



December 17, 2020
File: 172658241

Attention: Ms. Emily Truebner
Martin County Solar Project, LLC
422 Admiral Blvd
Kansas City, MO 64106

Dear Ms. Truebner,

Reference: Martin County Solar Site: Listed Species Habitat Assessment Summary

Stantec was retained by Martin County Solar, LLC to identify, delineate, and report on potential suitable habitat for listed species within the 1,053.4-acre proposed Martin County Solar site (“the Project”) near Inez, Kentucky in Martin County (see mapping in **Attachment A**). Prior to conducting field work, a database search was conducted to identify records for listed species with potential to occur in the vicinity of the Project. Based on available data, it was determined the Project was located within the range of the Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), gray bat (*Myotis grisescens*), and Big Sandy Crayfish (*Cambarus callainus*) and potential habitat may be present within the Project boundaries for each of these species (USFWS IPaC 2020).

A desktop review of aerial imagery, topographic maps, abandoned mine maps, USGS Geological Quadrangle maps and other available data sources were used to determine if potential winter bat habitat was present and to determine land use and land cover types that may correspond to suitable habitat for the identified listed species (Indiana bat, northern long-eared bat, gray bat). Field habitat assessments were then conducted during October and November 2020 to identify any potential winter bat habitat and document the dominant vegetation types and community structure in areas of potential habitat. Additionally, habitat within the perennial streams in the Project was evaluated for the Big Sandy crayfish. **Figure 1** in **Attachment A** shows the Multi-Resolution Land Characteristics Consortium National Land Cover Database data for the Project. **Figure 2** shows onsite identified and delineated habitats by category. **Figure 3** shows potential bat habitat within the Project

PROJECT SETTING

The site is located within Pigeonroost Fork drainage (HUC-12 [050702010504]) and Upper Wolf Creek drainage (HUC-12 [050702010503]) of the Tug Fork watershed (HUC 05070201) and is drained by a combination of Wolf Creek, Petercave Fork, and Pigeonroost Fork. Most of the project area has been previously cleared of forest and surface mined for coal and is currently non-forested with the exception of 19 areas, totaling 162 acres. For the purpose of the Project, plant communities present on the site are classified as mature unmined forest, young unmined forest, mined young forest, scrub/shrub, pasture, and old field. The pasture, old field, and some of the scrub/shrub communities are currently used to provide forage for cattle and horses. Mature forest on site is restricted to steep slopes where mining activities are absent.

The project area is located within the Allegheny (Appalachian) Plateau physiographic province of eastern Kentucky, which is also known as the Eastern Kentucky Coalfield. This portion of the province consists of steep-sloped mountains with deep V-shaped valleys containing narrow floodplains (KGS 2020). The

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landscape was formed as small streams incised themselves in a dendritic pattern into the former plateau's surface and created the mountains. In unmined portions of the Allegheny Plateau the mountains have narrow ridgetops often containing small sandstone outcrops. The geologic strata of the Appalachian Plateau consist of Devonian, Mississippian and Pennsylvanian sandstones, shales, and coal. The geologic strata contains no limestone, so large complex cave systems are absent from the Martin County portion of the Allegheny Plateau. Sandstone and shale strata, are slightly exposed on and near the ridgetops and along medium-sized and larger streams, thus providing some small rock houses and overhangs. Additionally, the coal seams were also mined using underground shafts and auger which produce subterranean, cave-like habitats.

The Appalachian Plateau is part of the Mixed Mesophytic forest region described by Braun (1950). Historically, this region was maturely dissected with strong relief with the uppermost forested slopes and ridgetops dominated by oak (*Quercus* spp.) and American chestnut (*Castanea dentata*), but a blight [fungus (*Cryphonectria parasitica*)] eliminated the chestnut component. American chestnuts have been replaced in the canopies by oaks, hickories (*Carya* spp.), and red maple (*Acer rubrum*). On some ridgetops and southern exposed points, pines, such as Virginia (*Pinus virginiana*), and pitch (*P. rigida*), are mixed with oaks, such as chestnut (*Q. montana*), black (*Q. velutina*), scarlet (*Q. coccinea*), and white (*Q. alba*). The mesic slopes and ravines in the area are composed of mixed mesophytic communities dominated by an overstory of tuliptree (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), sycamore (*Platanus occidentalis*), sugar maple (*Acer saccharum*), sweet buckeye (*Aesculus flava*), black walnut (*Juglans nigra*), basswood (*Tilia americana*), and American beech (*Fagus grandifolia*).

LISTED SPECIES HABITAT DESCRIPTION

Indiana Bat

Winter hibernacula for the Indiana bat consists of caves and abandoned mines; specifically, humid caves that have temperatures below 50° F but above freezing. During summer, the Indiana bat migrates from their hibernacula to their summer habitat where they typically roost under loose bark on living or dead trees (USFWS 2006). The Indiana bat is known to roost in over 30 tree species but will typically select ash (*Fraxinus*), elm (*Ulmus*), hickory (*Carya*), maple (*Acer*), oak (*Quercus*), and poplar (*Populus*) trees. Indiana bats may change roost sites every 2-3 days and may fly several miles to reach the next roost site (Kurta 2004). Females form maternity colonies of up to 100 individuals while males roost alone or in small groups. Foraging habitat for the Indiana bat includes upland and bottomland forested areas such as stream corridors, forested wetlands, and along edges of pasture and agricultural fields (USFWS 2019).

Northern Long-Eared Bat

The northern long-eared bat is similar to the Indiana bat in that they both hibernate in caves and abandoned mines, which is considered "Traditional Winter Habitat". However, they have also been found during autumn and winter roosting in "Non-traditional Winter Habitat", such as basements and crawl spaces of human dwellings and other buildings, natural rock outcrops, talus slopes, and other rocky structures (e.g. road-cuts and mine highwalls). Northern long-eared bats hibernate in a variety of caves with constant, cool temperatures. Within the caves they are usually found in small cracks or crevices (USFWS 2015).

Like the Indiana bat the northern long-eared bat roosts in forested habitats where they can be found in various sized trees. Summer roost sites for the northern long-eared bat typically include cavities, or crevices of live or dead trees, and occasionally manmade structures such as abandoned houses or barns. They

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typically select roost sites that have greater solar exposure (USFWS 2015). The northern long-eared bat typically forages in mature forest on hillsides, ridges, and road corridors (Harvey et al. 1999).

Gray Bat

The gray bat is a cave-obligate species that uses caves year-round. During the winter, gray bats hibernate in deep, vertical caves with large rooms that provide stable temperatures. About 95 percent of the total gray bat population is known to only hibernate in less than ten caves (KBWG 2020).

In the summer they usually roost in caves scattered along rivers, but they are also known to roost under bridges, inside storm sewers, and inside dams. The gray bat typically forages along waterways including creeks, rivers, and lakes where they eat emerging aquatic insects (KBWG 2020).

