CONSULTING

Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility
Listed Bat Photograph Log

Project No.:	County, State:	Photograph Log Page Number:
1543	Muhlenberg, Kentucky	1

Tricolored bat (not radio-tagged)
(juvenile, male, non-reproductive)
Captured at Site 1 on 1 August 2024

Tricolored bat 125 (KYF&WR C21800)
(juvenile, female, non-reproductive)
Captured at Site 1 on 4 August 2024

Tricolored bat 607 (KYF&WR C21799)
(juvenile, female, non-reproductive)
Captured at Site 1 on 4 August 2024

Gray bat (KYF&WR B26351)
(adult, male, non-reproductive)
Captured at Site 3 on 1 August 2024

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Listed Bat Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 2

Gray bat (KYF&WR B26351)
(adult, male, non-reproductive)
Captured at Site 3 on 1 August 2024

APPENDIX F

Roost Tree Survey Data

Roost Tree Habitat Overview for the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Roost ID	Bat ID	Latitude	Longitude	Location Description	Date First Used (2024)	Habitat	Roost Tree Plot Characteristics*		
							Live Trees	Snags	All Trees
170	125	37.095158	-86.979052	South of Site 1 east of Mason-Poyner Rd.	5-Aug	Interior	12	0	13
171	607	37.110844	-86.976473	Northeast of chicken farm, south of KY-949	5-Aug	Interior	9	0	9
582	125	37.095305	-86.979000	East facing forested hillside near RT 170	6-Aug	Interior	11	1	12
304	607	37.110883	-86.976415	Woodlot south of KY-949 near RT 171	6-Aug	Interior	13	0	13

*Plot characteristics determined using a 10-factor prism based at the roost tree location

Roost Tree Data for the Lost City Solar Generating Facility Project, Muhlenberg County, Kentucky.

Roost ID	Bat ID	Roost Type	Tree Species	DBH (cm)	Tree Height (m)	Roost Height (m)	Micro-Habitat Used by Bat	Tree Decay State	Bark Cover (%)		Tree Ranking	Canopy Cover (%)
									Total	Usable		
170	125	Live tree	*Acer saccharum*	16.2	18	UNK	Canopy leaf cluster	1	100	0	C	87
171	607	Live tree	*Liriodendron tulipifera*	9.8	12	UNK	Canopy leaf cluster	1	100	0	SC	75
582	125	Live tree	*Liriodendron tulipifera*	35.7	25	22	Canopy leaf cluster	1	100	0	C	75
304	607	Live tree	*Liriodendron tulipifera*	31.4	22	20	Canopy leaf cluster	1	100	0	C	100

C = Canopy, SC = sub-canopy; tree decay state 1 = Live; UNK = unknown

APPENDIX G

Roost Tree Photograph Log

COPPERHEAD
ENVIRONMENTAL CONSULTING

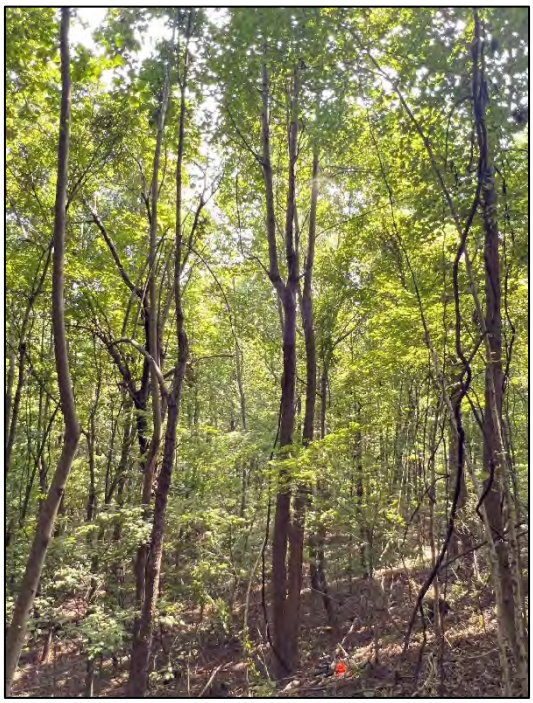
Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility
Roost Tree Photograph Log

Project No.:	County, State:	Photograph Log Page Number:
1543	Muhlenberg, Kentucky	1

Roost tree 170 used by bat 125
(37.09516, -86.97905)

Roost tree 171 used by bat 607
(37.11084, -86.97647)

Roost tree 304 used by bat 607
(37.11088, -86.97641)



Roost tree 582 used by bat 125
(37.09531, -86.97900)

