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August 14, 2020

Ms. Emily Truebner
Mercer County Solar Project, LLC
422 Admiral Boulevard
Kansas City, Missouri 64106

Re: Threatened and Endangered Species Habitat Survey Report for the Mercer County Solar Project, Mercer County, Kentucky

Dear Ms. Truebner:

Ecology and Environment, Inc. (E & E) is providing this letter report to Mercer County Solar Project, LLC (Mercer County Solar) to summarize the results of our threatened and endangered (T/E) species habitat survey at the Mercer County Solar Project, located in Mercer County, Kentucky (Project).

INTRODUCTION AND GENERAL SITE DESCRIPTION

Mercer County Solar is proposing to develop a solar energy project on approximately 1,843 acres of private land in a rural, agricultural region of central Kentucky (see Figure 1 in Attachment A). As requested by Mercer County Solar, E & E conducted a habitat survey May 21 - May 25, 2019 in order to assess potential habitat availability for federal and state-listed T/E species in the Project area. The purpose of the survey was to document current land uses within the Project area as well as to detail the type, amount, and quality of the land use and vegetative cover present. The land use and vegetation information can then be compared to the habitat requirements for T/E species that are known or have the potential to occur in the Project area or Mercer County.

The Project area is located in the U.S. Environmental Protection Agency's Level IV Inner Bluegrass Ecoregion, within the larger Level III Interior Plateau Ecoregion (USEPA n.d.). The Inner Bluegrass ecoregion is characterized by flat to rolling topography historically composed of open woodlands, savannas, and swamp forests that have been largely replaced by agriculture and urban, suburban, and/or industrial areas (Kentucky Department of Fish and Wildlife [KDPW] n.d.).

METHODOLOGY

Desktop Review

Prior to the May 2019 field survey, E & E conducted a desktop review of federal and state-listed T/E species for Mercer County to assess their potential occurrence within the Project area. The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) screening tool was used to evaluate federal T/E species that might be potentially present within the Project area (USFWS 2019a).

The KDFW and Kentucky Office of Kentucky Nature Preserves (KNP) list of T/E species were reviewed to identify state-listed species that could potentially be present within the Project area. The KDFW does not have a publicly available screening tool for specific project sites; therefore, the list of potential state-listed T/E species within the Project area was generated using the list for Mercer County.

Field Survey Effort

During the field survey, E & E biologists delineated habitat types and land uses within the Project area based on the land cover types presented in the Kentucky Comprehensive Wildlife Conservation Strategy (KDFW 2013). E & E biologists then modified, as necessary, each habitat type identified in the conservation strategy to best characterize the Project area. The dominant vegetation found in each habitat type within the Project area was recorded and the boundaries of these habitats were field delineated using a handheld GPS unit with sub-meter accuracy and high-resolution imagery. The eight habitat types represented in the Project area are described below.

Agriculture
The agriculture category includes active and fallow fields that are used in producing row crops. These fields are regularly disturbed by activities such as planting, tilling, and harvesting.

Deciduous Forest
This forest type is dominated by ash, hackberry, oak and walnut and contains mature hardwood trees and a well-established understory.

Developed Land
Developed areas include human structures, public roads, and structures associated with agricultural operations, including barns, silos, livestock pens, parking areas, and a cemetery.

Herbaceous
This land cover type is comprised of grassland and herbaceous vegetation existing on previously disturbed land, most often former agricultural lands. It is characterized by weedy and invasive flora (though native herbaceous plants occur as well).

Scrub-Shrub
Scrub-shrub areas include early successional vegetation dominated by young sapling trees, woody shrubs, and herbs.

Wetlands, Ponds, Streams and Drains
This land cover type includes all wetlands and waterbodies delineated within the Project area during the May 2019 wetland delineation and waterbody survey conducted in conjunction with the T/E habitat surveys.

RESULTS

Desktop Review

Seven federally listed endangered species and one federally listed threatened species were identified during the IPaC review as being potentially present in the Project boundary (see Table 1). The IPaC review indicates there are no designated critical habitat for federally listed T/E species within the Project area. The KDFW and KNP lists report nine state-listed endangered species (five of which are also federally listed as endangered, and one of which is also federally listed as threatened) and seven

state-listed threatened species (two of which are also federally-listed as endangered; see Table 1; KDFW 2014, KNP 2011).

Based on species habitat requirements and the habitat in the Project area, Table 1 includes a determination on the likelihood that each of the identified species will be present in the Project area. State-listed T/E species that are also federally listed but were not identified during the IPaC review, were omitted from Table 1.

Based on this desktop review, 10 federally or state-listed T/E animal or plant species have the potential to occur within the Project area including: gray bat (*Myotis grisescens*; federally listed endangered [FE] and state-listed threatened [ST]), Indiana bat (*Myotis sodalis*; FE and state-listed endangered [SE]), northern long-eared bat (*Myotis septentrionalis*; federally listed threatened [FT] and SE), grape honeysuckle (*Lonicera prolifera*; SE), hispid falsemallow (*Malvastrum hispidum*; ST), running buffalo clover (*Trifolium stoloniferum*; FE and ST), snow trillium (*Trillium nivale*; SE), softleaf arrowwood (*Viburnum molle*; ST), water stitchwort (*Sagina fontinalis*; ST), and western hairy rockcress (*Arabis hirsute*; ST). No other T/E species identified in Table 1 are likely to occur within the Project area based on the habitat characteristics within the Project boundary.