Big Sandy Crayfish

The Big Sandy crayfish is endemic to the Big Sandy River basin in eastern Kentucky, southwestern Virginia, and southern West Virginia. This crayfish requires clean, medium-sized streams with appropriate cover and little sedimentation. They normally occur in the swift water sections of streams having large boulders and rocks with open spaces underneath for cover. Suitable habitat for the Big Sandy crayfish has been greatly reduced by water degradation and sedimentation on stream bottoms which prevent crayfish from sheltering underneath large boulders. Surveys in 2015 by Zachary Loughman in Wolf Creek in Martin County failed to document the species within the drainage, but only three sites were surveyed.

SURVEY METHODS

Habitat assessments were conducted within the Project with emphasis on forested areas for use as potential summer roost habitat and foraging areas for bats. Evaluation of forested summer habitat for bats focused on habitat form; descriptions of which consisted of canopy closure, understory clutter/ openness, distance to water, flight corridors, and species, size, and relative abundance of large trees and snags that may serve as roost trees. Location shown on USGS Topographic Maps and Geologic Quadrangle Maps for abandoned mine portals were investigated as potential "Traditional Winter Habitat" for bats. In addition, rock outcrops, road-cuts, and high walls, abandoned buildings and mine structures, and bridges were also analyzed as these features may provide non-traditional winter habitat for the northern long-eared bat. Characteristic of the rock outcrops such as height, length, and crevices within the rock outcrops were noted during the surveys. Perennial streams were evaluated for Big Sandy crayfish habitat by noting their flow regime, presence of large shelter rocks, and reduced amounts of sediment. Shallow, slow flowing streams having only sand and gravel substrate and lacking large cover rocks do not provide potential habitat for this crayfish.

FIELD RESULTS

Winter Habitat for Bats

Traditional Winter Habitat

Extensive subterranean habitat is limited throughout most of the Eastern Kentucky Coalfield, especially this portion of Martin County, due to the absence of limestone bedrock near the surface. Traditional winter habitat is restricted within the Project to abandoned underground mine passages, which were left after the extraction of coal. These subterranean habitats are only suitable if they have openings (adits) to surface

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which allow bats to enter. The USGS Geological Survey Quadrangle Map shows two abandoned mine portals (adits) along the main road through the project area, and several in a small unnamed drain (impoundment present) adjacent to the property boundary along Wolf Creek, one which extends underneath the Project. During field investigations these sites were investigated to determine if they were still present and open to bats. The two abandoned portals shown on maps along the main road are no longer present. Both of these portals were mined through using surface mining techniques. Due to being located off of the Project, the exact location of the abandoned portals along Wolf Creek were not visited, but their subterranean passages were obvious when two large subsidence holes (aka mine break) were observed within the Project. One of these subsidence holes (portals) was located on a steep slope along the base of a sandstone rock outcrop. The opening was approximately 18 to 24 inches wide and the shaft went straight down for at least 30 feet. Some cool air was flowing from the hole indicating that a larger subterranean system was present below. The second subsidence hole was located on point upslope from previously mentioned one. This subsidence hole was approximately 6 – 12 inches wide and extended for at least 20 feet straight down into the sandstone rock outcrop. These two openings are most likely connected to a larger system. Both of these openings and associated subterranean passage may provide traditional winter habitat for the Indiana and northern long-eared bats.

While completing field surveys an additional four collapsed mine portals (adits) were discovered within the drainage of an unnamed tributary to Petercave Fork. Three of these are located on the west side, and upslope from Fletcher Jude Cemetery Road (County Road 1118) while the remaining one is across the small stream and upslope of the small cemetery. None of these provide entry for bats and have been closed for many years based on surrounding vegetation.

Non-traditional Winter Habitat

The only natural non-traditional winter habitat for the northern long-eared bats on site consists of the numerous amounts of natural sandstone outcrops and cliffs scattered throughout the unmined forested habitats. This habitat is present near the knob containing the unnamed and unmapped cemetery. The sandstone cliff and outcrop almost completely encircle the knob near the top. The cliff/rock outcrop ranges from 6 to 12 feet in height and contains crevices and burrows along the entire length of structure. This site provides non-traditional winter habitat for the northern long-eared bat.

Additional rock outcrops and sandstone cliffs are present within the unnamed tributary to Petercave Fork. These outcrops and cliffs range from 3 to 15 feet in height and located in mature forest. Numerous crevices within these features provide potential non-traditional winter habitat. Due to the extensive locations within this drain refer to **Figure 3** for habitat locations.

The most extensive natural non-traditional winter habitat for the northern long-eared bat occurs within the isolated parcel of property on the west facing slope in Wolf Creek. This area has steep slopes and extensive mature forest with sandstone cliffs and rock outcrops occurring on the upper slopes, especially on the points, and near the ridgetops. Sandstone cliffs and rock outcrops range from 3 to 20 feet in height. These features contain numerous crevices with some of them extensive and deep. Most of these outcrops get maximum solar exposure during spring and fall when leaves are not present on the overstory trees. These features provide good non-traditional winter habitat for the northern long-eared bat. See **Figure 3** for locations of these features.

A natural rock outcrop/cliff ranging from 3 to 6 feet in height extends from the large concrete bridge (main access road) over Pigeonroost Fork downstream for approximately 200 feet. This natural rocky habitat provides non-traditional winter habitat for the northern long-eared bat.

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The highwall/road-cut along the main access road from Pigeonroost Fork to ridgetop is similar to natural rock outcrops and cliffline, but more substantial in size. This rock feature ranges from 10 feet in height to approximately 100 feet with most ranging from 30 – 50 feet. It contains numerous crevices with some seeping water and others solar exposed and dry. This type of feature is on both sides of the main access road near the bridge over Pigeonroost Fork but is restricted to the south and southwest side of main access road beyond the first 600 feet. This highwall/road-cut provides non-traditional winter habitat for the northern long-eared bat. A smaller road-cut is located along Petercave Fork Road at the junction of Fletcher Jude Cemetery Road (County Road 1118). This road-cut ranges from 3 to 15 feet in height and is mostly shaded by adjacent slope and trees. Due to limited solar exposure this road-cut provides limited habitat for the northern long-eared bat.

Several man-made structures of what appeared to be chicken barns provided both non-traditional winter habitat for the northern long-eared bat and summer roost, including both day and night roosting habitat. Field surveys of one of these structures identified some big brown bat (*Eptesicus fuscus*) droppings (guano), indicating at least one species of bat is roosting here. An additional larger barn located in open pasture southwest from above structures also provides potential roosting habitat for the northern long-eared bat. This barn has huge dark zones and many cracks and crevices where northern long-eared bats could roost during both the winter and summer.