APPENDIX H

Bridge/Culvert Bat Assessment Datasheet

APPENDIX K: ASSESSING & SURVEYING BRIDGES & CULVERTS FOR BAT USE

Bridge/Culvert Bat Assessment Form

Date & Time of Assessment: 3 Aug 2024 1230	DOT Project Number or IPaC Code: 2024-00397038	Route/Facility Carried: N/A	County: Muhlenberg
Federal Structure ID: N/A	Structure Coordinates (latitude and longitude): 37.098622 -86.998199	Structure Height (approximate): 5 Ft	Structure Length: 60 Ft

Structure Type (check one)

Bridge Construction Style

	Cast-in-place		Pre-stressed Girder
	Flat Slab/Box		Steel I-beam
	Truss (Side View)		Covered
	Parallel Box Beam	X	Other: Earth Rail Bed

Culvert Type

X	Box
	Pipe/Round
X	Other: Historic Hand cut Stone

Other Structure

Structure Material (check all that apply)

Deck Material	*Beam Material*
Metal	None
Concrete	Concrete
Timber	Steel
Open grid	Timber
Other:	Other:

Culvert Material

Metal
Concrete
Plastic
X Stone/masonry
Other:

End/Back Wall Material

Concrete
Timber
Stone/Masonry
Other:

Creosote Evidence

	Yes	X	No
	Unknown		

Notes: Abandoned Rail road, over historic stone culvert

Crossings Traversed (check all that apply)

	Bare ground		Open vegetation
	Rip-rap		Closed vegetation
X	Flowing water		Railroad
	Standing water		Road/trail - Type:
	Seasonal water		Other

Surrounding Habitat (check all that apply)

X	Agricultural		Grassland
	Commercial		Ranching
	Residential-urban		Riparian/wetland
X	Residential-rural		Mixed use
X	Woodland/forested		Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	Assessment Notes	Evidence of Bats (include photos if present)
X All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	Not present: Dessicated Guano in Cracks	Visual - live # dead #; X Guano; Staining; Audible; Odor; Photos; Species
X Concrete surfaces (open roosting on concrete)	Not present: Fresh Guano on walls	Visual - live # dead #; X Guano; Staining; Audible; Odor; Photos; Species
Spaces between concrete end walls and the bridge deck	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
Crack between concrete railings on top of the bridge deck (Gap / Railing)	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
Vertical surfaces on concrete I-beams	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
Spaces between walls, ceiling joists	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
Weep holes, scupper drains, and inlets/pipes	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
All guiderails	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species
All expansion joints	X Not present:	Visual - live # dead #; Guano; Staining; Audible; Odor; Photos; Species

Name: Ian Burns

Signature: [signature]

APPENDIX I

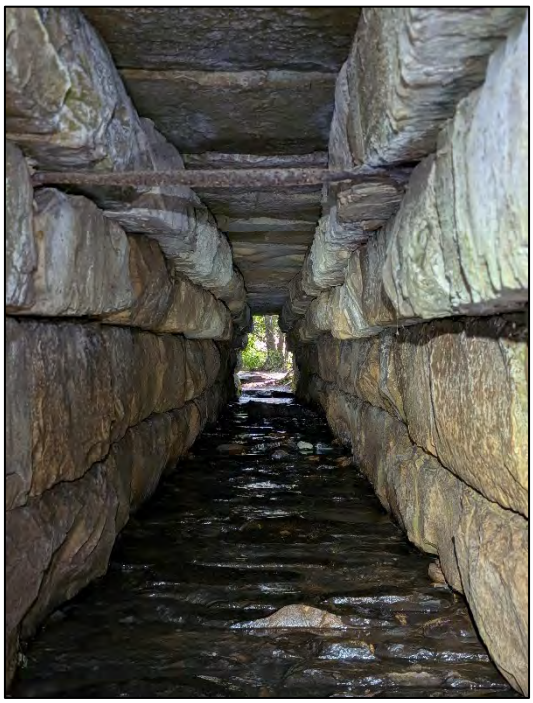
Culvert Inspection Photograph Log

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Culvert Inspection Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 1

Historic railroad culvert entrance
(37.098622, -86.998199)

Abandoned railroad bed above culvert

Culvert entrance showing cut stone walls and roof



Internal passage of culvert

COPPERHEAD ENVIRONMENTAL CONSULTING	Summer 2024 Bat Mist-Net Surveys for the Lost City Solar Generating Facility Culvert Inspection Photograph Log	
Project No.: 1543	**County, State:** Muhlenberg, Kentucky	**Photograph Log Page Number:** 2

Bat guano found in the wall of the culvert

Potential bat roost location in the ceiling of the culvert

Potential bat roost location in the wall of the culvert

Interior wall of the culvert showing possible roost locations for bats