Project Area Habitat

The T/E species habitat survey was conducted between May 21 and May 25, 2019. Based on the habitat categories identified and delineated during the survey, the total acreage and percentage of the overall Project area for each habitat category is presented in Table 2. A map depicting the geographic locations of the delineated habitats within the Project area is provided in Figure 2 in Attachment A, while representative photographs of delineated habitats can be found in Attachment B.

Table 2 Habitat Types Identified within the Mercer County Solar Project Area

Habitat Category	Acres	Land Use (%)
Agriculture	1,702.1	92.3%
Herbaceous	65.8	3.6%
Deciduous Forest	39.5	2.1%
Scrub-Shrub	29.0	1.6%
Developed Land	3.8	0.2%
Wetlands, Ponds, Streams, and Drains	3.1	0.2 %
Total	**1,843.3**	**100%**

Table 1 List of Potential T/E Species Within or Near the Mercer County Solar Project, Mercer County, Kentucky

Common Name	Scientific Name	Status	Habitat	Presence Determination
Mammals				
Gray Bat	*Myotis grisescens*	FE, ST	Limestone caves serve as winter hibernacula and summer roosts. Summer caves are located within two miles of rivers, streams, or lakes where bats forage.	**Potential suitable habitat present.**
Indiana Bat	*Myotis sodalis*	FE, SE	Forests, riparian corridors, wetlands for summer roosting and foraging. Mines and caves as winter hibernacula.	**Potential suitable habitat present.**
Northern Long-eared Bat	*Myotis septentrionalis*	FT, SE	Forests, riparian corridors, wetlands for summer roosting and foraging. Mines and caves as winter hibernacula.	**Potential suitable habitat present.**
MusselsI				
Orangefoot Pimpleback	*Plethobasus cooperianus*	FE, SE	Medium to large rivers with steady currents, with substrates of sand, gravel, and cobble. Found in shoals and riffles in shallow and deep water.	Potential suitable habitat not present.
Pink Mucket	*Lampsilis abrupta*	FE, SE	Medium to large rivers with moderate to high gradient, with substrates of sand, gravel, rocks, or boulders. Found in water 3 feet or deeper.	Potential suitable habitat not present.
Sheepnose Mussel	*Plethobasus cyphyus*	FE, SE	Medium to large rivers with low to moderate gradient, with substrates of mud, sand, gravel, and cobble. Found in deep water with slight to swift currents.	Potential suitable habitat not present.
Plants				
Grape Honeysuckle	*Lonicera prolifera*	SE	Rocky woods and rocky banks.	**Potential suitable habitat present.**
Hispid Falsemallow	*Malvastrum hispidum*	ST	Upland open areas, barrens, prairies, old fields.	**Potential suitable habitat present.**
Purple Oat	*Schizachne purpurascens*	ST	Dry limestone outcrops along large waterways.	Potential suitable habitat not present.
Running Buffalo Clover	*Trifolium stoloniferum*	FE, ST	Partly sunny well drained soils in old trails and roads, streambanks, lawns, and prairies.	**Potential suitable habitat present.**
Short's (Globe) Bladderpod	*Physaria globosa (Lesquerella globosa)*	FE, SE	Barrens and wooded cliff edges.	Potential suitable habitat not present.
Snow Trillium	*Trillium nivale*	SE	Forests with limestone derived soils, slopes of large rivers.	**Potential suitable habitat present.**
Softleaf Arrowwood	*Viburnum molle*	ST	Dry to somewhat dry rocky woods.	**Potential suitable habitat present.**
Starry-cleft Phlox	*Phlox bifida ssp. stellaria*	SE	Dry cliffs, dry sandy soils, rocky ledges/outcrops, sand hills.	Potential suitable habitat not present.
Water Stitchwort	*Sagina fontinalis*	ST	Full to partly sunny wet limestone cliffs or wet streambanks.	**Potential suitable habitat present.**
Western Hairy Rockcress	*Arabis hirsute*	ST	Dry rocky open woods.	**Potential suitable habitat present.**

Key: FE – Federal Endangered; FT – Federal Threatened; SE – State Endangered; ST – State Threatened
Sources: KDFW 2014, KNP 2011, NatureServe 2019, USFWS 2019a.

For the six habitat types identified with the Project area, a more detailed description of each habitat type and the vegetation present is provided below.

Agriculture
Agricultural areas compose the vast majority of the Project area, representing nearly 92% (1,702 acres) of the land cover within the Project boundary. These areas are large, contiguous croplands that were planted with corn (*Zea mays*) and soybeans (*Glycine max*) during the habitat survey. These areas appear to be regularly farmed and disturbed. There are very few areas of undisturbed land within these large agricultural fields that could offer permanent or semi-permanent cover for wildlife. A representative photograph of agriculture habitat within the Project area is included in Attachment B, Photo Location HAB-01.

Deciduous Forest
The forested habitat in the Project area consists of three small woodlots (2% of the Project area; 39.5 acres), two of which are located in the northern portion of the Project area and one located in southeastern corner (see Figure 2 in Appendix A). The canopy species include white ash (*Fraxinus Americana*), common hackberry (*Celtis occidentalis*), eastern black walnut (*Juglans nigra*), white oak (*Quercus alba*), and northern red oak (*Quercus rubrus*). The understory is dominated by white oak, white ash, and common hackberry. A representative photograph of forested habitat within the Project area is included in Attachment B, Photo Location HAB-02.