A mine related structure downslope of the unmapped cemetery and adjacent to main road through site provides some cave-like/rockshelter conditions. This tipple like structure is mostly underground and constructed of thick concrete. It is estimated to be 15 feet wide, 20 feet high, and 90 feet deep with water standing in the bottom. The structure contains no real dark zone for large clusters of bats to roost but could be used during the winter and summer by individual northern long-eared bats. To the north of the above-mentioned site and across the main road running through the Project, two additional mine related structures are present. These are located at the junction of the main access road and the road that extends to Fletcher Cemetery. Both structures are constructed of concrete. These structures contain no real dark zones for large clusters of bats to roost but could be used during the winter and summer by individual northern long-eared bats.

The large concrete bridge that provides the main access to the site and crosses Pigeonroost Fork has crevices underneath similar to those found to provide summer roosting habitat for gray bats. It has many long narrow crevices (expansion joints) and crosses a larger stream (Pigeonroost Fork). Bat guano was found on the ground beneath one of these crevices during field investigations, but it was broken down and identification to species could not be determined. The crevice above the guano also had urine stains. This massive man-made structure could provide both summer and winter roosting habitat for northern long-eared bat, and summer roosting habitat for gray and Indiana bats. It would need to be resurveyed between May 15 and August 15 to determine what species of bat is using the crevices.

Summer Habitat for Bats

Much of the Project has reverted to scrub-shrub dominated primarily by dense autumn olive (*Elaeagnus umbellata*) since it was mined. Approximately 259 acres of the site is improved pasture where both cattle and horses keep the cool season grasses grazed to less than 2-inches in height. Of the 1,031 acres within the project area only 46.3 acres is mature forest growing on unmined land. An additional 71.4 acres of young forest is present on unmined land while the remaining 44.7 acres of forest is young and occurring on previously mined land. These three types of habitat are the only ones that provide the Indiana and northern long-eared bat potential summer roosting habitat within the Project. The total forested area in the project area is 162.4 acres (15.7%). **Table 1** contains the current land use types, as delineated from aerial

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photography and field verified in October and November 2020, and shows the amount of each found within the Project. **Figure 2** shows the location of each of these land use types. Descriptions of some of these land types can be found below.

Table1. Land use types and acreage for each within the Project, Martin County, Kentucky

Land Use Type	Acreage	Listed Species Habitat
Mature Unmined Forest	46.3	Yes
Young Unmined Forest	71.4	Yes
Young Mined Forest	44.7	Yes
Old Field	35.5	No*
Pasture	258.8	No*
Scrub-Shrub	538.2	No*
Open/Developed	35.9	No*

*Does not include the man-made structures (e.g. buildings, rock-cuts, highwalls) that could be used by bats.

Mature Forest on Unmined Land

Several examples of this type of forest community are present within the Project, including a forested knob containing a small unmarked cemetery, a slope within an unnamed tributary of Petercave Fork east of the Fletcher Jude Cemetery Road, and a northwest facing slope along Wolf Creek. The smallest of these areas is the knob where the unmarked cemetery is located. This area is completely encircled by sandstone rock outcrop and small cliffs. The upper slope and ridgetop are dominated by an overstory of 12 – 18 inch diameter at breast height (dbh) scarlet oak, chestnut oak, and black gum (*Nyssa sylvatica*) with some large (24 – 30 inch dbh) southern red oak (*Quercus falcata*), pitch pine, and chestnut oak also present. The midstory is moderately open and dominated by 4 – 8-inch dbh chestnut oak, red maple, scarlet oak, and mockernut hickory (*Carya tomentosa*). The lack of autumn olive here allows for the presence of early low-bush blueberry (*Vaccinium pallidum*), flame azalea (*Rhododendron calendulaceum*), sourwood (*Oxydendrum arboreum*), and flowering dogwood to be scattered throughout the shrub layer. Several dead snags and the open midstory of this forest provide good roosting and foraging habitat for the Indiana and northern long-eared bats.

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Another example of mature forest on unmined land is located within the unnamed tributary of Petercave Fork east of the Fletcher Jude Cemetery Road. The forested slope along the small stream is dominated by an overstory of 10 to 18-inch dbh white oak, tuliptree, northern red oak (*Quercus rubra*), scarlet oak, pignut hickory (*Carya glabra*), and American beech. The midstory woody vegetation layer is moderately open and dominated by 3 – 8-inch dbh American beech, black gum, sourwood, tuliptree, red maple, and white oak. The portion around the edge of this area has a dense shrub layer due to the presence of autumn olive and multiflora rose (*Rosa multiflora*), but the majority of the slope has a moderately open shrub layer. The shrub layer is dominated by pawpaw (*Asimina triloba*), mapleleaf viburnum (*Viburnum acerifolium*), American strawberry bush (*Euonymus americanus*), and saplings of overstory species, especially American beech, and red maple. The presence of large live shagbark hickory (*Carya ovata*) and white oak along with numerous large diameter dead trees provide good roosting habitat for the Indiana and northern long-eared bats.

The largest area of mature forest occurs on the steep northwest facing slope along Wolf Creek. This approximately 35-acre forested area contains some of the largest trees within the project area, and a small area near the ridgetop could possibly qualify as “old growth forest”. The sub-xeric upperslope and ridgetop contains some very large, old looking chestnut and scarlet oaks, and pitch pine. Overall, the forest is dominated by an overstory of 8 to 30-inch dbh trees. Ridgetops and upper slopes are dominated by chestnut oak, scarlet oak, black oak, pignut hickory, pitch pine, and American beech. The midstory wood vegetation layer in these areas are moderately open and dominated by 3 – 10-inch dbh red maple, American beech, sourwood, black oak, scarlet oak, chestnut oak, and black gum. The shrub layer is moderately open and contains mountain laurel (*Kalmia latifolia*), low-bush blueberry, roundleaf greenbrier (*Smilax rotundifolia*), flame azalea, sourwood, and sapling overstory species. The middle to lower slopes in this area are dominated by an overstory of tuliptree, American beech, white oak, Midstory woody vegetation layer is moderately dense and dominated by 4 – 10 inch dbh American beech, red maple, American hornbeam (*Carpinus caroliniana*), tuliptree, and sourwood. Lower slope forest has a dense shrub layer and consists primarily of American beech saplings, and other overstory tree saplings. As with the upper slope and ridgetop forest, the presence of large white oak, and numerous dead trees on lower slopes provide good potential summer habitat for the Indiana and northern long-eared bats.

Young Forest on Unmined Land

At least nine different areas within the Project are considered to be young forest growing on unmined land. The best example of this land use type occurs on the slope located west of the Fletcher Jude Cemetery Road. This slope is dominated by an overstory of 4 to 10-inch dbh tuliptree, American beech, red maple, white oak, mockernut hickory, and sweet birch (*Betula lenta*). Due to young age of this forest, the midstory is moderately dense and dominated by 3 to 6-inch dbh flowering dogwood, American hornbeam, American beech, tuliptree, red maple, and black gum. Shrub layer within this land use type is considered moderately dense and composed of autumn olive, American beech saplings, and other sapling overstory species. Due to the presence of scattered hickory and medium-sized dead trees with sloughing bark, this type of forest provides potential summer habitat for the Indiana and northern long-eared bats.

Young Forest on Mined Land

Young forest growing on mined land near southwestern edge of large continuous parcel is the best example of this forest category within the Project. This forested slope is dominated by an overstory of 4 – 12-inch diameter at breast height (DBH) sycamore, tuliptree, boxelder (*Acer negundo*), wild cherry (*Prunus serotina*), and red maple. Additional canopy species present include the following non-native species,

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princess tree, loblolly pine, and Scotch pine. As with most of the forest and shrub dominated landscape within the Project, the midstory and shrub layer is dense and dominated by 4 – 8 inch dbh autumn olive with native species like flowering dogwood (*Cornus florida*), eastern redbud (*Cercis canadensis*), and sapling overstory species also present. Numerous smaller (6 – 10-inch dbh) snags, including black locust (*Robinia pseudoacacia*) are present and provide potential summer roost habitat for both the Indiana and northern long-eared bats.

Aquatic Habitat

Only two streams occur within the Project that are large enough to provide foraging habitat for the gray bat and appropriate flow and cover for the Big Sandy crayfish. Petercave Fork consists of a series of pools, resulting from beaver (*Castor canadensis*), and associated herbaceous wetlands, thus causing the stream bottom to be covered with fine sediments. This stream appears to lack the velocity to keep fine sediments flushed out and the larger cover rocks that would typically provide habitat for the Big Sandy crayfish are covered. Petercave Fork does not provide habitat for the Big Sandy crayfish, but does provide good foraging habitat for bats, including the endangered gray bat.

Unlike the previous stream, Pigeonroost Fork near the large concrete bridge where the main access road crosses does provide low quality habitat for the Big Sandy crayfish. A small section upstream and immediately downstream of the bridge has enough current to keep fine sediments flushed out. Some large cover objects occur within this section of stream, but approximately 300 feet downstream water velocity is slowed due to beaver dams thus allowing sedimentation. This stream provides some potential habitat for the Big Sandy crayfish, and foraging habitat for the listed bats.

DISCUSSION

For all three of the bat species of concern, traditional winter hibernacula typically consist of caves and abandoned mines. While no caves have been previously documented within the Project, two openings created by mine subsidence are present on the isolated parcel along Wolf Creek that may provide traditional winter habitat for the Indiana and northern long-eared bats. Most of the vegetation on the site is non-conducive for bat roost sites during the summer. However, the 162 acres of forested habitat composed of the mature unmined forest, young unmined forest, and young mined forest land use types provide suitable conditions to be summer roosting habitat for the Indiana and northern long-eared bats. Most of the forest is located on steeper slopes where mining activities either did not occur or where minor modifications occurred. The 162 acres of forest would need to be surveyed for Indiana bats following the most recent U.S. Fish and Wildlife Service surveying guidelines prior to removal. Presence of the species could be assumed which would require formal consultation under Section 7 or 10 of the Endangered Species Act. Consultation could only occur under Section 7 of ESA if a Federal Nexus is involved with the Project. Since no known occupied sites for the northern long-eared bat occur within the Project, the final 4(d) rule can be utilized for all impacts to this species. However, the two openings created by mine subsidence within the isolated parcel of forest in Wolf Creek would need to be surveyed for both the northern long-eared bat and Indiana bat prior to any disturbance to the two structures. Most of the stream within the Project are ephemeral, or intermittent in size, but two streams, Pigeonroost Fork and Petercave Fork, both have permanent flow and provide bats foraging habitat. In addition, Pigeonroost Fork has a small section that provides low quality habitat for the Big Sandy crayfish.

Avoidance of forested areas, streams, wetlands, and ponds (potential suitable summer habitat for bats) would likely eliminate impacts to gray, Indiana, and northern long-eared bats. Avoidance of all the aquatic

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habitats, especially the stream channel and floodplain of Pigeonroost Fork would likely also avoid project impacts to the Big Sandy crayfish. If any alterations are planned for the concrete bridge over Pigeonroost Fork, then surveys are needed to determine what species of bat is using the bridge. The same needs to occur prior to removal of all the man-made structures on site. Several of these are used by bats, presumably big brown bat, but verification of species usage would need to be made prior to structure removal. Table 2. Contains a list of sites along with their locations, species potentially using them, and future actions if removed or disturbed.

Table 2. Sites requiring additional survey effort for endangered species if disturbed.

Type of Site	Latitude	Longitude	Species Habitat	Future Actions if Disturbed
Subsidence holes (portals)	37.74542	-82.493430	Gray, Indiana, Northern Long-eared Bats	Conduct mist net/harp trap surveys at entrance to underground structure between September 15 – October 31, or April 1 – April 21
Subsidence holes (portals)	37.745248	-82.493566	Gray, Indiana, Northern Long-eared Bats	Conduct mist net/harp trap surveys at entrance to underground structure between September 15 – October 31, or April 1 – April 21
Concrete bridge	37.738206	-82.440009	Gray, Indiana, Northern Long-eared Bats	Conduct visual surveys underneath the bridge between May 15 – August 15
Concrete Mine Structure	37.754607	-82.477354	Indiana and Northern Long-eared Bats	Conduct visual surveys inside structure between January 1 – March 1, and again May 15 – August 15
Chicken Barns (9 units)	37.761495	-82.471965	Indiana and Northern Long-eared Bats	Conduct visual surveys inside structure between January 1 – March 1, and again May 15 – August 15
Chicken Barn	37.759107	-82.476265	Indiana and Northern Long-eared Bats	Conduct visual surveys inside structure between January 1 – March 1, and again May 15 – August 15

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Mature Forest on Unmined Land	See Figure 1 for Locations		Indiana and Northern Long-eared Bats	Conduct acoustic, or mist net survey on landscape between May 15 – August 15
Young Forest on Unmined Land	See Figure 1 for Locations		Indiana and Northern Long-eared Bats	Conduct acoustic, or mist net survey on landscape between May 15 – August 15
Young Forest on Mined Land	See Figure 1 for Locations		Indiana and Northern Long-eared Bats	Conduct acoustic, or mist net survey on landscape between May 15 – August 15
Pigeonroost Fork	37.738082 To 37.739274	-82.439961 To -82.441181	Big Sandy Crayfish	Conduct Seine Surveys between September 11 – July 19

However, if impacts to any water resources or forested resources are anticipated as part of the Project, it is recommended that coordination be initiated with U.S. Fish and Wildlife Service to seek concurrence with these findings prior to any impacts.

If you would like any further information or clarification, please feel free to contact either myself at (502) 396-3199, or the project manager, Josh Adams at (502) 718-9512, at any time.

Regards,

Stantec Consulting Services Inc.