Developed Land
Developed areas comprise roughly 0.2% (3.8 acres) of the total Project area. These areas consist of a cemetery, farm buildings, and other structures, roadways, and areas with staged farm equipment. Developed areas are generally clustered along public roads or farm roads within the Project area. A representative photograph of developed habitat within the Project area is included in Attachment B, Photo Location HAB-03.

Herbaceous
The herbaceous habitat represents approximately 3.6% (65.8 acres) of the total Project area and consists of numerous, isolated patches scattered throughout the Project area of areas that were likely previously farmed but are no longer regularly farmed/disturbed (see Figure 2 in Appendix A). Species observed in the herbaceous habitat include: Kentucky bluegrass (*Poa pratensis*), Canada goldenrod (*Solidago canadensis*), meadow fescue (*Schedonorus pratensis*), Queen Anne's lace (*Daucus carota*), poison hemlock (*Conium maculatum*), shortbeak sedge (*Carex brevior*), oval-leaf sedge (*Carex cephalophora*), orchard grass (*Dactylis glomerata*), curly dock (*Rumex crispus*), common yarrow (*Achillea millefolium*), sweetclover (*Melilotus alba*), groundsels (*Packera species*), wild teasel (*Dipsacus fullonum*), Allegheny blackberry (*Rubus allegheniensis*), and Chinese lespedeza (*Lespedeza cuneata*). A representative photograph of herbaceous habitat within the Project area is included in Attachment B, Photo Location HAB-04.

Scrub-Shrub
The scrub-shrub habitat type comprises roughly 1.6% (29 acres) of the Project area and is represented by two small areas adjacent to large agricultural fields found in the south-central and southern portions of the Project area (see Figure 2 in Appendix A). Dominate overstory species include Morrow's honeysuckle (*Lonicera morrowii*), multflora rosa (*Rosa multiflora*), silver maple (*Acer saccharinum*), and eastern red cedar (*Juniperus virginiana*). Dominate herbaceous species include various Solidago species, bedstraw

(*Galium aprine*), threetip sagebrush (*Artemisia trifida*), Vinca species, and various Erigeron species. A representative photograph of Scrub-Shrub habitat within the Project area is included in Attachment B, Photo Location HAB-05.

Wetlands, Ponds, Streams, and Drains

Delineated wetlands and waterbodies represent 0.2% of the total Project area (3.1 acres). Thirteen palustrine emergent wetlands (PEM) are located within the Project area ranging in size from 0.01 to 0.16 acres. These wetlands are found in depressions in herbaceous habitats and abutting streams located throughout the Project area. Fourteen streams are located within the Project area; four perennial flowing, three intermittent or seasonally flowing, and seven ephemeral flowing streams. Stream SS-T01-002 is spring fed. Substrates vary between streams but generally contain silt, sands, gravel, and cobbles. Twelve drains were identified scattered throughout the Project area. All drains have ephemeral flow and appear to drain water from agricultural fields. Drain beds match soils of the surrounding agricultural fields and do not receive enough flow to reveal gravel, cobbles or larger substrate. Six ponds were identified in low-lying herbaceous and agricultural habitats throughout the Project area. The ponds range in size from 0.01 to 0.60 acres (see Figure 2 in Appendix A). The majority are small in size and occur near heavily disturbed agricultural areas. A representative photograph of a PEM wetland (W-T01-006), intermittent stream (SS-T01-002), and pond (WB-T01-004) are included in Attachment B, Photo Locations HAB-06, HAB-07, and HAB-08, respectively.

Project Area T/E Species Assessment

As determined through the desktop review, the gray bat (FE, ST), Indiana bat (FE, SE), northern long-eared bat (FT, SE), grape honeysuckle (SE), hispid falsemallow (ST), running buffalo clover (FE, ST), snow trillium (SE), softleaf arrowwood (ST), water stitchwort (ST), and western hairy rockcress (ST) were identified to have the potential to occur within the Project area. The T/E species field habitat survey conducted in May 2019 allowed E & E to make a more accurate assessment of the potential presence of the 10 state and/or federally listed T/E species identified during the desktop assessment. The results are discussed by species below.

- **Gray Bat**. Gray bats roost in caves year-round; however, this species utilizes forested riparian corridors and reservoirs as foraging grounds during months outside the hibernation season (USFWS 1982). Potentially suitable foraging habitat for gray bats appears to be very limited within the Project area (12.7 acres of deciduous forest; 0.7% of the total land cover; and 1.1 acres of National Hydrography Dataset [NHD] stream/rivers) based on land cover data. Known gray bat hibernacula have not been documented in Mercer County, but multiple gray bat caves are present in adjacent counties (USFWS 1982; Martin 2007). Maternity and reproductive records for this species have been documented in Mercer County by the KDFW (KDFW 2014a). Field surveys indicate that the small, forested areas scattered throughout the Project area could provide suitable foraging habitat for the species but hibernacula and maternity colonies are not likely to be present. Limited tree clearing will likely be necessary within the Project area, therefore the Project is not expected to adversely affect gray bats.