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 Senior Biologist
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 James.Kiser@stantec.com

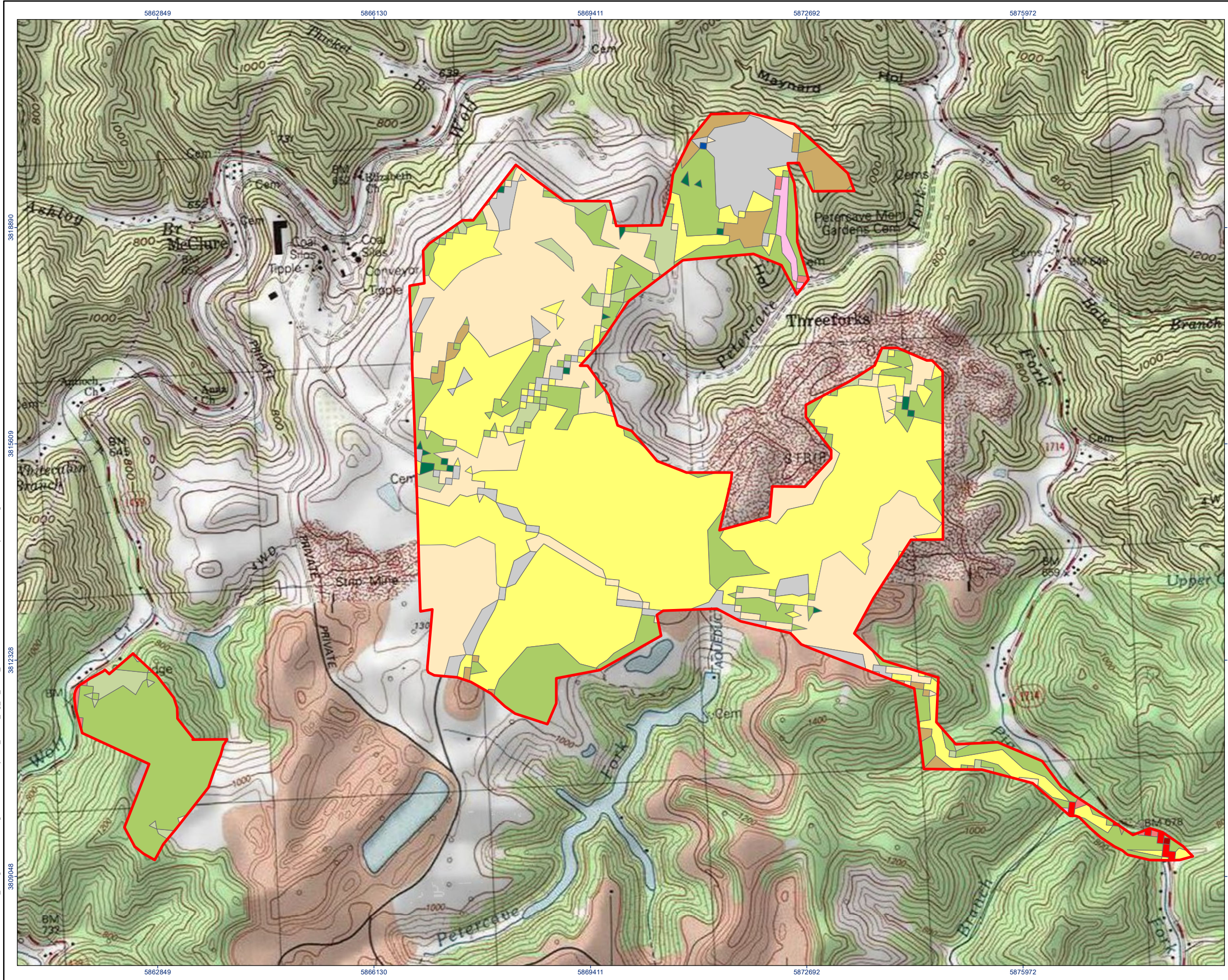
Attachment: Attachment A: Mapping
 Attachment B: Photograph Log

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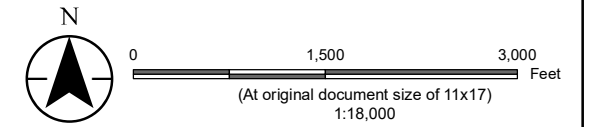
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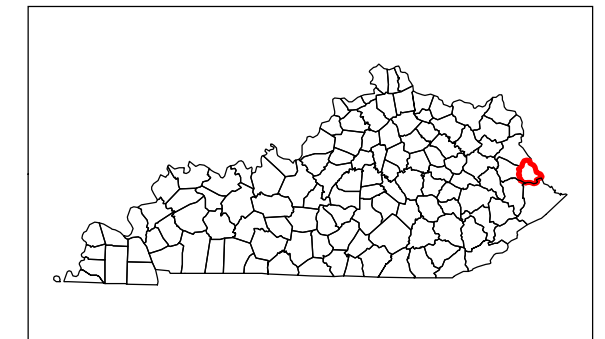
Attachment A



- Legend**
- Study Area (9/29/2020)
 - Open Water (11)
 - Developed, Open Space (21)
 - Developed, Low Intensity (22)
 - Developed, Medium Intensity (23)
 - Developed, High Intensity (24)
 - Barren Land (31)
 - Deciduous Forest (41)
 - Evergreen Forest (42)
 - Mixed Forest (43)
 - Shrub / Scrub (52)
 - Grassland / Herbaceous (71)
 - Pasture / Hay (81)



- Notes**
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
 2. Data Sources: Imagery Date (5/8/2018)
 3. Background: Copyright © 2013 National Geographic Society, i-cubed



Project Location Wolf Creek Road (CR-1439) Inez (Threeforks), Martin County, Kentucky

Prepared by WRC on 2020-11-18
TR by SPK on 2020-11-23
IR Review by JJA on 2020-12-01

Client/Project Martin County Solar Project, LLC
Martin County Solar Project
Threatened & Endangered Species Habitat Assessment

172658241-400.200 REVA

Figure No. 1

Title
2016 National Land Cover Database (NLCD)

V:\172658241\172658241_03_data\gis\mxd\Habitat\Figures\MartinCountySolar_Habitat_Fig_01_NLCD_20201119.mxd Revised: 2020-11-19 By: wccunningham

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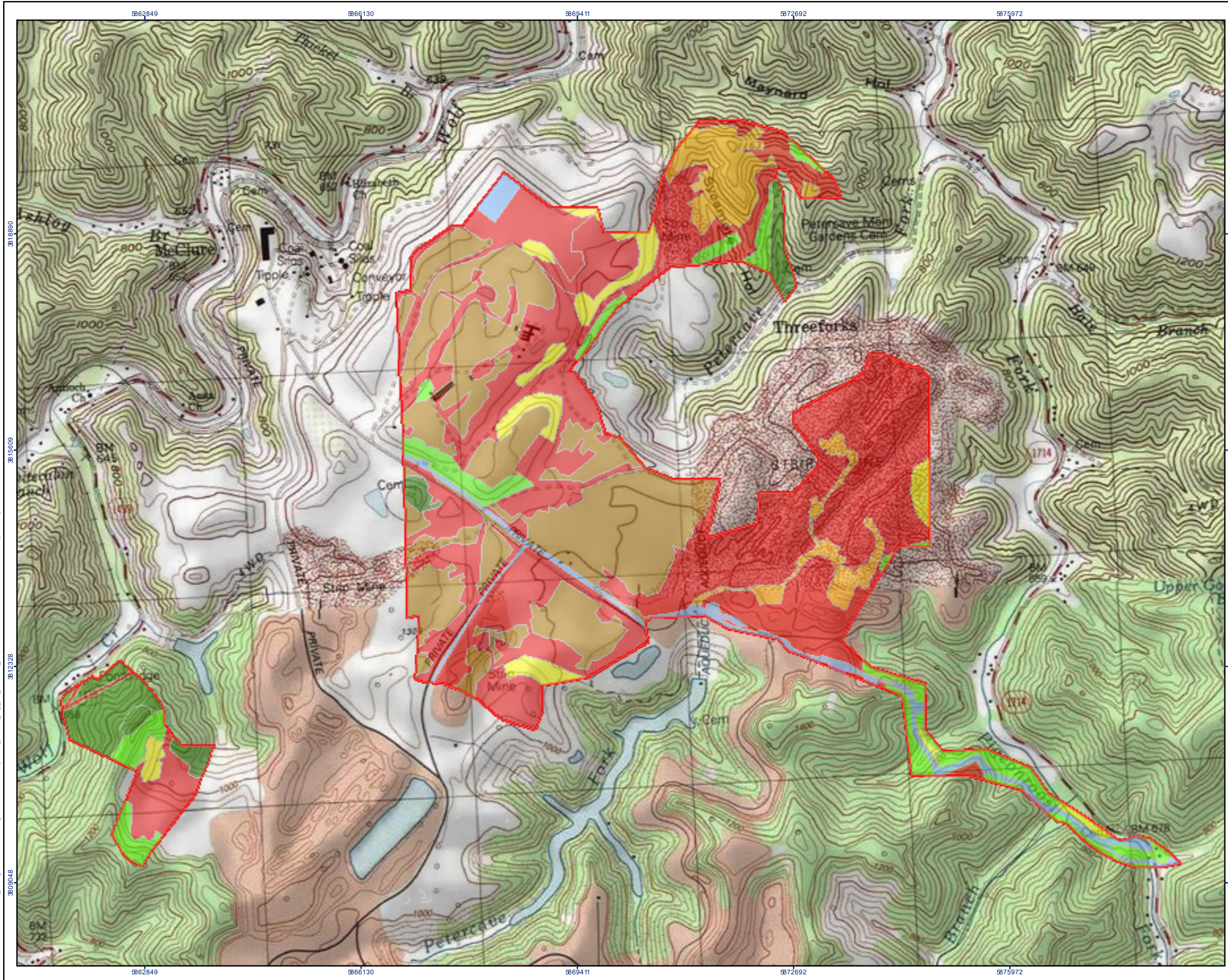
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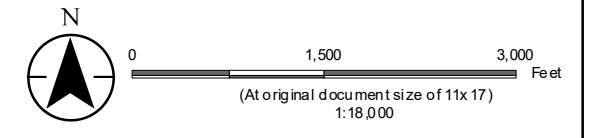
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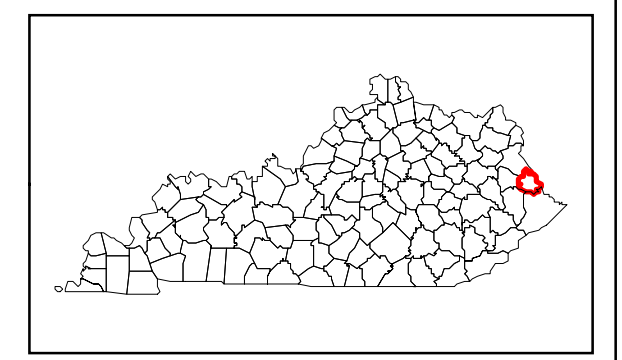
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- Legend
- Study Area (9/29/2020)
- Type
- Mature Unmined Forest
 - Young Unmined Forest
 - Young Mined Forest
 - Old Field
 - Pasture
 - Scrub-Shrub
 - Open



- Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
 2. Data Sources: Imagery Date (5/8/2018)
 3. Background: Copyright © 2013 National Geographic Society, icubed



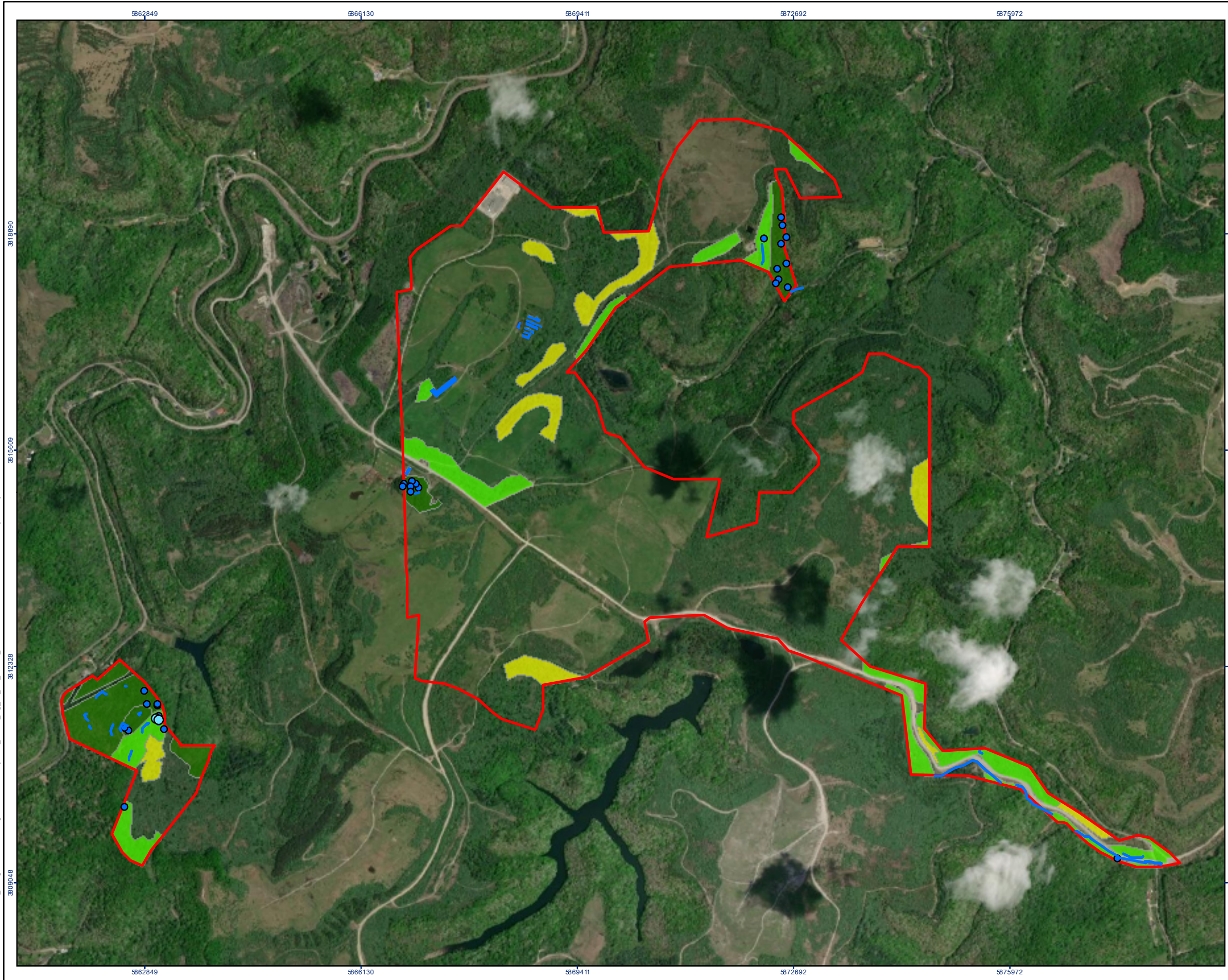
Project Location: Wolf Creek Road (CR-1439), Inez (Theeforks), Martin County, Kentucky