- **Indiana Bat and Northern Long-eared Bat**. Indiana and northern long-eared bats hibernate during winter months in mines or caves, and otherwise roost in tree crevices, cracks, or under exfoliating bark during the summer. Man-made structures, such as barns or bat boxes, are also occasionally used as summer roosts. Foraging habitat includes forested stream corridors and wetlands, upland forest, and field edges (USFWS 2019b). Mines, caves, or other suitable winter hibernacula are not present within the Project area. The USFWS defines "potentially suitable summer habitat" as forested areas that contain trees that have suitable features and are more than or equal to 3 inches diameter at breast height (DBH) for the northern long-eared bat and more than or equal to 5 inches DBH for the Indiana bat (USFWS 2019b). Given this definition, all forested portions of the Project area may offer suitable summer habitat for Indiana and northern long-eared bats. Although there have been no recorded occurrences of either species within Mercer County (KDFW 2014b, 2014c), the Indiana and northern long-eared bat were identified during the IPaC review to be potentially present in the Project area (USFWS 2019a), and the KDFW presume state-wide presence of the northern long-eared bat (KDFW 2014c). Based on available habitat and the species' ranges, Indiana and northern long-eared bats could potentially utilize the forested habitats within the Project area for roosting and foraging. Limited tree clearing will likely be necessary within the Project area; however, to minimize any potential impacts to roosting Indiana and northern long-eared bats, clearing will be done outside of the summer maternity season (October 1 to March 31). Based on habitat avoidance and out-of-season tree clearing, the Project is not expected to adversely affect Indiana and northern long-eared bats.

- **Grape Honeysuckle**. Grape honeysuckle inhabits rocky woods and rocky banks (NatureServe Explorer 2019). The karst topography in the small wooded areas in the Project area could provide suitable habitat. Field surveys indicated that other similar honeysuckle species, including Japanese honeysuckle (*Lonicera japonica*) and Morrow's honeysuckle, did occur in the forested areas within the Project area. The Project may adversely affect the species, if the species is present, and the wooded area is disturbed.

- **Hispid Falsemallow**. The hispid falsemallow is found in open upland areas, prairies, and old fields (NatureServe Explorer 2019). While the majority of the Project area is actively managed for agriculture, there is approximately 66 acres of herbaceous habitat (i.e., primarily fallow fields or edge habitat along agricultural fields) that may be suitable for this species. The Project may adversely affect the species, if the species is present, and the herbaceous area is disturbed.

- **Running Buffalo Clover**. Running buffalo clover prefers partly-sunny, well-drained soils along

streambanks, lawns, prairies, and old trails or roads (NatureServe Explorer 2019). The Project area includes numerous small streams, herbaceous areas, and two-track farm roads that may provide suitable habitat for this species. The Project may adversely affect the species, if the species is present, and the preferred habitat is disturbed.

- **Snow Trillium**. Snow Trillium can be found in forests with limestone derived soils, and the slopes of large rivers (NatureServe Explorer 2019). No large rivers occur in the Project area, but approximately 13 acres of deciduous forest occur within the Project boundary with limestone derived soils that may be potentially suitable habitat for this species. The Project may adversely affect the species, if the species is present, and the wooded area is disturbed.

- **Softleaf Arrowwood and Western Hairy Rockcress**. Softleaf arrowwood and western hairy rockcress are species found in dry rocky woods. The softleaf arrowwood prefers mid-slope areas in calcareous woods while the western hairy rockcress prefers more open woods (NatureServe Explorer 2019). Deciduous forest on limestone derived soils occurs within the Project boundary; thus, there is potential these species may occur in the Project area. The Project may adversely affect the species, if the species is present, and the wooded area is disturbed.

- **Stitchwort**. Stitchwort is found along wet streambanks and wet limestone cliffs with full sun to light shade (NatureServe Explorer 2019). While no limestone cliffs occur in the Project area, streams are present in karst areas with limestone derived soils that may provide potential habitat. The Project may adversely affect the species, if the species is present, and streams are disturbed.

CONCLUSIONS

The majority of the Project area is composed of agricultural land that provides either poor or unsuitable habitat for T/E species that were identified during the desktop assessment as having the potential to occur in the Project area. However, the gray bat, Indiana bat, northern long-eared bat, grape honeysuckle, hispid falsemallow, running buffalo clover, snow trillium, softleaf arrowwood, western hairy rockcress, and stitchwort may occur in the various non-agricultural habitat types present within the Project area, primarily woodlands, herbaceous areas, and wetlands/stream habitat. If potential T/E species habitat cannot be avoided, then additional coordination with USFWS, KDFW, and KNP may be required.

If you have any questions about the contents of this report, please contact me at (312) 578-9243 or scooper@ene.com.

Sincerely,
ECOLOGY AND ENVIRONMENT, INC.