Prepared by WRC on 2020-11-18
 TR by SPK on 2020-11-23
 IR Review by JJA on 2020-12-01

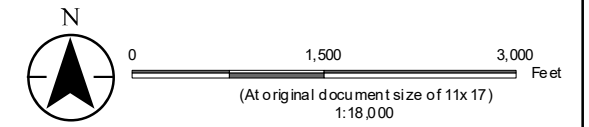
Client/Project: Martin County Solar Project, LLC
 Martin County Solar Project
 Threatened & Endangered Species Habitat Assessment

Figure No. **2**
 Title **Habitat Types Identified Onsite**

V:\1726\active\17265824103_data\figs\md\HabitFigures\MartinCountySolar_Habitat_Fig_02_Habitat_20201209.mxd
 Revised: 2020-12-09 By: akelley
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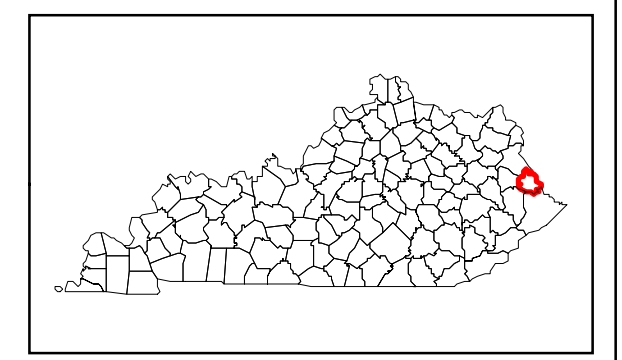


- Legend**
- Study Area (9/29/2020)
 - Traditional Winter Bat Habitat
 - Non-Traditional Winter Bat Habitat
 - Non-Traditional Winter Bat Habitat
 - Non-Traditional Winter Bat Habitat (Structures)
- Habitat Type**
- Mature Unmined Forest
 - Young Unmined Forest
 - Young Mined Forest



Notes

1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Imagery Date (5/8/2018)
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Project Location
 Wolf Creek Road (CR-1439)
 Inez (Theeforks), Martin County, Kentucky

Prepared by WRC on 2020-11-18
 TR by SPK on 2020-11-23
 IR Review by JJA on 2020-12-01

Client/Project
 Martin County Solar Project, LLC
 Martin County Solar Project
 Threatened & Endangered Species Habitat Assessment

172658241-400.200 REV A

Figure No.
3

Title
Bat Habitat: Forest and Winter Roost Structures

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Attachment B


Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky



Photograph ID: 1	
Photo Location: Subsidence Crack (Mine Portal) Located on Isolated Tract in Wolf Creek Drainage	
Direction:	
Survey Date: 11/3/2020	
Comments: Potential Traditional Winter Habitat for Indiana Bat and Northern Long-eared Bat	

Photograph ID: 2	
Photo Location: 2nd Subsidence Crack (Mine Portal) Located on Isolated Tract in Wolf Creek Drainage	
Direction:	
Survey Date: 11/2/2020	
Comments: Potential summer and winter roosting habitat for northern long-eared bat, and summer roosting habitat for Indiana bat and gray bat	


Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky


Photograph ID: 3	
Photo Location: Unique Geologic Feature (Table Rock) and Sandstone Cliff on Ridgetop of Isolated Parcel in Wolf Creek Drainage	
Direction:	
Survey Date: 11/3/2020	
Comments: Potential non-traditional winter habitat for northern long-eared bat.	



Photograph ID: 4	
Photo Location: Sandstone Cliff on Upperslope of Isolated Parcel in Wolf Creek Drainage	
Direction:	
Survey Date: 10/31/2020	
Comments: Potential non-traditional winter habitat for northern long-eared bat.	

Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 5			
Photo Location: Rock Outcrop Below Unmarked Cemetery			
Direction:			
Survey Date: 10/31/2020			
Comments: Potential non-traditional winter habitat for northern long-eared bat.			
Photograph ID: 6			
Photo Location: Road-cut/Highwall Along Main Access Road Through Site On Pigeonroost Fork Side.			
Direction:			
Survey Date: 11/1/2020			
Comments: Potential non-traditional northern long-eared bat winter habitat.			

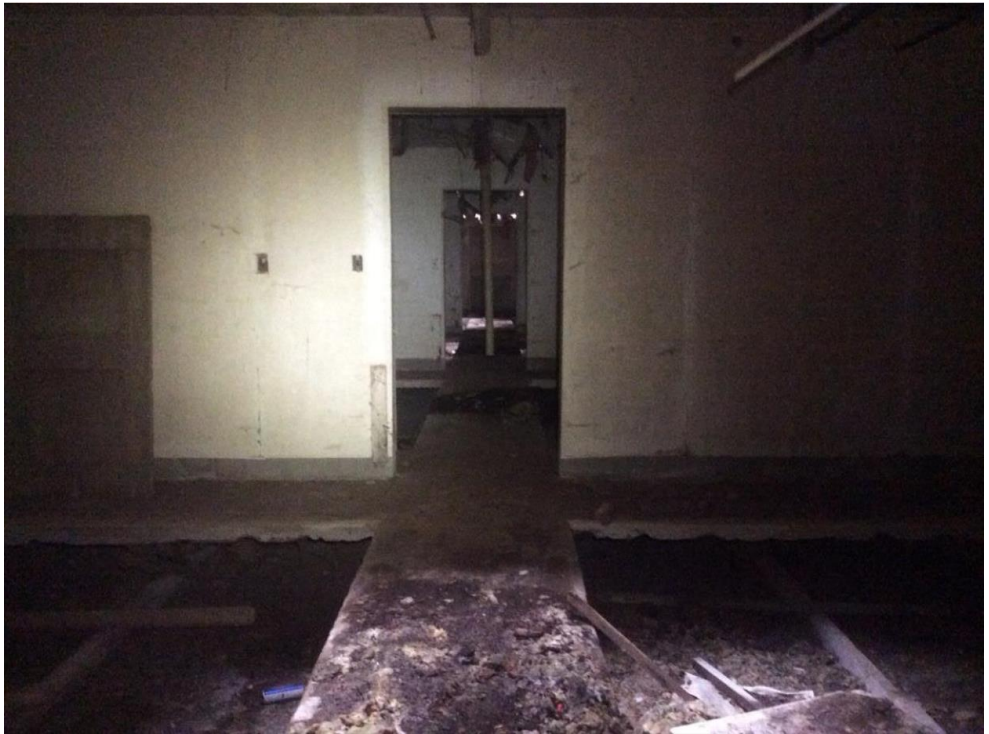
Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky

Photograph ID: 7	
Photo Location: Road-cut/Highwall Along Main Access Road Through Site On Pigeonroost Fork Side.	
Direction:	
Survey Date: 11/1/2020	
Comments: Potential non-traditional northern long-eared bat winter habitat.	



Photograph ID: 8	
Photo Location: Road-cut/Highwall Along Main Access Road Through Site On Pigeonroost Fork Side.	
Direction:	
Survey Date: 11/1/2020	
Comments: Potential non-traditional northern long-eared bat winter habitat.	



Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 9			
Photo Location: Rock Outcrop/Cliff on West Facing Slope in Unnamed Tributary Stream to Petercave Fork			
Direction:			
Survey Date: 11/2/2020			
Comments: Potential non-traditional winter habitat for northern long-eared bat.			
Photograph ID: 10			
Photo Location: Inside Abandoned Chicken Barns			
Direction:			
Survey Date: 10/30/2020			
Comments: Potential non-traditional winter and summer habitat for northern long-eared bat and Indiana bat.			



Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky

<p>Photograph ID: 11</p> <p>Photo Location: Inside Abandoned Chicken Barns</p> <p>Direction:</p> <p>Survey Date: 10/30/2020</p> <p>Comments: Potential non-traditional winter and summer habitat for northern long-eared bat and Indiana bat.</p>	
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<p>Photograph ID: 12</p> <p>Photo Location: Metal Portion of Concrete Mine Powder Loading Structure Downslope of Unmarked Cemetery</p> <p>Direction:</p> <p>Survey Date: 10/31/2020</p> <p>Comments: Potential non-traditional winter and summer habitat for northern long-eared bat and Indiana bat.</p>	
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Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 13			
Photo Location: Concrete Mine Powder Loading Structure Downslope of Unmarked Cemetery			
Direction:			
Survey Date: 10/31/2020			
Comments: Potential non-traditional winter and summer habitat for northern long-eared bat and Indiana bat.			
Photograph ID: 14			
Photo Location: Upstream on Petercave Fork from Bridge Near Cemetery			
Direction:			
Survey Date: 11/2/2020			
Comments: Stream dosse not provide habitat for Big Sandy Crayfish			



Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 15			
Photo Location: Pigeonroost Fork near Bridge Where Main Access Road Crosses			
Direction:			
Survey Date: 11/4/2020			
Comments: Potential Big Sandy crayfish habitat			
Photograph ID: 16			
Photo Location: Underneath Main Access Road Bridge Over Pigeonroost Fork Where Bat Stain Was Observed			
Direction:			
Survey Date: 11/4/2020			
Comments: Potential summer and winter roosting habitat for northern long-eared bat, and summer roosting habitat for Indiana bat and gray bat			

Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 17			
Photo Location: Underneath Main Access Road Bridge Over Pigeonroost Fork Where Bat Stain Was Observed			
Direction:			
Survey Date: 11/2/2020			
Comments: Potential summer and winter roosting habitat for northern long-eared bat, and summer roosting habitat for Indiana bat and gray bat			
Photograph ID: 18			
Photo Location: Mature Forested Unmined Land on West Facing Slope in Unnamed Tributary Stream to Petercave Fork			
Direction:			
Survey Date: 11/2/2020			
Comments: Potential Summer Habitat for Indiana Bat and Northern Long-eared Bat			


Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky

<p>Photograph ID: 19</p> <p>Photo Location: Mature Forested Unmined Land on Knob Where Unmarked Cemetery is Located</p> <p>Direction:</p> <p>Survey Date: 12/18/2020</p> <p>Comments: Potential Summer Habitat for Indiana Bat and Northern Long-eared Bat</p>	
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<p>Photograph ID: 20</p> <p>Photo Location: Mature Forested Unmined Land on Upperslope of Isolated Parcel in Wolf Creek Drainage</p> <p>Direction:</p> <p>Survey Date: 11/3/2020</p> <p>Comments: Potential Summer Habitat for Indiana Bat and Northern Long-eared Bat</p>	
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Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 21			
Photo Location: Mature Forested Unmined Land on Ridgetop of Isolated Parcel in Wolf Creek Drainage			
Direction:			
Survey Date: 11/3/2020			
Comments: Potential Summer Habitat for Indiana Bat and Northern Long-eared Bat			
Photograph ID: 22			
Photo Location: Young Forested Unmined Land on East Facing Slope in Unnamed Tributary Stream to Petercave Fork			
Direction:			
Survey Date: 11/2/2020			
Comments: Potential non-traditional winter habitat for northern long-eared bat.			

Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky

Photograph ID: 23	
Photo Location: Young Forested Mined Land in Center Portion of Site	
Direction:	
Survey Date: 10/30/2020	
Comments: Potential Summer Habitat for Indiana Bat and Northern Long-eared Bat	

Photograph ID: 24	
Photo Location: Inside Dense Scrub-Shrub (Autumn Olive) Within Project Area	
Direction:	
Survey Date: 11/2/2020	
Comments: Non-habitat for Threatened and Endangered Species	

Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 25			
Photo Location: Old Field Habitat On Recently Reclaimed Mined Land Near Northeastern Edge of Site			
Direction:			
Survey Date: 10/30/2020			
Comments: Non-habitat for Threatened and Endangered Species			
Photograph ID: 26			
Photo Location: Grazed Pasture with Scrub-Shrub in Background Located Near Middle of Site			
Direction:			
Survey Date: 10/30/2020			
Comments: Non-habitat for Threatened and Endangered Species			

Client:	Martin County Solar Project, LLC	Project:	Potential Bat Habitat
Site Name:	Martin County Solar Site	Site Location:	Inez, Martin County, Kentucky
Photograph ID: 27			
Photo Location: Grazed Pasture in Middle of Site			
Direction:			
Survey Date: 10/31/2020			
Comments: Non-habitat for Threatened and Endangered Species			