Scott Cooper
Project Manager

Attachment:
A – Figures
B – Site Photographs

REFERENCES

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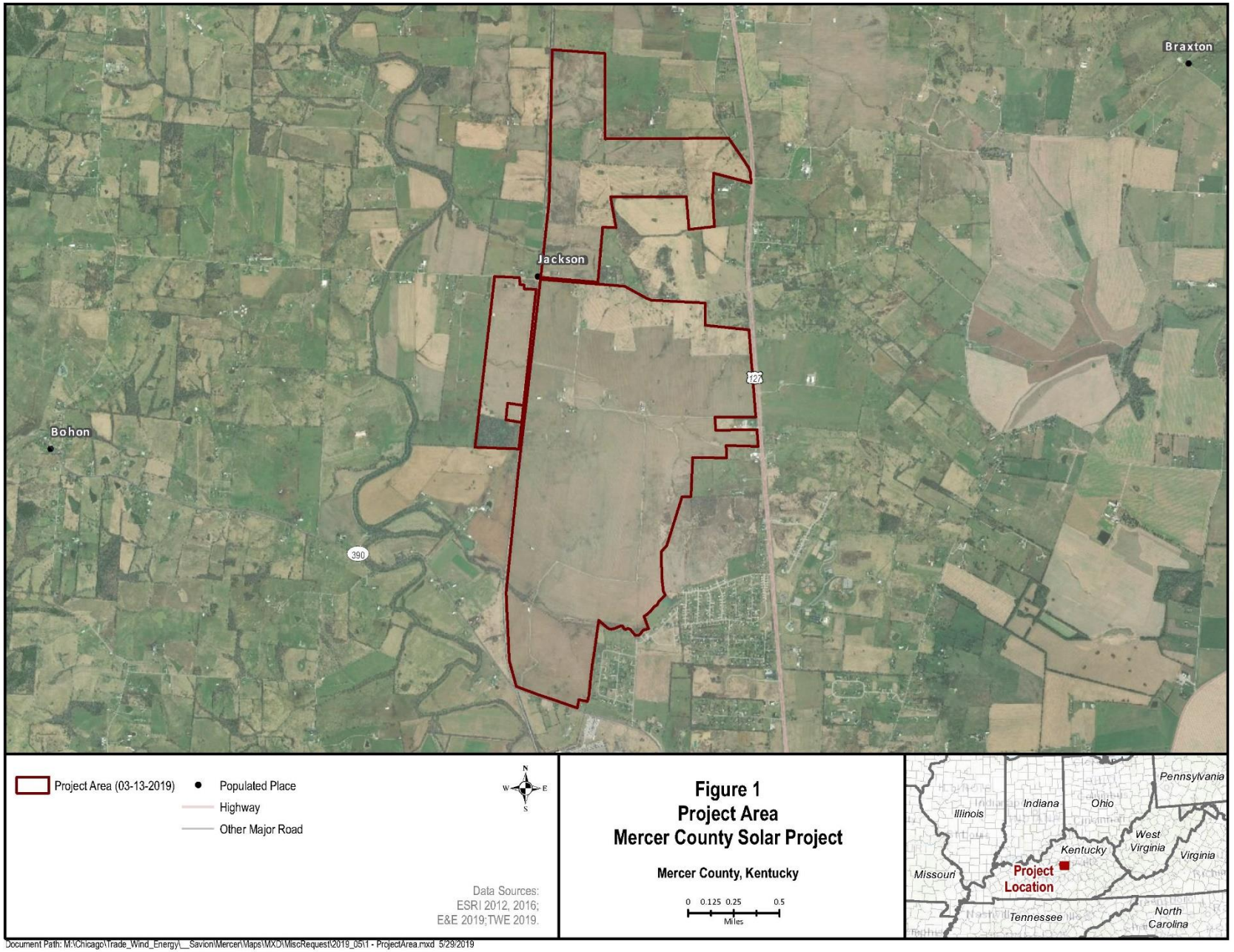
Attachment A

Figures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Project Area (03-13-2019)
Populated Place
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Other Major Road
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Data Sources:
ESRI 2012, 2016;
E&E 2019;TWE 2019.
Figure 1
Project Area
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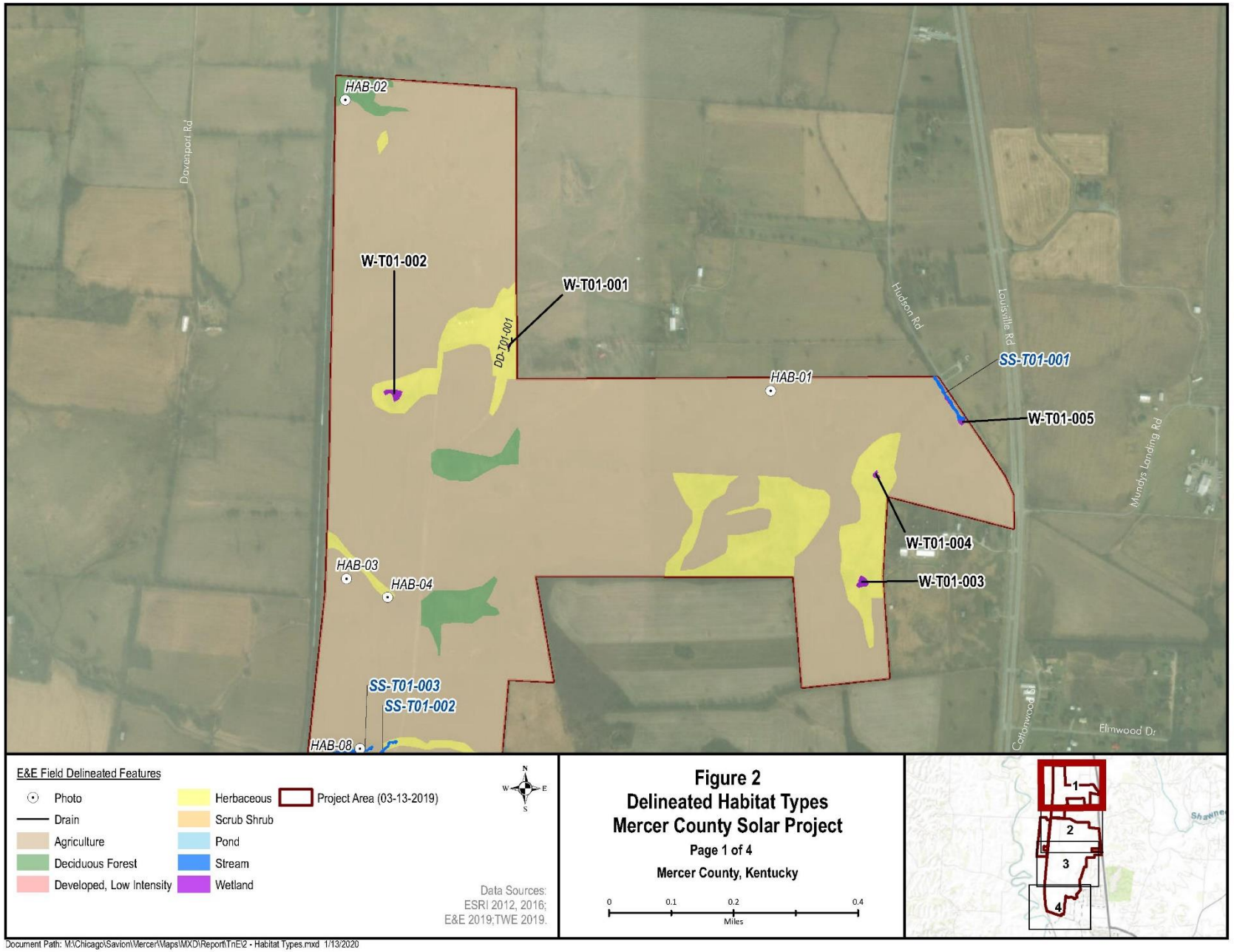
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HAB-03
HAB-04
SS-T01-003
SS-T01-002
HAB-08
Davenport Rd
Hudson Rd
Louisville Rd
Mundys Landing Rd
Cottonwood Dr
Elmwood Dr
E&E Field Delineated Features
Photo
Drain
Agriculture
Deciduous Forest
Developed, Low Intensity
Herbaceous
Scrub Shrub
Pond
Stream
Wetland
Project Area (03-13-2019)
Data Sources:
ESRI 2012, 2016;
E&E 2019;TWE 2019.
Figure 2
Delineated Habitat Types
Mercer County Solar Project
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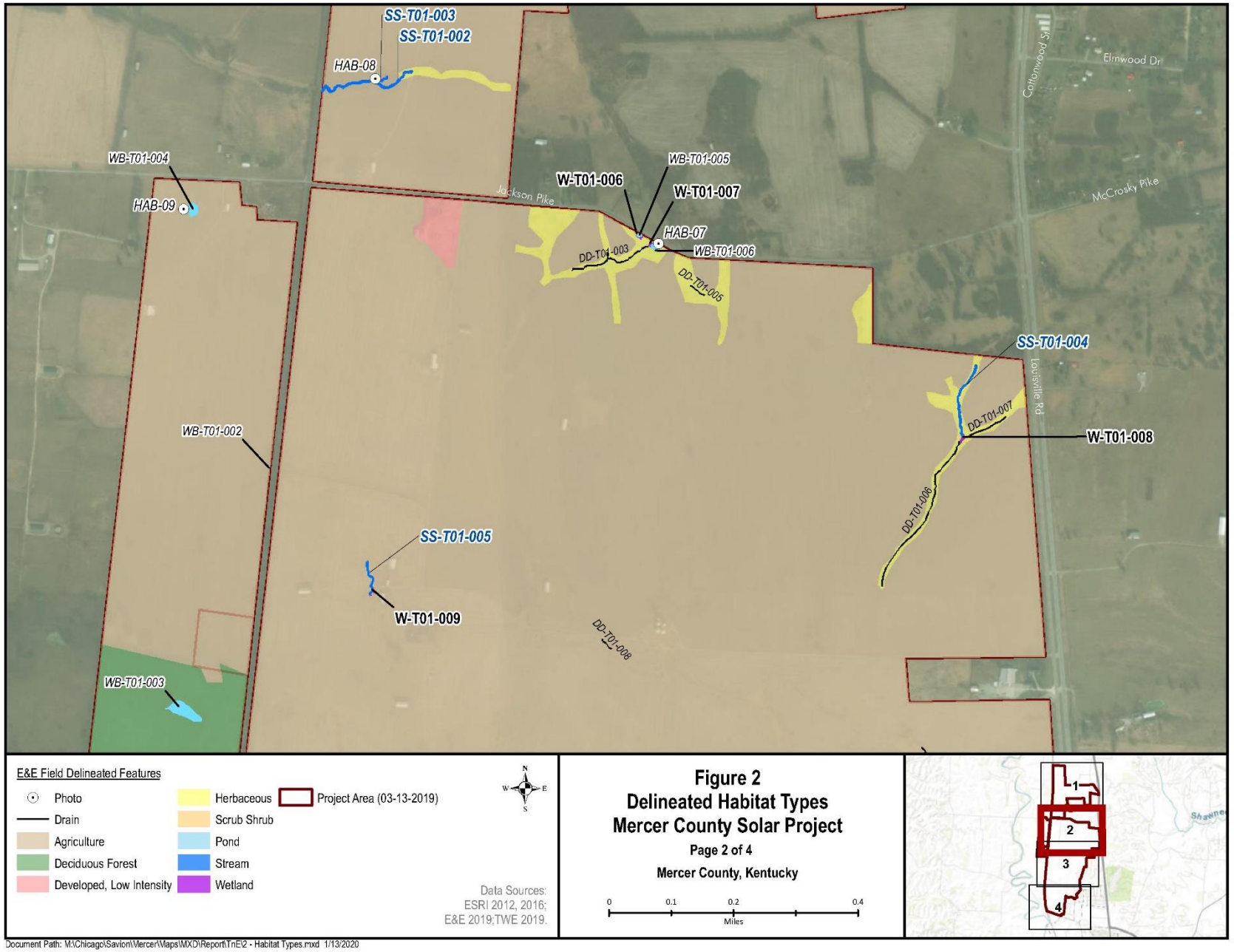

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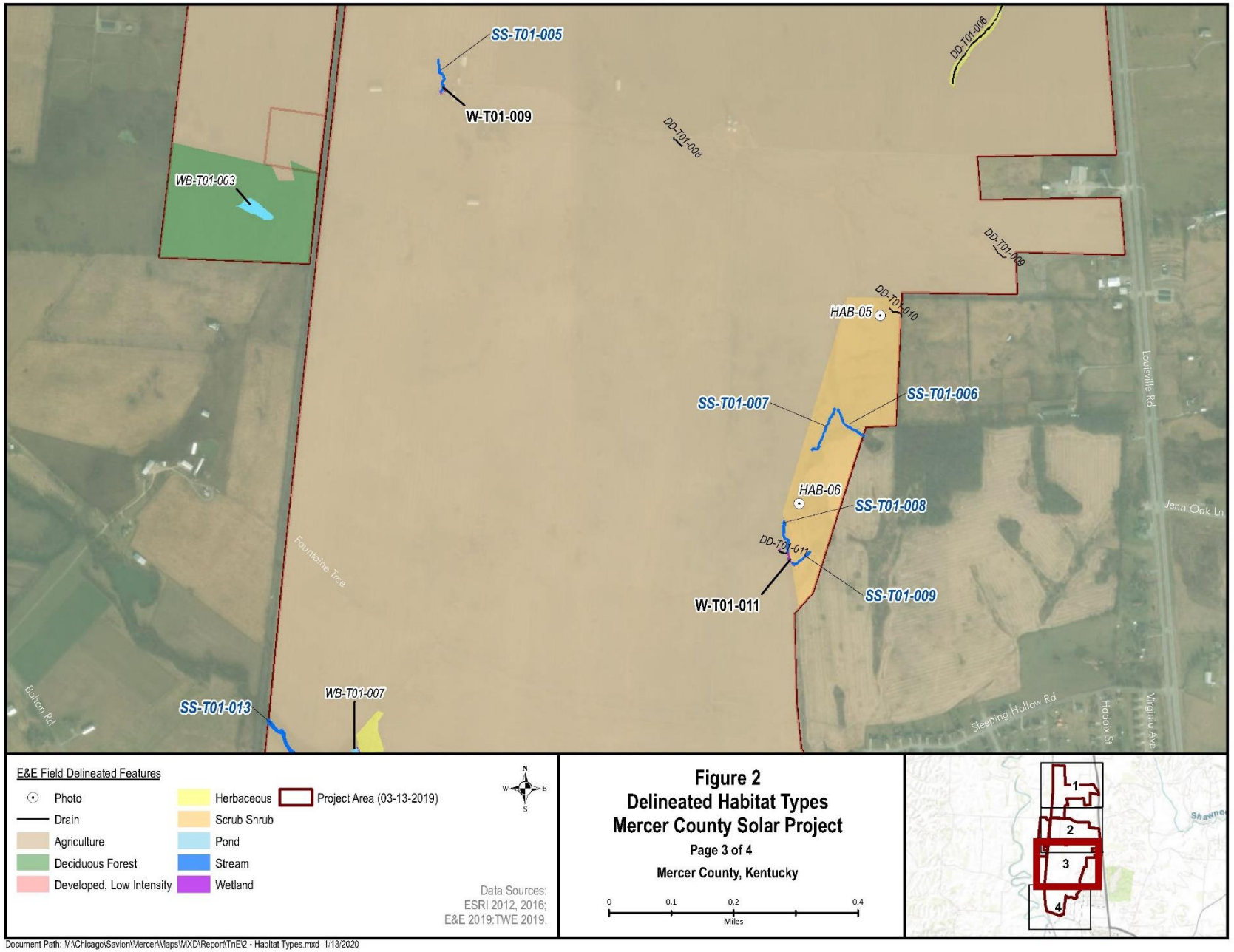
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SS-T01-006
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HAB-06
SS-T01-008
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DD-T01-011
W-T01-011
SS-T01-009
Fountaine Tree
Bohon Rd
SS-T01-013
WB-T01-007
Sleeping Hollow Rd
Haddix St
Virginia Ave
E&E Field Delineated Features
Photo
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Project Area (03-13-2019)
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E&E 2019;TWE 2019.
Figure 2
Delineated Habitat Types
Mercer County Solar Project
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Mercer County, Kentucky
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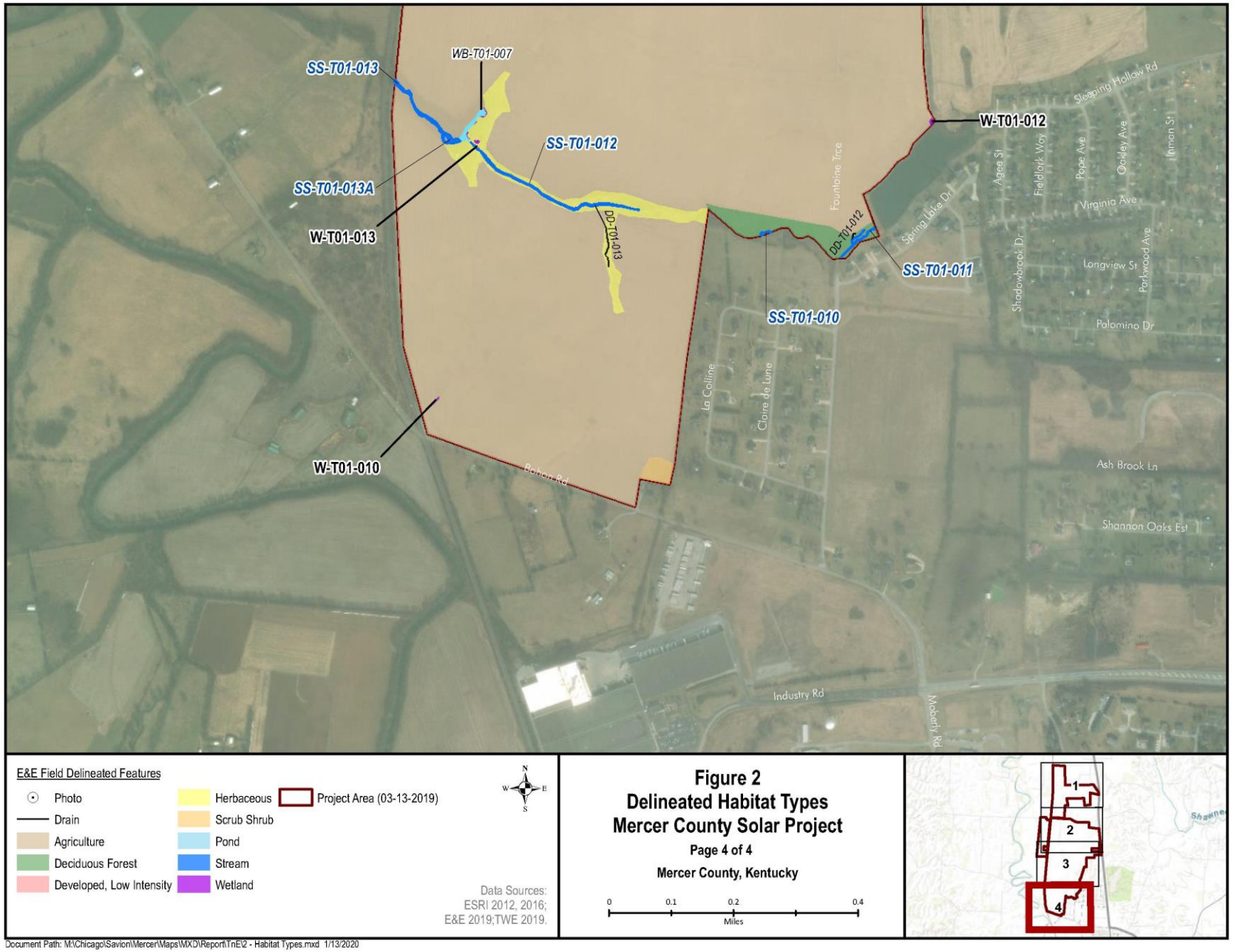

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Attachment B

Site Photographs

Photo Location: HAB-01
Date: May 21, 2019
Direction: West
Feature: Agriculture habitat within the Project area.

Photo Location: HAB-02
Date: May 21, 2019
Direction: North
Feature: Deciduous forest habitat within the Project area.

Photo Location: HAB-03
Date: May 21, 2019
Direction: East
Feature: Developed habitat within the Project area.

Photo Location: HAB-04
Date: May 22, 2019
Direction: West
Feature: Herbaceous habitat within the Project area.

Photo Location: HAB-05
Date: May 24, 2019
Direction: East
Feature: Scrub-shrub habitat within the Project area.

Photo Location: HAB-06
Date: May 23, 2019
Direction: West
Feature: PEM wetland, W-T01-006. Herbaceous wetland habitat within the Project area.

Photo Location: HAB-07
Date: May 23, 2019
Direction: East
Feature: Intermittent stream SS-T01-002, unnamed tributary to Salt River, facing upstream. Stream habitat within the Project area.

Photo Location: HAB-08
Date: May 22, 2019
Direction: South
Feature: Pond, WB-T01-004. Pond habitat within the Project area.